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Peter Zettinig

INVISIBLE ORGANISATIONS
Inter-firm Organisational Formation and Form

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1 INTRODUCTION

1.1 The Theme of this Study

Among the first answers a reader looks for when he or she opens a book is in response to the question of what kind of book it is. I would like to start answering this question by pointing out what this book is not.

This study does not have as an objective the creation of a *general theory of inter-firm organisational formation*. As I will show in my discussion later, I ascribe little success to such an attempt. This study is not concerned with giving guidelines to practitioners in terms of how to design and manage inter-firm organisations. Further, the author entertains no aspirations to produce a textbook, even though continuous discussion about alternative theoretical approaches occurs throughout.

This study should be regarded as a perspective. It is a perspective of rationales as to why firms perceive the need to engage in inter-firm organisations, and on the possible results of such activities. To this end, it uses an eclectic approach[1]. This path is taken because a number of fragmentations in the field of organisational and business research have occurred in recent decades. These fragmentations have split organisational and management studies into different schools of thought. Organisational studies, by their very nature, interest a number of different managerial disciplines. Departing from these disciplines, different schools have developed their own theories in organisational and especially in inter-organisational studies. Such schools of thought derive theories from disciplines such as sociology (e.g., Cook and Emerson, 1984), socio-technology (e.g., Callon, 1987), political science (e.g., Marin and Mayntz, 1991), economic geography (e.g., Storper and Harrison, 1991), entrepreneurship studies (e.g., Aldrich and Zimmer, 1986) and marketing (e.g., Mattsson, 1985)[2]. The approach taken in this study is one of integration, or as Grandori (2001) suitably puts it, *re-integrating what has always been interdisciplinary*. It follows the approach that was taken in the

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[1] An eclectic approach in the original meaning of the concept "eclectic" is defined as "selecting what appears to be best in different doctrines, methods or styles" and "composed of elements drawn from different sources". The definition of the word relies, like all other definitions of words in this study, on the Merriam-Webster dictionary (the continuously updated online version, 2002/2003).

[2] A more extensive review of influencing disciplines in the field of inter-organisational studies is provided in Möller and Rajala (2001).

1950s and 1960s by Herbert Simon, James March and James Thompson, who viewed administrative science as a distinct discipline that "should stand approximately in relation to the basic social sciences as engineering stands with respect to physical sciences or medicine to the biological" (Thompson, 1956).

This study should be regarded as an approach that goes beyond empirical observation. Beyond observation means that observed events do not serve as inputs for creating conclusions about inter-firm organisational formation and forms, but that logical concepts are created in order to arrive at a multiplicity of rationales. Consequently, conceptual deduction is the guiding methodological approach. The main reasons for not using observation are twofold. First, there is the basic criticism of inductive methods formulated by David Hume[3]. According to his philosophy, all observations are theory-laden. Therefore there is no such thing as pure observation. Because observation limits the conclusions that may be drawn about events observed in the past, there is little room for other ways of understanding current or future events. Such room is necessary, however, when the multiplicity of rationales behind the behaviour of people, firms and organisations is the subject of analysis[4].

The second reason is based specifically on criticism of the qualitative methods that are widely used in this type of research, the problem of generalisation. Because this study considers the multiplicity of rationales in social activity, the issues of interest are extreme and ideal types[5]. Extreme types, which serve as reference points, are highly unlikely to occur in qualitative research, and the explanatory nature of investigated types of behaviour would therefore be based on chance. Their explanatory value is thus limited, and the multiplicity of rationales cannot be discovered by pure induction.

This study should further be regarded as a study that is concerned with the emergence and self-organisation of socio-economic systems. The challenge in forming theories about social systems is complexity. Systems such as firms or inter-firm organisations are constituted by a number of elements. Interactions among related elements lead to a multiplicity of forms of behaviour of such social constructs. A strong influencing factor in terms of this study is thus well

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3 David Hume, the problem of induction, in Popper (1968).

4 In that context, Popper's criticism of historicism contributes to a better understanding (Popper, 1968). Future events cannot be predicted through past events. I cannot predict future product innovations based on observations and explanatory models of past product innovations.

5 Extreme types mark instances that are rarely if ever found. They serve as conceptual points of reference between actual occurrences. Many occurrences that fall between will not be qualified at either extreme, but as exhibiting each of the two traits to a certain extent (compare: Hempel, 1965). Ideal types, in contrast, are constructed types, which serve the purpose of explaining social and historical phenomena. They cannot be used as an ordering device.

summarised in Letiche's (2000) discussion of complexity theory, the principles of which are used throughout.

This short general introduction about what this study is not and what it is concerned with leads to the more specific topic elaborated in it. The firm embedded in its environment searches for organisational solutions for which inter-firm organisational formation is rationalised and from which organisational forms between firms are created.

The topic of the study is the firm, which is perceived as being controlled by its environment and which seeks to gain influence over environmental aspects in order to be able to determine the state of its future. It is about attaining desirable organisational outcomes that secure the survival and growth of the firm, and about the avoidance of undesirable outcomes that threaten this general goal achievement.

1.2 The Importance of the Study

One important question when working on a lengthy theoretical project is that of meaning and positioning in a larger context. Why is this study important? I consider it to be important in two ways. First, the general meaning of interactions between firms is a major issue that affects their management every day. Second, this research uses a holistic theoretical approach to investigating rationales and forms of inter-firm organisation, and it has the objective of providing a new perspective.

The practical importance pointed out above concerns the interaction between the firm and aspects of its environment. Dunning (1998) reflects on changes in market-based capitalism in recent centuries. The 17th to the early 19th centuries were characterised by a land-based economy as the primary source of wealth creation. Economic activity was strongly based on local and regional activity resulting from agriculture and forestry. Organisations had feudal and entrepreneurial structures, and the economic authority was decentralised.

The 19th and later 20th centuries saw machine- and finance-based manufacturing becoming responsible for the major creation of economic wealth. Regionally and nationally focused economic activities accounted for the biggest slice of economic wealth creation. In that form of market-based capitalism, the principle form of company organisation is based on generally adversarial economic relationships such as managerial structures and hierarchy-based constructs.

In the later 20th century, finance- and knowledge-based economies developed along spatial dimensions based on regional and global clusters. The

principal form of organisation in such economies is described as alliance or "*heterarchical"* (Dunning, 1998), indicating a shift in tendency from direct competition to more cooperative ways of generating economic activity.

These changes have been investigated by a number of authors. An alternative stream of thought, emphasising a third organisational paradigm, has been gaining popularity since the early 1990s.Networkshave been proclaimed to be the third "*ideal type*", alongside market and hierarchical organisation, for facilitating economic activity (e.g., Powell, 1990; Ernst, 1994, Galaskiewicz, 1996; Castells, 1996; Achrol, 1997; Achrol and Kotler, 1999). This intriguing idea has its foundation in the notion that networks are collections of separate firms that cooperate in order to facilitate economic activity in a finance- and knowledge-based economy. The cooperation between economic actors is the focus, and competition occurs mainly between rival networks of firms. This view, in my opinion, fails to qualify as an ideal type[6], however, because the definition of what is a network does not provide an exclusive description, as *firms* and *markets* do (Demsetz, 1991).

Different authors support the importance of inter-firm organisational studies. Blomqvist (1999) points out that globalisation, turbulent environments and fast technological change have resulted in increased interest in inter-firm cooperation. Teece (1998) states that firms have the need to develop new structures that facilitate entrepreneurial and innovative behaviour in order to be able to respond more quickly to environmental changes. Nohria (1993) characterises changes that benefit from inter-firm organisations as a "network of lateral and horizontal linkages within and among firms". Peter Drucker (1993) created the term "*network society*" to describe this phenomenon.Many researchers have been following different avenues in order to describe and explain types and mechanisms of what are called networks.

Empirical contributions illustrate the diversity this field of research provides. Upton and McAfee (1996) investigated inter-firm relationships in the airplane manufacturing industry in order to analyse networks that were based on developments made possible through improvements in information technology. Chesbrough and Teece (1996) review the history of the personal-computer industry, observe the consequences of outsourcing, and compare them with the degrees of centralisation of different organisational forms used by inter-firm organisations. Werther (1999) reviews industries such as the automotive industry to show how firms tend to locate non-core-competence activities outside[7].

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[6] An ideal type as defined by Hempel (1965)

[7] Further case studies, industry analyses and discussions illustrating organisational changes shifting towards different inter-firm organisational solutions in the automotive industry have been reviewed, including: Marx, Zilbovicius and Salerno (1997), Colins and Bechler (1997), Kochan

On the theory-building level, a number of conceptual studies have been contributing to the explanatory advancement of inter-firm organisation. As mentioned above, one problem is in the fragmentation (Grandori, 2001) in different schools of thought of a theoretical field that should be interdisciplinary. Barringer and Harrison (2000) agree with this position and call for the re-integration of the field of inter-organisational relationships. They investigated theoretical approaches to transaction-cost economics, resource dependence, strategic choice, stakeholder theory, organisational learning theory and institutional theory, and concluded: "*Although each paradigm alone is insufficient to capture the complexities of inter-organisational relationship formation, the fact that inter-organisational relationships can be justified from such diverse theoretical backgrounds is impressive*". Their suggestion for rapid advancement was to re-integrate different theoretical approaches. Beverland and Bretherton (2001) also support such an approach: "Despite a number of studies, there is still much to be learned about why alliances [inter-firm organisations] form and why they take forms they do".

Nevertheless, another perceived shortcoming in inter-firm organisational studies in addition to fragmentation is the way rationality is dealt with. Many approaches (e.g., Contractor, 1986; Contractor and Lorange, 1988; Ring and Van de Ven, 1992; Varadarajan and Cunningham, 1995) classify rationales for inter-firm organisational formation in lists of reasons. For instance, Oliver's (1990) study identifies six critical contingencies of network formation: a) the necessity to meet legal or regulatory requirements, b) asymmetry in terms of exercising power over another firm's resources, c) reciprocity in the pursuit of mutually beneficial goals, d) efficiency, e) counteraction to environmental uncertainty, and f) legitimacy in establishing status or presence. The current study avoids classifying single rationales, and instead seeks a framework for identifying what is capable of capturing a multiplicity of them.

Because a study like this should be important not only to the world, but also to the author, my personal motivation should be mentioned. It may be useful for the reader to understand how this approach emerged. From a personal point of view, this theoretical field is interesting because of an early fascination with virtually organised firms, and because of different events that took place in my professional life as a business developer. I have discovered that a large proportion of business success derives from rationalising and designing organisations between firms.

(1997), Bidault, Despres and Butler (1998), Senter and Flynn (1999) Proff (2000), Noori and Lee (2000) and Okamuro (2001).

The initial focus of the study goes back to 1997 when I was interested in the phenomenon of virtual organisations. I found in Davidow and Malone's (1992) book on *virtual corporation* that different changes in corporate strategy facilitated by developments brought through the Internet, for instance, have contributed to perceived changes in organisational design and work. The visible parts of the phenomenon rest on observations of increasing organisational disintegration and activities concerned with outsourcing. Given such influences, and on the basis of working experiences in the automotive industry, the medical-service industry and the information-technology industry, and discussions with business managers, a number of articles have been written and presented in academic and business conferences (e.g., Zettinig, 1998; Hansén and Zettinig, 1999). Further, a number of trends (Zettinig, 2001) have been investigated that appeared to have influenced the establishment of cooperation between individuals, firms and institutions, and such trends have strengthened the view that the virtual corporation is forming. Acknowledging that my previous knowledge in marketing, international marketing and international management does not provide all the tools necessary to investigate the phenomenon satisfactorily, I ventured out in order to study the *nature of the firm*, from the economics perspective as a starting point (e.g., Curwen, 1976). Further insights have been acquired through studying different branches of *organisational theory,* including classical theories, behavioural theories, systems theories and contingency theories with their ramifications and overlapping into other fields of social science concerned with what an organisation consists of and does (e.g., Hodge and Anthony, 1988). Through the study of diverse fields concerned with the matter at hand, interesting approaches were identified, and a rather high level of confusion was generated when I started learning about the "*third paradigm*" (Achrol, 1997; Achrol and Kotler, 1999). This approach promotes the view that a third ideal type exists alongside the firm and the market(Powell, 1990). It has found many supporters (e.g., Ernst, 1994; Galaskiewicz, 1996; Castells, 1996), and triggered a new wave of network studies in the scientific arena. As I became acquainted with Williamson's (1975) writings about the market and hierarchies, and with his reflections on the transaction-cost approach, I began to get the idea that there is an "*invisible swing of a pendulum"* that iterates between the market and the hierarchy paradigms. When I compared this with developments in different industries such as computer manufacturing and automobiles, it appeared that the pendulum was behaving like *some kind of trend,* stopping either closer to the *market ideal type* or to the *hierarchy ideal type* for organising economic activity. Given such considerations, I recognised that this was hardly a rationale for a third paradigm, nor were there signs of thereby establishing a framework that would manage to satisfy a midrange

theory level (cf. Pinder and Moore, 1979) for virtual corporations. Instead, the idea developed that the market and the hierarchy as ideal types were constructs of the human mind (cf. Hempel, 1965) rather than natural occurrences, and useful ones at that. The proclaimed third paradigm, or in other terminology virtual corporations or networks, faded as the original subject of interest. It did not appear to serve any purpose to have a third ideal type since it could not justify the same usefulness that market and hierarchy paradigms establish. It became clearer that the range of possibilities must be a form of continuum or space in which to find solutions for alternatives to markets and hierarchies. At the extremes are the established ideal types, and between them a number of organisational constructs that are either closer to the market or closer to the hierarchy (cf. Demsetz, 1991). In accepting that perspective I was looking for recorded evidence, or at least descriptions, of organisational forms that are neither transactions performed by markets nor economic processes facilitated by firms. A number of classifications, most of them more accurately defined as typologies, have been studied and investigated, and different definitions of organisational constructs between business firms were considered. The result was that most of the accessible literature suggested descriptive models (e.g., Ernst, 1994; Achrol, 1997), a few shared the frameworks approach (e.g., Grandori and Soda, 1995; Colombo, 1998), and many went on to define single organisational models created between business firms (e.g., Chesbrough and Teece, 1996; Werther, 1999). The conclusion was that there was no establishment of a new paradigm, but that a number of different organisational innovations were taking place. Therefore the focus of the study altered. The conclusions from this search for new ways of organising led to the decision to focus on fundamental elements that are important to firms. In their multiplicity, these allow consideration of possible inter-firm connections, rationales and new organisational forms.

To conclude this section, I suggest that the importance of this study is illustrated through the number of different approaches adopted. A general historic review of socio-economic development over the centuries provides a better understanding of how the diversity of economic interaction emerged. The current interest in networks and in their interpretation by a number of authors is discussed in order to point out the tensions that exist in this field of research. Some studies are mentioned that pinpoint the overall trends, and some empirical research is described that investigates certain dimensions of inter-firm organisational studies leading to a number of theoretical avenues that deepen the fragmentation. I will close this section with the thought that my personal approach to this subject also facilitates a better understanding by the reader of why certain choices are made.

1.3 Objectives

Having discussed the importance of this study, I will now move on to the research objectives. As I pointed out above, the study is meant to provide perspectives that are based on understanding the formation rationales of inter-firm organisations and the resulting forms that are outputs. Consequently, it has two distinguishable but closely interrelated research objectives. The first one is to arrive at a high level of understanding of the rationales behind inter-firm organisational formation. The corresponding research question is simply:

> *"Why do firms enter inter-firm organisations?"*

This research question is not new per se. I am aware of a large number of research projects with the same objective (e.g., Varadarajan and Cunningham, 1995). In drawing a demarcation line between other studies, I would like to stress that my approach follows the principles of complexity theory.

The second research objective is to understand the dimensions that influence the multiplicity of organisational forms that facilitate economic behaviour between firms. This objective is not a quest to devise descriptions or explanations of what a strategic alliance, a joint venture or a reciprocal transaction is. It is rather to formulate a framework of concepts that explain different dimensions, their elements and natures with the multiplicity of possible organisational solutions that derive from their interrelationships. The research question that simplifies the practical pursuit of this objective is the following:

> *"Which organisational forms are used between firms in order to facilitate economic activity?"*

This research attempts to draw a framework that builds on understanding the basic concepts that are inherent in any organisation. It is an attempt to create a label-free discussion on the possible differences between inter-firm organisational forms. By so doing, I aim to create perspectives that avoid certain shortcomings that are present in academia and in practice. This leads to the implications for these two fields to which I hope to contribute.

The theoretical implications of this study concern the re-integration of concepts that are valuable in promoting a better understanding of the rationales of firms engaging in inter-firm organisations, and of the foundations of the organisational solutions that distinguish them. Hence, the study follows the calls of Barringer and Harrison (2000) and Grandori (2001) to overcome

fragmentation in the field of inter-firm organisational studies. Nevertheless, it should be viewed as a new departure rather than a ready-made meta-framework. Therefore constructive criticism of the generated frameworks is extremely important if we are to advance in such a new direction.

The contribution this study is intended to make to managerial practice is to provide a better understanding of interrelationships of factors and to draw possible solutions that facilitate the firm's goal achievement. In this it directly responds to a request made by business consultants for the development of new strategic tools[8]. It is an academic work, however, and its appeal to managers will therefore be indirect rather than direct.

1.4 Theoretical Antecedents

1.4.1 Complexity Theory

As mentioned above, complexity theory provides the means to launch this alternative perspective for understanding inter-firm organisational formation and form. The "*complexity approach*" has regained popularity during the last decade, probably because of Lewin's (1993) book "*Complexity – Life at the Edge of Chaos*". Earlier development of the theory in its philosophical form originated from the philosophy of Bergson (e.g., 1932). While Lewin (1993) has inspired managers and consultants to think about emergence and self-organisation, the academic counterpart is strongly represented by Letiche (2000), who builds on Bergson's philosophy in order to develop a research agenda for organisational studies that are concerned with complexity theory. The interest of practitioners in this approach is the thin line between stability and predictability in static systems, which opposes the "*non-order*" and unpredictability of chaos. Complexity, or the "*edge of chaos*", is assumed to represent the zone in which systems and organisations adapt, learn and grow most: nothing changes in conditions of stability and too much changes in conditions of chaos, and therefore no adaptation takes place. Complexity has interested managers on the grounds of an inherent maximum potential for growth. Lewis (1994) describes this thin zone of complexity: "*Chaos theory has led to the understanding that complex systems are by their very nature incapable of being predicted. It is impossible, for example, to say what the weather will be like in ten days hence. This is not because physical laws do not*

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[8] McKinsey Consulting promotes the search for a complexity-based micro-economic model that especially focuses on dynamism, evolutionary principles and a realistic model of how humans make decisions in order to arrive at new solutions for "*complex-adaptive systems*". See: McKinsey Consulting (2002).

apply – they do". Keene (2000) writes, "*The dominant organisational paradigm remains wedded to scientific management, which reflects a philosophy that remains committed to a need for control and prediction. Complexity theory on the other hand tells us that the desired order managers seek through control is in fact the very outcome of change and uncertainty and will come to pass irrespective of our efforts to control and direct*".

The idea of using the principles of complexity theory as the guiding approach in this inter-organisational study was supported following a review of the ideas and rationales that lie behind it. The principles applied here are broadly consistent with the treatment by Letiche (2000), who returned to Bergson's (1932) philosophy of *Durée*, *Élan Vital* and *Intuition*.

In emergence (Letiche, 2000), the whole is more than the sum of its parts. Emergent qualities are realised when self-organisation transcends the elements from which it has developed. Complexity theory recognises that human existence is an open system characterised by a constant process of complexification. Progress to higher levels of organisational and social complexity is continuous. Complexification poses a challenge in terms of rethinking social science – future development cannot be accurately predicted from the nature of its constituent parts if self-organisation really produces qualitative changes in systems. Traditional concepts and research paradigms only suffice as long as a higher level of organisation than the one to which they refer is not achieved. Scientific laws can only apply to defined and consistent universes. If the universe being studied changes so radically that it substantively becomes a new universe, then old laws no longer apply. Change introduces plurality or contingency if the systems under study have different identities before and after emergence (Letiche, 2000).

The study of the formation of inter-firm organisation and the resulting inter-firm organisational forms requires making choices concerning elements that provide rich explanations. Such elements are linked through cause-and-effect relationships, which occur in open social systems, so that explanations of their systemic outcomes can be provided. Nevertheless, the prediction of certain outcomes in complex systems cannot be produced in terms of *characteristica universalis* (Letiche, 2000). What can be provided is an explanatory path leading to a multiplicity of rationales and forms, and bifurcations[9] of behaviour. Complexity theory, with its concepts of "emergence" and "self-organisation", contributes to such a view.

[9] Bifurcation is the process of dividing into two parts or branches.

1.4.2 The Enactment Process

The focus of interest in this study is on firms and interactions between firms. Therefore, another important concept is introduced here. Karl Weick (1979) provides valuable explanations about firms and organisations as collections of organised individuals who make individual and collective sense out of their realities. Weick (1979) explains this process as an "*enactment process*" in which meaningful environments are outputs of organising, not inputs to it. Weick (1979) describes the term enactment as representing the notion that when people act they bring structures and events into existence and set them in action. The process of enactment involves two steps. First, preconceptions are used to set aside portions of the field of experience for further attention, in other words, perception is focused on predetermined stimuli. Second, people act within the context of these portions of experience guided by their preconceptions in such a way as to reinforce them. Hence, attention to certain stimuli will guide subsequent action so that the stimuli are confirmed as important. The result of the process of enactment is the enacted environment (Weick, 1979), which comprises "*real"* objects, but their significance, meaning and content will vary. These objects are not significant unless they are acted upon and incorporated into events, situations and explanations. Thus the enacted environment is a direct result of the preconceptions held by the social actor. It is internalised by social actors as the way in which actions have led to certain consequences. It is therefore analogous to the *concept of schema*[10] and is the source of expectations for future action (Weick, 1988). An enacted environment is "*a map of if-then assertions in which actions are related outcomes*" that in turn serve as expectations of future action and focus perception in such way that these preconceived relationships will be supported. The importance of the notion of enactment is that it provides a direct link between individual cognitive processes and environments. This is especially interesting in this study since it links the perspective of the firm, the perception of the environment and sense making concerning future actions. It provides an understanding about the *sense-making* component of decisions that lead to the formation of an inter-firm organisation.

[10] Bartlett (1932, 1958) is credited with first proposing the concept of schema. He arrived at the concept from studies of memory he conducted in which subjects recalled details of stories that were not actually there. He suggested that memory takes the form of schema that provide a mental framework for understanding and remembering information.

1.4.3 Firms' Attitudes

Another element in this linkage between the firm, its perception of the environment and the actions that follow is an attitudinal one. The attitude of management has implications for the formation of rationales and for the form of inter-firm organisation. Entrepreneurship studies are engaged in related research. Machovec (1995), for instance, proposes integrating economics with general organisation theory in order to draw a more realistic picture of how markets work. The role of knowledge, uncertainty and most importantly the entrepreneur should be stressed most in such an approach. This is directly linked to the Austrian School of economics and organisational theory. One of the core concepts of the Austrian School is the concept of uncertainty: in the "… *market process*" (e.g. Kirzner, 1997), "*search, risk taking, and discovery through interacting with other market participants*" are emphasised (Hayek, 1945). The entrepreneurial-minded firm attempts to reduce or neutralise environmental constraints (Machovec, 1995) by discovering new knowledge[11] through interaction with others (Hayek, 1945; Kirzner, 1997). Chandler (1962) found that the development of US industry was driven by the search for new market opportunities, which supports the propositions of the Austrian School. At the same time, it provides a counter-position to the uncertainty-avoidance proposition inherent in the *resource-dependence approach* (e.g., Pfeffer and Salancik, 1978). It is vital to consider such different positions concerning the nature of *uncertainty* when developing frameworks of the multiplicity of rationales and behaviour. "*Pure*[12]" positions are realistic propositions about driving attitudes of people in firms and organisations and the existence of such differences can contribute to identifying opposing extremes or ideal types of attitude. Attitudes influence firms' rationales in the formation process of inter-firm organisation, and ultimately also influence the organisational forms jointly implemented with other firms.

Given these considerations and the theoretical and philosophical backgrounds described in the above, the level of investigation needs to include the following spheres: (1) the firm with its internal nature and attitudinal orientation; (2) the environment in which the firm is embedded with its structural and relational elements that form bases for uncertainty perceptions; and (3) the resulting forms of organisation between firms engaging in inter-firm organisations.

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11 In this study I wish to emphasise resources in general and not only knowledge.

12 Cf. Hempel (1965).

1.5 Methodological Approach

Inter-organisational studies are conducted in order to develop theories that are useful for managers dealing with related issues. In order to qualify as a science, a set of theories has to be developed around the focal point of inter-organisational issues, and such theories have to apply scientific methods (Hunt, 1983). A theory needs to satisfy the condition of systematically relating statements that serve as law-like generalisations that can be empirically tested in order to explain and predict phenomena (Hunt, 1983). According to Letiche (2000), prediction is difficult to achieve in social systems when a substantial qualitative change alters the universe under investigation so that scientific laws no longer apply. The argument is that explanations of interrelationships among concepts provide a better understanding of potential future developments.

As mentioned at the beginning of this chapter, this study is not concerned with the creation of a general theory of inter-firm organisation, but should be regarded as taking a holistic perspective incorporating a multiplicity of rationales. It is therefore a departure in a direction that eventually generates a theory of inter-firm organisational formation and outcomes. A broader discussion of theory building is necessary before this road map is arrived at.

1.5.1 Theory-building Requirements

A theory should be evaluated according to the meta-theoretical criteria of syntax, semantics and pragmatism (Sheth, Gardner and Garrett, 1988). The criterion of syntax or the organisation of the theory includes its structure, which should incorporate a network of definitions that are integrated into a nomological network. Syntax also includes the criterion of specification, thus excluding relationships between theoretical concepts that delimit the hypothesis in order to provide a contingency framework. Semantics, the relationship of the theory with reality, consists of the criteria of testability, or preciseness of definition in order to make it operational, and empirical support - in other words the degree of confirmatory evidence. The criterion of pragmatism, which reflects the relevance of a theory, is fulfilled by the criteria of richness, or to what degree it can be generalised, and simplicity, or the ease with which it can be communicated.

Dubin (1969) summarises five requirements for a theory: (1) it allows predictions or increased understanding; (2) it is interesting; (3) it includes attributes or variables and their interactions; (4) it does not include “composite” [undefined] variables; and (5) it includes boundary criteria.

Given these requirements, three different blocks of tasks in theory building can be identified. The first set of tasks is the description of the phenomenon, followed by explanation and the testing of the theory. The iteration of the cycle of description, explanation and testing leads to theories and thus contributes to science. Meredith (1993) states that this cycle of theory building is often short-circuited through the skipping of one of the stages. For instance, research is carried out between the stages of description and testing, and the explanatory stage is left out. This means that frameworks and theories are never developed to produce non-explanatory models that are like "black boxes", which simulate or replicate reality. Managers are then unwilling to accept the results of the models because they would rather live with a problem that they understand than accept a solution that they do not understand (Meredith, 1993). Science very often iterates between the explanation and the testing stages with solutions that are prescriptions from the "ivory tower". Over time these are disconnected from reality and thus become irrelevant for managers.

This study has the primary aim to create an explanation for the multiplicity of rationales in the inter-firm formation process and the subsequent organisational results. The phenomena are described throughout the text by inserting descriptive illustrations that help to relate to the issues in question. The iteration circle that is required to produce a general theory is therefore not closed, and needs empirical testing in order to provide falsification for statements that are not valid.

1.5.2 Conceptual Methods

I apply conceptual methods in this research on inter-firm organisational formation and forms. In order to pinpoint the different approaches, it would seem necessary to provide an overview of methodological choices. Meredith (1993) described a hierarchy of conceptual research methodologies. The first level contains conceptual models, followed by conceptual frameworks and, finally, theories.

The difference between the levels of conceptual methods is not in their degrees of complexity, but in the degree of explanatory power (Meredith, 1993). While conceptual models do not attempt to explain the phenomenon, they may be very complex. Meta-frameworks, in contrast, possess a high degree of explanatory power and are therefore more relevant to managers. The different methodologies described in Figure 1.1 provide conceptual solutions, but only meta-frameworks satisfy all five requirements set by Dubin (1969) for consideration as a theory.

The most basic conceptual methodology is *conceptual description*. It does not explain a phenomenon, but rather describes the relevant elements and relations. *Taxonomy* is the science of classification (Hempel, 1965). Through the creation of classifications, interesting issues are brought into the picture on the basis of which further research can be conducted. Classification, like conceptual description, is not intended to explain relationships of elements of a phenomenon (Meredith, 1993). Classification has an important role in this study. It allows for the creation of ideal types and it assumes extreme types. Ideal types[13] are theoretical constructs that are not used for the kind of generalisation that is characteristic of ordering types; rather they are invoked as a specific device for the explanation of social and historical phenomena (Hempel, 1965). They are therefore used for advancing concept formulation in sociological research. Max Weber (1922) interprets them as being derived from "nomological knowledge", conveyed from our own experience and from our knowledge of the conduct of others. Extreme or pure types, on the other hand, are concrete instances, which are rarely if ever found (Hempel, 1965). The difference between ideal and extreme types is in the "*ordering quality*". Extreme types, even though they are rare in reality, mark end points of natures or behaviours. Therefore they can be used in the ordering of other occurrences in between that contain some of the characteristics of each extreme type. They facilitate the assumption of a relative position of occurrences in observations. Ideal types, on the other hand, are theoretical constructs with an explanatory purpose.

In this study I use these two types of methodology for illustrating positions and for explanatory purposes. Through the use of deductive methods I attempt to construct ideal types and to provide a range of logically possible types with assumed qualities of extreme types. Taxonomic methods have been proposed as a solution for arriving at a higher theoretical order in organisational research. Pinder and Moore (1979) argue that, by applying taxonomic methods such as phenetics and phyletics, found in the natural sciences, it is possible to devise general theories[14]. "*Eventually, it might be possible to develop higher order theories based on a more complete understating of the organisational relationships between groups, and the detection of similarities of phenomena and relationships across groups*" (Pinder and Moore, 1979). In their view, it is a question of arriving at mid-range theory levels by clustering similar organisations in which certain characteristics are common. From these mid-

[13] Howard Becker calls ideal types constructed types in order to point out the difference from extreme types (Becker, 1950).

[14] McKelvey (1982) also proposes using taxonomic methods in the search for higher-order theories in organisational research. He distinguishes between four main methods: nominal, essential, phenetic and phyletic, each with their respective philosophical backgrounds.

theoretical clusters a higher-order mid-range theory may be created by again sorting similar characteristics of clusters into a higher-order cluster. Eventually, after repeating this several times, a general theory would result[15].

As mentioned above, taxonomy is considered important in this study, with certain limitations. The first limitation, in the organisational context, is that I do not see the need for an evolutionary process from which different ramifications of organisational forms spring. My position here is that firms may make quantum leaps in organisational development, and eventually come up with completely new solutions without going through an evolutionary phase. Second, by restricting the classification to observable events in inter-organisational formation and form, degrees of insight are getting lost because many organisational innovations might not fit into such classifications, or the classifications may not provide classes to capture such forms. Therefore I use taxonomy for forming ideal and assumed extreme types, and as ordering mechanisms that allow a systematic order of dimensions, elements and natures and their interrelationships. By taking this path I aim to arrive at explanatory relationships of organisational elements that go beyond empirical observation, and to provide an understanding of future formation rationales and forms of inter-firm organisation.

The next class in Meredith's (1993) classification of conceptual methods is *philosophical conceptualisation*. This is a theory-building method that is the product of inductive philosophical reflection. It integrates a number of different scientific studies centred on the same phenomenon, and summarises the common elements, points out the differences and extends the line of argumentation. On the creative level, philosophical conceptualisation creates new connections between phenomena that were formerly not known to belong together. Ladd (1987) describes this process as being based on the diversity of knowledge, experiences and interests, which form a necessary condition for initiating the development of innovative research. Koestler (1964) termed this approach "bisociation", or the creative act of combining what was formerly not known to be connected.

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[15] Jeffrey (1968) explains in this context his movement from "*special purpose*" to general purpose, or as he calls it, "*natural*".

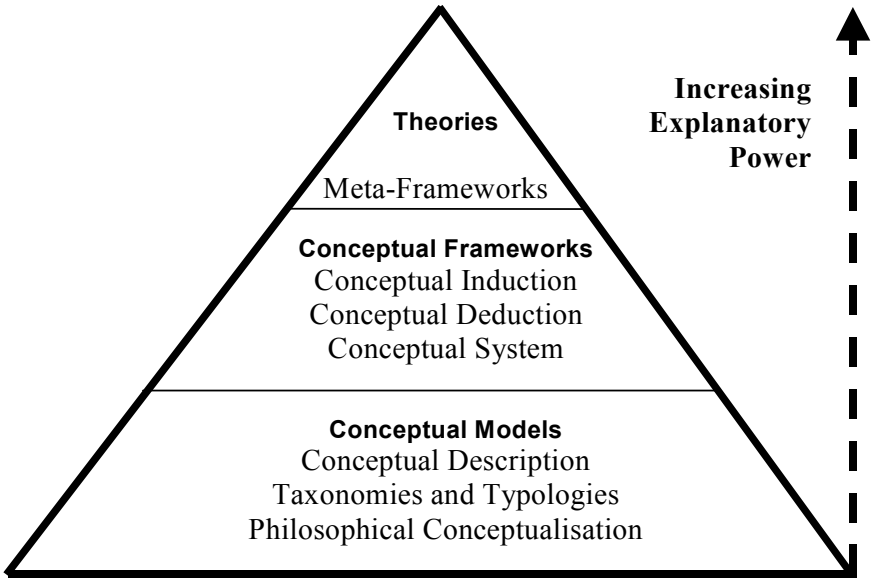

Figure 1.1 Types of Conceptual Methods (Adapted from Meredith, 1993)

Conceptual research within conceptual frameworks utilise three different approaches. The first is *conceptual induction*, the analysis of a number of occurrences of a phenomenon in order to infer the nature of the system or treatment that produced them (Meredith, 1993). This method has the objective of explaining a phenomenon through the relationships observed between its elements. It is a basic attempt to simply interpret the "system", explicit rules of which have never been explicated.

The second methodology in the higher order of explanation in conceptual methods, *conceptual deduction*, creates a framework that has the power to predict. The nature of the framework is such that it can be compared with reality, and it may provide guidelines for managers (Meredith, 1993)[16]. Two types of deductive method are frequently distinguished. Logical, or as it is often called, mathematical deduction produces a mathematical model that provides conclusions by algebraic manipulation. The advantage of this method is that it minimises the chance of error by its use of mathematical language rather than verbal expressions. A further advantage is that it avoids *bounded rationality* (Simon, 1972) and computational errors. The second deductive method is the conceptual method based on intuition. The big advantage of logical deduction is that emergent concluding formulae are often non obvious and therefore unlikely to be revealed purely by intuition. The problem with it is that it has limitations in terms of complexity. In that case, intuitive

[16] An example of the use of conceptual deduction is Hayes and Wheelwright's (1979) "*Product-Process*" Matrix.

conceptual deduction could be applied in reaching common-sense conclusions in order to provide a second-best alternative. In this study I rely on intuitive conceptual deduction based on its advantages for complex systems. Criticism of this method is based on weaknesses concerning subjectivity, bounded rationality and proneness to error. The objective of my study is to devise an explanatory framework[17] that is facilitated by this method[18].

The third method in this class, the *conceptual system,* is characterised by the many interactions and interrelationships occurring among the elements of the conceptual framework. This system consists of a set of concepts with many interrelated propositions. It is typically as complex as a theory, but fails to satisfy at least one of Dubin's (1969) requirements (Meredith, 1993). The advantage of applying conceptual-system methodology is based on its power to transcend disciplinary boundaries and achieve the re-integration of this theoretical field. This methodology seeks isomorphism among the philosophical principles, applied concepts and laws that exist in various realms. At the same time, this justifies my use of this methodology in establishing relationships between concepts that originate from different theoretical approaches.

Theories are found on the highest level of scientific explanation (Figure 1.1). They satisfy all of the requirements set by Dubin (1969), and may be as straightforward and simple as a framework. Examples of theories that fulfil all scientific requirements are the theory of motivation and hygiene developed by Herzberg et al. (1959) and Maslow's (1970) theory of human needs. Meta-frameworks, the conceptual methodology leading to theories, is the compilation and integration of previous frameworks without creating a contingency framework that allows composite variables, and by defining clear theoretical boundaries. An example is Gerwin's (1988) theory of technology adoption, in which he integrates the three frameworks concerned with adoption, preparation and implementation, identifying their interactions, eliminating all composite variables and delimiting the boundary of theoretical application.

The methodological tools I use in this study are based on three conceptual methods: (1) conceptual deduction, in order to devise frameworks that can explain different rationales of inter-firm organisational formation; (2) taxonomic methodologies, in order to generate an organised systematic framework that provides an order of inter-firm organisational forms; and (3) conceptual systems, which allow the integration of different bodies of

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[17] Explanatory theory: this approach is also known as the Machlup (1955) approach.

[18] Logical deduction, on the other hand, facilitates "*predicitonal theory*", which constructs an unknown explanandum by logical deduction. It is also known as the Friedman (1953) approach.

knowledge into a systemic framework of inter-firm organisational formation and form. The use of these methods facilitates the building of a system of statements that tackle the intertwined questions of inter-firm organisational formation and the resulting forms. The statements concern selected dimensions and elements, which are discussed in terms of their natures and then related to each other. This contributes to the research objectives by holistically explaining rationales and solutions for inter-firm organisation. The question of validity is closely related to the deductive nature of the study. Tackling the research problems in a holistic way leads to the creation of a system. Therefore the concepts used have to be rigorously delimited in order to avoid linguistic misinterpretation. Cause-and-effect relationships are drawn that lead to a system comprising a number of bifurcations that allow the capturing of alternative explanations or a multiplicity of rationales and forms for inter-firm organisations. Validity, therefore, other than in studies that measure occurrences, is provided by the rigorous definition and systematic interrelationships of concepts.

1.6 Organisation of the Study

This section is significant in that it introduces the reader to the different chapters of this monograph. By outlining and connecting the different clusters of topics I hope to give an *a priori* overview of the direction and content of the study (Figure 1.2 provides a graphic overview of the study design).

The current **Chapter one** is designed to inform the reader about the relative position of this study in an inter-organisational context. By setting out the research questions and objectives with a view to providing an alternative perspective on inter-firm organisational formation and form, I am endeavouring to sensitise the reader to this approach. The theoretical antecedents serve to introduce the philosophical and mental background of this study in combination with the methodological choices that facilitated my investigations.

The **second chapter** prolongs my efforts to sensitise the reader to the subject of the study. The inspiration for the style of this chapter derives especially from Penrose's (1959) and Pfeffer and Salancik's (1979) books, which introduce the reader to the "*world*" of their studies, and which at the same time define and delimit the *universe of discourse*. I consider this to be important in this conceptual study because it defines basic concepts that are widely used in common and scientific contexts. This invites the reader to share the same understanding of the concepts, and by doing that I attempt to pre-

empt misunderstandings later in the systemic treatment. The following concepts are discussed and defined throughout this chapter.

The *firm* as a concept is defined in order to arrive at a common understanding with the reader. Most critically, the role of the goal-setting process is discussed, and some effort is made to define the most basic goals of firms. These definitions are important since there are so many different points of view from different schools of thought about the nature and the top priorities of the firm.

This study is concerned with the firm on the one hand, and with a construct of a higher class, the *organisation,* on the other. It therefore includes a section defining the organisation and the systemic view according to which it is analysed. This section provides a basic understanding of the organisation in its role of coordinating and facilitating cooperation among subsystems.

In order to define the higher system of which the organisation is part, the embedded nature of the *firm in its environment* is reflected upon. This chapter provides a basic systemic view of organisations, and defines certain concepts such as the nature of resources. These definitions occur throughout the book. What is also essential is the discussion about different aspects of the environment, and how the stakeholders of an organisation make sense of their role in it. This section ends with a short verbal illustration that introduces the reader to the challenges of firms dealing with their environments in order to satisfy top-level organisational goals.

The final section of Chapter two introduces and defines the spheres that are created between firms – *inter-firm organisation*. A rationale is provided for using the term inter-firm organisation per se, and different behaviours of firms and markets are described to justify positioning it in a larger context. One part of this section comprises a review of inter-organisational research that provides different approaches to describing, explaining and understanding inter-firm organisational behaviour.

Beginning with Chapter three, the research objectives guide the further processes. Chapters three to five especially explain inter-firm organisational formation. Chapter six builds explanatory and classification frameworks for inter-firm organisational forms. The seventh chapter pulls together the concepts in order to illustrate one of the findings, that the rationales for inter-firm formation determine inter-firm organisational forms.

The aim in Chapter three is to build an understanding about the nature of the environment from prior discussions and descriptions by different authors. The purpose is to derive dimensions and elements that originate in the environment of the firm and influence its formation rationale and behaviour. From these discussions, and especially from Pfeffer and Salancik's (1979) original "outside dependence" approach, I reach conclusions about

environmental issues that provide the rationale to trigger the formation or alteration of inter-firm organisations. This chapter deals with important issues such as interdependence, in the context of which I create an "ideal type" of classification of interdependencies. It is this taxonomic tool in particular, and the final systemic view on structural and relationship elements found in the environment, that are crucial for any further investigations.

Chapter four is the counterpart to the previous chapter dealing with the firm's outside influencers. It provides reflections on different chosen characteristics of the firm. This offers an alternative, firm-based approach to understanding the rationales behind inter-firm organisational formation. Analysing the dimensions of goal setting, resource specificity, specialisation, company boundaries and adaptation offers a systemic internal approach that provides rationales for inter-firm organisational formation from this point of view.

Chapter five integrates the previous explanatory attempts by building a bridge between environmental uncertainty and the perceptions and attitudes of the firm. It offers a systemic explanation of the firm's needs to adjust to the environment, which leads to inter-firm organisational formation and ultimately to different organisational forms.

Chapter six deals with the question of the diversity of inter-firm organisational forms. It derives its conclusions from the formation rationales discussed in Chapters three and four, and builds on deductively established dimensions of inter-firm organisations. The chapter promotes understanding of the different mechanisms that are considered crucial in inter-firm organisations, and which could lead to the establishment of possible inter-firm organisational forms. The resulting forms are logical possibilities with the power to provide insights for managers in designing effective and efficient forms of organisation that allow economic activity between firms.

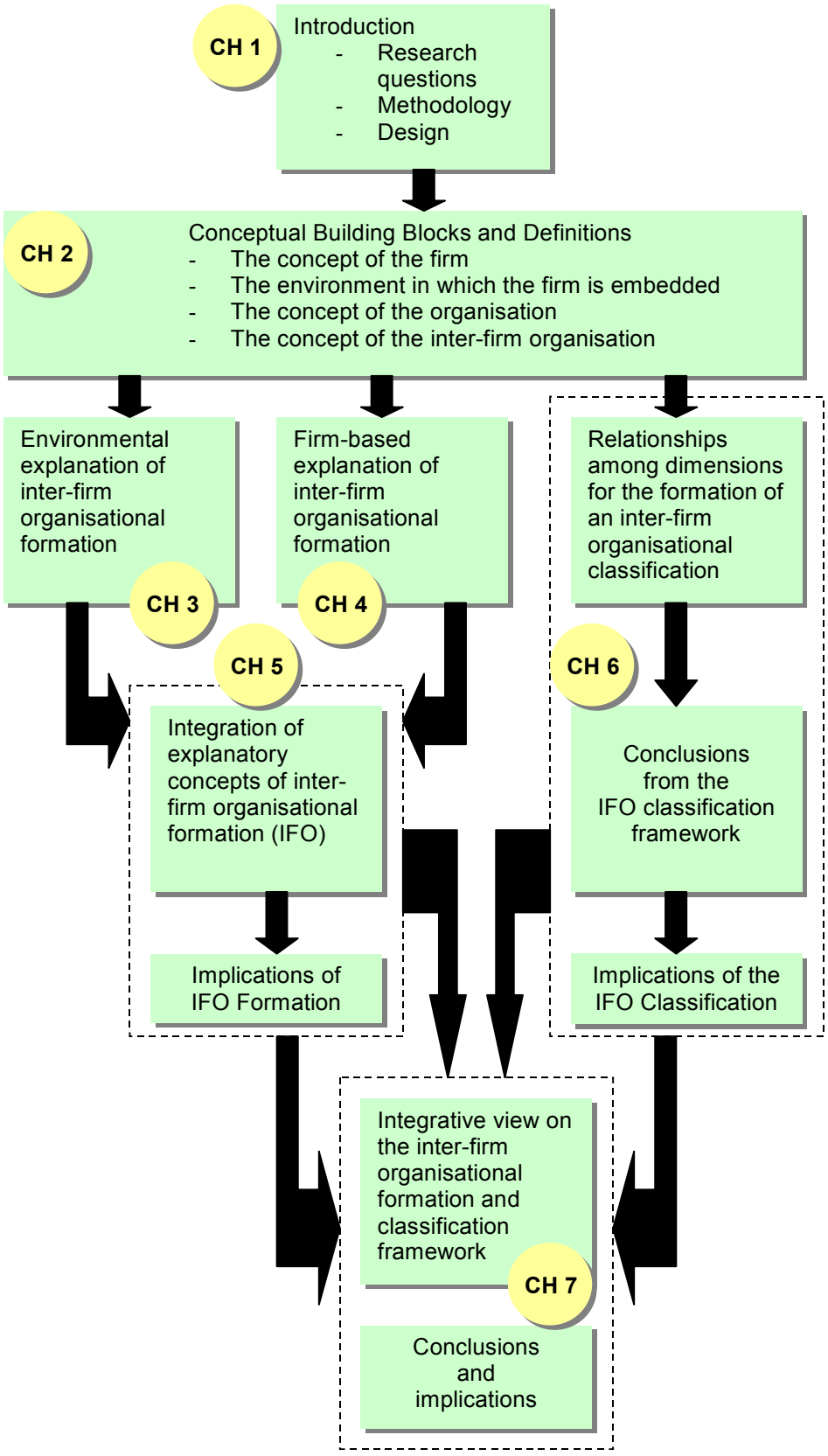

Figure 1.2 The Organisation of the Study

The aim in Chapter seven is to point out the most important propositions this conceptual study has arrived at. It has a bridging function between externally and internally influenced formation rationales and the organisational forms resulting from them. It offers conclusions, reflects on the original research objectives and discusses possible contributions on both theoretical and practical levels. Further, some thoughts are put forward concerning how this study could give new impulses for further development.

2 CONCEPTUAL BUILDING BLOCKS

This chapter deals with the basic concepts that are used throughout this study. The aim is to form a common understanding about them with the reader, and therefore to delimit the meanings of the firm, the environment and inter-firm organisation.

2.1 The Concept of the Firm

The firm is one of the four main concepts and a constituting pillar in this study. Therefore a shared understanding of what "*firm*" stands for is essential. This means that the concept of the firm has to be defined and what it is not has to be excluded. Still, like other key concepts, this one may not be defined to the last detail, but it will suffice if it supports the argumentation.

First, "*firm"* means different things to different people. The etymologist[1] understands the concept as originating in the German "*Firma",* where it came into use from the Italian "*firmare"*, or signature. Many legal forms of the firm still reflect that meaning. The *firma* of the owner, or his signature, is set equal with the activities that the economic actor *firm* is conducting. The establishment of the Dutch *Verenigde Oostindische Compagnie,* in 1602, changed that original meaning, and a corporation was created for the first time in recorded history (Van der Kraan, 2001). The firm has been detached from the entrepreneur and became a legal entity with an economic purpose in its own right. The owners were basically venture capitalists who risked their money in order to create an economic actor possessing more than a single person's financial resources. That organisational revolution also created a division between ownership and the management of the firm. The occurrence of these two groups within the firm has also altered its behaviour. While one group expects financial gains paid as dividends, another has a set of other economic and non-economic rationales. Both actors therefore work towards diverging goals, which complicates the basic assumption of what is the purpose of the firm.

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[1] The whole study relies on Merriam Webster's Collegiate Dictionary (2002/2003) for the etymology and general meaning of words.

In general, I will use the following explanation of the purpose of the firm. Its ultimate goal is growth. This requires it to secure its survival[2]. Owners and managers share both interests. I could allow that explanation to stand alone, but there is potential confusion if we say that the firm's goal is survival and growth. While survival[3] is quite a clear-cut explanation, growth creates trouble. From the owner's point of view, growth expectation could be expressed as an increase in capital over a time period. The *neo-classical theory of the firm* (cf. Curwen, 1976), on the other hand, assumes that the owner's growth expectation is the maximisation of profit. This is understandable, but has little to do with the firm as I use it in this study. The owner is not the sole ruler, and in the real world has to agree with the management, which in turn sees growth from a different perspective. As far as management is concerned, other growth measures are preferable to profit growth. Cyert and March (1963), the founders of *the behavioural theory of the firm*, argue convincingly that growth determinants that increase management's prestige or power, for instance, are preferred to pure increases in capital. Hence, the two controlling groups in the firm have to find an agreement, a compromise that allows it to grow along dimensions such as turnover, personnel, sales, machinery stocks and international expansion, to name a few. At the same time, this agreement includes agreement on the targeted profit that satisfies the owners.

These are two of the growth perspectives that are inherent in the firm. If I take another look at reality, a third one comes into play, especially considering the developments on international stock exchanges during the period from 1998 to 2002. The growth of the firm also means the growth of the valuation of the firm. This is an interesting subject that I do not wish to delve very deeply into, but it is also a factor to be taken into account when the basic goal of the firm as such is in focus. The firm and its stakeholders expect it not only to deliver profits at the end of an accounting period, and to achieve growth along multiple qualitative and quantitative dimensions, but also to grow in value. Many corporate philosophical statements set the value of the firm as a prime goal in order to satisfy owners and managers by increasing the value as such.In view of the increasingly common option schemes and the like, it is not only the owners but also the managers who have an active interest in that kind of growth. This study thus defines the basic goals of the firm as survival and

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2 This argumentation is in line with Chandler (1962).

3 Survival or the "*continuity of the history of a firm*" is nevertheless a very interesting topic that is excellently addressed by E. Penrose. The question of when a firm ceases to exist is also important in the context of inter-firm organisation. For more details, see "*The Theory of the Growth of the Firm*", Penrose (p. 22 ff, 1959).

growth in value[4]. This focus on the basic goals helps in arriving at a common understanding and in avoiding misunderstandings. This definition is not without its complications either, even though in many cases it unifies motivations and aspirations that are shared by managers and owners. As far as non-publicly quoted firms are concerned, for instance, value is only a vague estimation[5] and critics might argue that SMEs or privately owned companies do not base their rationale on the concept. Nevertheless, one assumption is that capital-market thinking about value also entered the equation of non-publicly quoted firms[6]. Another supportive argument is that the firm as such can grow in terms of turnover, sales, assets in general and profits, and that such growth more or less directly increases its value. To sum up, one could say that managers and owners agree on a profit target and on multiple growth variables, both of which increase the value of the firm and, in other words, increase the long term accumulated profit it generates.

Further, I would like to point out that the firm as seen in this study is an industrial firm comprising a pool of resources that are obtained from the external environment. The industrial firm makes use of the productive opportunities of the resource pool in an internal transformation process, and emits the results as outputs to the environment. As such, it is an economic actor that develops plans that are put into effect within it. The very concept is opposed to another economic activity that is happening outside firms – the market. The firm in that respect is also characterised throughout the text as a bureaucracy. Even though, in my view, the firm reflects a hierarchy, the two cannot be set equal because this study is also concerned with hierarchies that occur outside of the firm. A lengthy discussion about the economic activities of bureaucracies and the market follows in a later section.

The above description of the firm includes an input, transformation and output model that indicates a systemic view. In this, the firm has to be seen as a system belonging to a larger system. Throughout the study, this is termed the environment, the external environment or the task environment, with slight distinctions among them, which will be discussed in a later section.

This study is organised in a way that reflects the view of the firm as an economic actor. The other main concepts, the organisation, the environment and the inter-firm organisation, are therefore reflections of this view.

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4 Hence, in this study, when the goal of the firm is mentioned it means growth in terms of the value of the company.

5 This is also true of the expected value of publicly traded firms in the future, but at least there is a current picture of the value.

6 This assumption is based on observations I have made during the four years I was working with start-up companies. Nevertheless, it should not imply that there are firms that do not directly share the growth goal.

2.2 The Concept of Organisation

In this study I am relying to a large extent on the concept of organisation. In order to reduce the bounded rationality caused by language (compare: Simon, 1961; Williamson; 1975), the term and the concept as used in this study are defined and delimited.

Organisation is the act of organising. As such it develops functional and administrative structures and processes. As social construct, and human behaviour it has been observed for thousands of years (cf. Sun Tzu: "The Art of War", in Pheng and Chuvessiriporn, 1997). Organisation has the function of combining different talents and resources, and sharing workloads. To illustrate the concept I would like to use the organisation of a medieval village. For example, people in the medieval village specialised in different activities and became farmers, millers or bakers. Each profession promoted its specialisation for the purpose of delivering part of the food supply to the inhabitants. As a whole, the society of the village benefited from that division of work as opposed to conducting each of the production steps individually, since experience, specialisation in one part of the work process, and asset specificity are substantially different. The sophistication of organisation, or in other words the division of labour, is related to the complexity of the task and the purpose the group wants to achieve.

The commonality of a simple medieval village society and a highly sophisticated corporation is the requirement of cooperation. Cooperation is an underlying organisational concept. In order to achieve cooperation and certain desired goals, systems of structural relationships have to be established and coordinated. Therefore the basic definition of organisation I use throughout the study is: "*two or more people or entities coordinating their activities cooperatively for the purpose of attaining a common goal or set of objectives*" (cf. George and Jones, 2002). This definition stresses the fact that at least two actors have to engage in cooperative actions, and that this cooperation is governed by some form of coordination. Both inherent terms, cooperation and coordination, are important concepts in this study, one aim of which is to explain inter-firm organisational formation and its forms. These concepts are relevant to business and to society as a whole. The dictionary defines cooperation as "*the action of co-operating*", working together, "*for a common effort*". Further, it gives a secondary meaning as the "*association of persons for common benefit*". Other authors define the concept of cooperation in a similar manner (Roos, 1989; Hovi, 1995).

Understanding cooperation in these terms shows that organisation as defined in this study is an entity that is inseparable from the concept of

cooperation. Coordination is defined in the dictionary as the "*harmonious functioning of parts for effective results*". It is the underlying steering mechanism that produces effective outcomes of cooperation. I discuss the role of coordination in depth in Chapter four, since it is one of the key characteristics in terms of how an organisation functions.

Organisation as defined above needs further elaboration as it is used in this study, which takes the systemic view. It is an open system. Openness requires some form of permeability of boundaries, unlike closed systems. Early contributors to general systems theory (Bertalanffy, 1955 and 1968; and Boulding, 1956) stated that an organisation had to be seen as an open system like all biological and social systems, since it interacted with the environment in which it was embedded, and affected and was affected by that environment. The assumption (Bertalanffy, 1968) was that every system had to be open to its environment to some degree otherwise entropy, or spending more resources than were replaced from outside, was the result. Nevertheless the dichotomy of open-closed systems is rather a continuum on which an organisation takes a position. Its aim is to reach the state of negative entropy, which takes in at least the same amount of energy or resources that is spent (cf. Hodge and Anthony, 1988).

An organisation may be dynamic as opposed to static. The organisation as a dynamic system implies that it is in a state of change over time (Ackoff, 1971). Most organisational investigations take a snapshot of a particular state at a certain time.

Ackoff (1971) writes that organisations are multi-goal seeking[7]. The organisation seeks different goals in at least two different external or internal states, which nevertheless have a common property. The discussion above about the goals of different groups within the firm (management vs. ownership) illustrates this multi-goal-seeking nature. Multi-goal seeking means that the organisation is capable of choosing different means in order to accomplish its goals (cf. Britton and McCallion, 1994).

The organisation is purposeful (Ackoff, 1971), which means that the same outcome can be produced by different means and the same means may produce different outcomes[8]. The section on goal systems introduces a hierarchy of organisational goals, which illustrates the two concepts of multi-goal seeking and purposefulness by showing that goals on a higher hierarchical level can be achieved by setting goals on lower levels (to do with vision, strategy and operation).

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[7] The original introduction of "goal-seeking" into the cybernetic view was given by Rosenbluth and Wiener (1943)

[8] This is a point also stressed by Penrose (1959).

An organisation contains concrete and abstract components (Hodge and Anthony, 1988), which reflects the fact that it is a pool in which concrete objects such as machinery are also included among abstract components such as ideas.

Further, an organisation cannot be investigated without taking into account the larger system it is part of. The environment is part of the definition since it supplies all input factors and serves as a receptor for all of the outputs. This is in accordance with the concept of holism (cf. Kast and Rosenzweig, 1985). The systems that are internal to the organisation are interrelated and interdependent, and likewise the organisation as a whole is interrelated and interdependent with systems found in the external environment. The principle is that internal change has effects on environmental systems, and changes in the environment have an impact on the systems of the organisation (Simon, 1961). The organisation is goal seeking, and therefore the goals of its subsystems are to reach a state of harmony or equilibrium.

In the same sense, the organisation as a system attempts to comply in its goals with the goals of the system on a higher order, the relevant environment. It regulates the behaviour of the subsystems and is regulated by environmental systems. When a deviation in a subsystem is detected, the organisation will correct it. The prerequisite, as often assumed, of a central regulating decision maker is not given, as Bechtold (1997) also suggests, because regulation can be achieved through participation in all subsystems[9].

Given the above discussion on the nature of the organisation, a definition that extends the basic one presented above may be summarised as follows: "An *organisation is an open, dynamic, multi-goal seeking, purposeful system with elements of concreteness and abstractions. It acquires resources from the environment and transforms them into outputs that are released into the environment*".

In order to elaborate on some interesting ideas about how organisations evolve, the *phenomenal complexity theory* as described by H. Bergson[10] and presented by Letiche (2000) now enters the discussion. Complexity theory deals with the concept of *emergence,* or in other words with *self-organisation*. Since my study is concerned with the formation of inter-firm organisations and its forms, a theory that helps to explain how organisation occurs is to be considered valuable. Therefore I would like to introduce some of the

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[9] In this section I have used Skyttner's analysis of General Systems Theory. [(1996) General Systems Theory: Origin an Hallmarks. Kybernetes, Vol. 25. No. 6. pp. 6-22] as a basis for formulating the principles of systemic interrelationships between the organisation and its environment.

[10] H. Bergson developed his "phenomenal complexity theory" between 1900 and 1938 (cf. Letiche, 2000). It is mainly concerned with the behaviour of *complex adaptive systems*. Such systems include the human immune system. H. Letiche attempts to introduce the thinking of Bergson into the study of organisations by posing the problem of the consciousness of the human mind that creates realities.

principles of complexity theory in order to evaluate how helpful they are in the further analysis of the organisation.

In emergence the whole is more than the sum of the constituent parts. As business researchers, we are used to dealing with that fact under the term synergy. Emergent qualities are realised when self-organisation transcends the elements from which it has developed. Complexity theory recognises that human existence is an open social, historical system characterised by a constant process of *complexification*. Social constructs continuously develop into a higher organisational order. The problem with social science in that respect is that the scientific laws that are constructed refer to an organisational level that has already evolved to a new level. Therefore a social construct, such as a firm, is no longer the same as that to which the scientific laws refer. What conclusion does this fact allow us to make? Because of complexification, which could be defined as "the *self-organisation of the constituent parts leading to qualitative changes in systems*", it is problematic to believe that future developments can be accurately predicted based on its constituent parts. Letiche (2000) states, "Traditional scientific concepts and research paradigms only suffice so long as a higher level of organisation than the one they refer to is not achieved". This aspect has also been extensively dealt with in business research and is generally discussed in the context of change. Change introduces plurality or contingency if the organisations under study are different in nature before and after emergence. Before discussing the basics of complexity theory, I will sum up the main points it puts forward. When we look at an organisation and try to understand what its constituent parts are, the perception of the subject in a dynamic state is that of another organisation, since evolution has already altered the nature of the one in focus. Part of the explanation is that a number of different constituent parts that are interrelated and interdependent interact with each other and create contingent new realities. In respect of the kind of organisations that are relevant to this study, two explanations can be given. The first concerns the role of perception by the actors in the organisation, while the second is about dealing with the complexity of such interactions.

Weick (1979) considers socio-psychological factors in an organisation. His "*enactment process*" describes and explains how members of an organisation engage in a process of scanning, scooping and narrowing the macro environment to its pertinent parts. The underlying principle is that the consequences of the reality will unfold as one proceeds. The *enacted environment* label emphasises the fact that meaningful environments are outputs of organising, not inputs to it. The enacted process itself segregates possible environments that the organisation could clarify and take seriously, but whether it actually does so is determined in the selection processes.

Boundaries between organisations and the environment are never quite as clear-cut or stable as many believe (Weick, pp. 131-132, 1979). Weick suggests that the organisation creates the environment to which it adapts as a system, and does not react to it. This is justified in terms of the limited perception capabilities of the human mind. It emphasises that different points of view exist about reality, which is created in retrospect and therefore is a picture of the past in a dynamic environment. This is a major problem for organisational stakeholders since the picture of the past creates the perception of the present, and actions for the future are selected in the goal-attainment and achievement process. Organisations thus give meaning to the perceived environment in retrospect based on what they deem to be important for their proper functioning. These are important issues since they affect the adaptation process, which will be discussed in a later chapter.

The second challenge thrown up by complexity theory concerns the interaction between interrelated and interdependent constituent parts of an organisation and its environment. The challenge, in one word, is complexity. Even if the members of an organisation could capture the nature of all the relevant constituent parts, and were capable of understanding all the possible moves (developments) and interactions between those parts, it would still be impossible to create accurate forecasts. Simon (1961) conceptualises this fact under the label of "*bounded rationality*"[11]. A well understood principle is that complexity in an open system is too great for the human mind to process. Too many components have too many possible variables to enable prediction of the probable outcomes. Simon provides a very simple example. A chess game has six different figures with perfectly predictable possible moves. However, the sheer complexity of the interaction between the figures creates too many possibilities (or in terms of game theorists: too many equilibria) for the human mind to process. Therefore chess is still a game worth playing. This example illustrates bounded rationality very well. It has to be remembered that this game is happening in a perfectly closed system. In transferring that to open systems such as organisations it becomes evident that it is not only the complexity of interacting parts but also imperfect information about what all the parts are and how they behave that provide the challenges.

In sum, from the insights of complexity theory described above, one could argue that its basic message is that nothing can be predicted and whoever tries has a crystal ball or is a fool. Such a conclusion also seems valid if we consider Weick and Simon's explanations of human perception and capacity.

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[11] Williamson (1975) elegantly describes bounded rationality as "*the physical limits take the form of rate and storage limits on the powers of individuals to receive, store, retrieve, and process information without error*".

If that were true (any social) science would be useless. If I try to understand the same theory in slightly different ways, I could also argue that each of the constituent factors has certain possible and potential outcomes in the same way as every figure in the chess game has a predetermined range of possible and, in certain situations probably successful, moves. Given that the perception of what are the constituent parts, and that the complexity of their interactions creates complexification, the solution I adopt for this study is the following. In order to predict possible outcomes and to select those that are potentially interesting, I need to come to an agreement about which of the constituent parts of the subject, inter-firm organisation, is of relevance. Consequently, it is necessary to define the possible "moves" or variables of each of those selected constituent parts. On the basis of those two factors, the selection of important constituent parts and the definition of their nature and behaviour, I will be able to create a large number of contingencies from which the potential or *realistic* ones can be selected in order to arrive at useful descriptions and explanations of inter-firm organisational forms and their formation.

The definition of the organisation, including the discussions about what constitutes it, will be helpful throughout this study. Some insights from complexity theory indicate how organisations emerge, what is the problem in perceiving and predicting organisational outcomes, the environment and their developments, and what is the challenge in formulating a theory that attempts to explain inter-firm organisational formation and the resulting organisational forms.

2.3 The Concept of the Organisation and its Environment

This part of the study originally carried the title "The firm and the environment" because my perspective was formation and form of inter-firm organisations in the context of the firm. Nevertheless, what is written here about the firm's *embedment*[12] in the environment is also considered valid for the inter-firm organisation. Therefore the more general title of this section is "The organisation and the environment". The term embedment itself carries a meaning that is characteristic of the study as a whole. It could be understood as "*making something an integral part of something*", which reflects the fact

[12] I use the term embedment, which is not interchangeable with Granovetter's (1985, 1992) famous "*embeddedness argument*".

that the organisations I am looking at are to be seen as part of the environment. This holistic view underlies the theoretical framework of systems theory[13].

The organisation in my systemic model (Figure 2.1) is, in general terms, a simple input, transformation and output model. All of the resources are drawn from the environment, integrated and transformed within the organisation and emitted back to the environment.

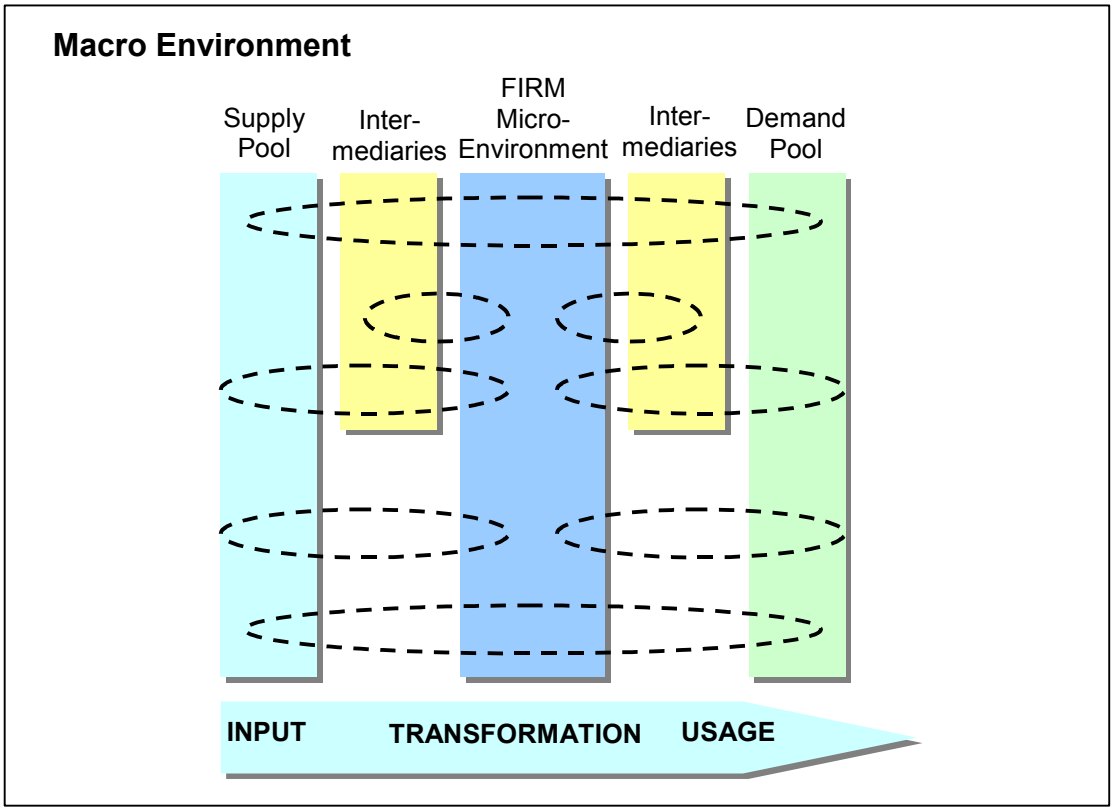

Figure 2.1 The Embedment of the Firm in its Environment

This model especially reflects the organisational function of "*work*"[14]. Resources in this study are understood as "*assets which contribute based on the services they render to the functioning of the organisation*". This definition leans on Edith Penrose's (1959) view that "*It is never resources themselves that are the 'inputs' in the production process, but only the services that the resources can render*". This view is substantially different from classical microeconomics in that it makes no distinction between the resource and the

[13] The analysis of General Systems Theory by Skyttner, L. [(1996) has been instrumental in facilitating systems theories and their limitations.

[14] Hodge and Anthony (1988) include a very illustrative chapter about the work function of organisations.

services it offers (Penrose, 1959). This makes a substantial difference in a systemic study incorporating the complexity view because a resource may render various services depending on the context and specified needs of the actor who is using it. For instance, a car may render the service of transportation for me but it may also help me to express my image. This distinction also underlines the fact that each resource reflects different potential behaviours, or may be used for different ends. Further, resources include not only tangibles such as raw materials, machinery and humans, but also intangibles such as ideas, skills, education, capital, laws, culture, technology and competition.

Another important element of what I term a resource within this study is *demand,* or indirectly, *access to demand*[15]. Penrose (1959) supports the notion of the productive opportunity of resources, according to which an organisation with certain input resources is capable of going after a number of substantially different opportunities without changing its resource pool[16]. For instance, a paint-producing chemical company may choose to sell its output resources through market mechanisms to automotive manufacturers. Alternatively, the paint producer may use the output for rendering the service of managing the whole painting process for the car producers[17]. Both cases differ from each other in the usage of the output resource. In the first case, the firm is selling a product and in the second case it is selling a service, while the output resource remains the same, as do the resources required to produce the output.

Hence, the organisation takes in resources from the environment, transforms them through primary work processes, assisted by secondary work processes, and emits the outputs back to the environment (see Figure 2.1). To give an example, the model describes the acquisition of machinery from manufacturers, employees from the labour market, and production resources from suppliers. The organisation transforms them internally into products and services that then are put further through the *value chain*[18] to a final user. Less obviously, it also describes less tangible processes. For instance, an input into

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[15] This problematic issue of including demand and the access to it in the definition of resources simplifies things and is based on some personal experiences, especially with IT and Internet start-ups, which, at least at one time, have measured the value of the firms with access to demand (or potential consumption opportunities) and related that to the expected life-time value of the consuming economic actors.

[16] This is discussed in the extended definition of an organisation as a purposeful entity. Penrose (pp. 22-24, 1959) interestingly mentions "the continuity of the history of a firm".

[17] An article that illustrates this example is to be found in Kauffman Johnson, J. (2000), Chemical Management Services: Good for Business, Good for the Environment. Further, see www.chemicalstrategies.org on the goal to transform the market transactions between auto manufacturers and the chemical industry into alliance-like forms.

[18] The use of the term value chain in this study follows the Porterian view (Porter, 1980). It basically describes the "work system" from the basic resources until the ready product/service reaches users across a number of companies.

the organisation may be a new law requiring environmentally friendly production processes. Such a law is also considered an input resource into the organisation to which it has to react. As with all resources, the organisation can deal with such input in different ways. It may start lobbying against such a law and produce defence actions against it, or it may transform such a resource into competitive advantage.

Between the organisation and the diverse environmental resource pools from which it draws ("supply pool") and to which it emits ("demand pool") are different systems that connect it with such aspects. The "firm" system as part of the larger environment creates "*subsystems"* to other systems in order to primarily perform work. I define a subsystem as "*the connection the firm is building to/with systems in the environment in order to function*[19]". Figure 2.1 shows subsystems of the firm characterised by circles. The different connections these circles indicate suggest different possible inter-firm organisations (subsystems). Between the original producers or pools of necessary resources exist different systems that produce, distribute, administer and protect them. For example, in the automotive industry the "original equipment manufacturer"[20] needs paint from the chemical industry to manufacture its product. The paint may be directly acquired from a paint producer or alternatively it may be obtained through a distributor. On the demand side of the value chain, national car distributors, car retailers and replacement-parts resellers complete the work system of the industry. In order for this system to function along the value chain, the firm creates the subsystems that regulate what enters and leaves it. The term used for this function in this study is "the boundary of the firm", and it will be analysed in depth in Chapter four.

The next important issue for the embedded firm concerns the choice of systems to work with in the environment. Dill (1958) summarises the environment as containing (1) customers, (2) suppliers of equipment, materials, labour, capital, and workspace, (3) competitors for both markets and resources, and (4) regulatory groups such as governmental institutions, unions and inter-firm associations. From the wholeness of the environment, the organisation only emphasises the parts that are considered *important or*

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[19] I discuss subsystems and their natures in Chapter four, which deals with the *boundary of the firm*.

[20] I use the term "Original Equipment Manufacturer" several times in this study. I therefore introduce the abbreviation *OEM* at this point. The term is also widely used within the automotive industry. OEMs in general are manufacturers of cars in the classic sense. Today, given the changing roles and practices, I would like to refer to OEMs in general as the owners of automotive brands. Because I use many examples from the automotive industry, I would like to point out that, unless otherwise stated, the view I take is from the OEM perspective.

potentially important[21] for achieving its goals. Dill (1958) labels that part of the environment the "*task environment*". The rest of the macro environment that is of no relevance, actual or potential, is the *non-relevant environment*. The process of choosing the task environment is of special interest here. Levin and White's (1961) observations concerning the definition of a firm in terms of what is the focus of its business and what is the task environment lead to the term *domain consensus process*. The focus of the firm, the domain, includes both the choice of task environment and the activities the firm chooses in attaining its goals. In the consensus process in which the organisational claims are agreed upon, the stakeholders[22], including the owners, management, government and others (cf. Dill, 1958), define the domain (see Figure 2.2).

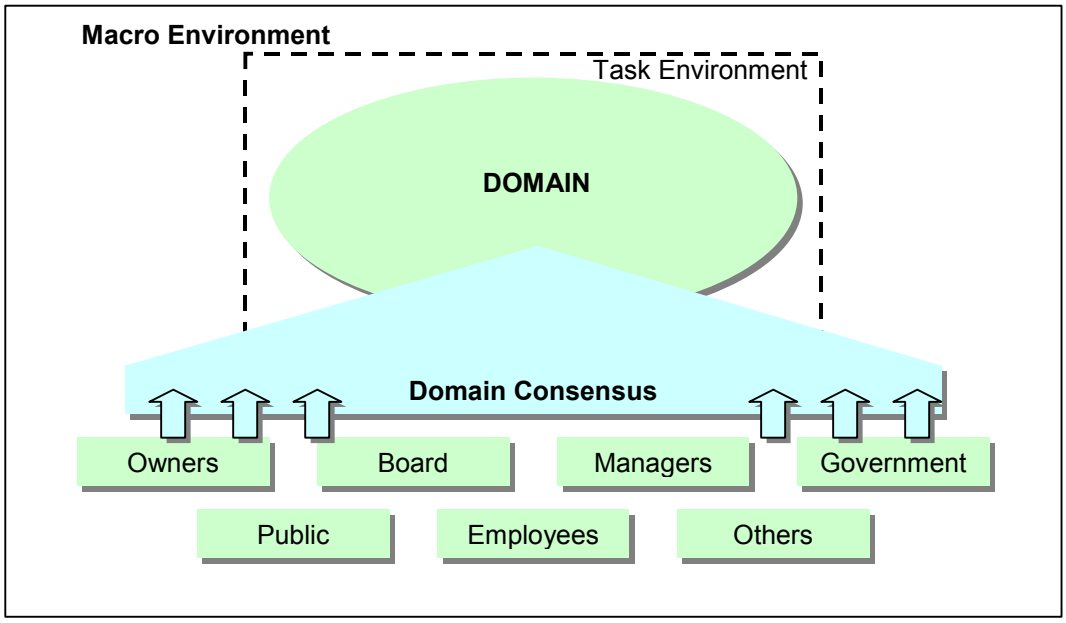

Figure 2.2 The Domain Consensus Process

Thompson (1967) defines domain consensus as "… a set of expectations both for members of an organisation and for others with whom they interact, about what the organisation will and will not do. It provides … an image of the organisation's role in a larger system".

The stakeholders referred to in Figure 2.2 are individuals, institutions, companies and parties that affect and are affected by the organisation and its

[21] In this study the concept of the "important and potentially important part of the macro environment" is included in Dill's (1958) term *task environment* or alternatively *relevant environment*.

[22] Stakeholders are defined as the different groups that have an interest in the results of the actions of the firm.

activities reciprocally. The systems in the task environment[23] are, in general, only imperfectly known by the actors within a firm. Hence, prediction of the future state of the dynamic environment is imperfect[24]. The firm therefore concentrates on the aspects of the environment that are most important for its survival and growth. According to Thompson (1967), "Spending energy and resources on other aspects than those defined is unnecessary since other aspects have little or no effect on the survival and growth of the organisation, although they might have a tangential effect". From the perspective of the firm, these aspects of the environment are important because degrees of dependency between the firm and its activities and the important aspects in the task environment exist. This resource-dependence view[25] permeates this study together with the resource-based view[26]. While the former provides an explanation of the relationships of the firm to the macro-environment, the latter facilitates understanding of how the firm combines obtained resources in order to render services that create productive opportunities. The resource-dependence view also introduces the concept of uncertainty, which has a major role in my conceptual study and will be discussed in Chapter three. Case 2.1 involving the farmer, the miller and the baker is a simplified example of how the firm relates to its task environment.

> For a baker, two important aspects of his environment are the farmer and the miller who produce and process the resources he needs as input factors. The baker is dependent upon the supplies of the miller, who in turn is dependent on the supplies of the farmer. From the other perspective, both farmer and miller are dependent on the baker using their outputs. In a situation in which there is equilibrium between the outputs of one and the need for inputs of the other there is little problem. The baker is dependent on the miller, but the miller is also dependent on the baker. All are likely to meet on a market and engage in exchange. The situation changes when the baker is one of ten bakers and the miller can only supply eighty per cent of all of the necessary input factors. The baker still has the same dependency on the miller but the miller is not dependent on the orders of the baker, given the small enough size of the baker's business. The importance of aspects of the environment in such a

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[23] I use systems of the task environment synonymously with "important aspects of the environment".

[24] This study, in general, deals with dynamic environments since the firm is defined as an open system. The insights of complexity theory apply, and therefore the phenomenon of self-organisation occurs. For more detail, see Letiche (2000).

[25] Cf. e.g., Pfeffer and Salancik (1978). The resource-dependence view suggests that the firm is controlled through dependence on outside aspects.

[26] Cf. Penrose (1959). The resource-based view focuses on internal resource combinations.

situation, which quite often occurs in reality, is asymmetric in its dependence from different perspectives. The baker's dependency on the miller is total if there are no alternatives. The miller's dependency on the baker is non-existent if the other nine absorb his output. They still could meet on the market but the baker will try to avoid that because the market in that case is potential uncertainty for him since he cannot predict the actions of the other nine bakers nor can he predict the resulting actions of the miller. He has to deal with his dependence on the miller and with the uncertainty this situation creates for him. One way to reduce this uncertainty might be to buy the business of the miller and internalise the dependence in his own organisation, in other words to effect backward vertical integration. Another uncertainty-reducing action would be to acquire the businesses of some other bakers. This way he would gain in importance and influence and become a dependence aspect in the miller's environment that could not be ignored since it would be responsible to a great extent for the absorbing of his outputs. These are only a few scenarios the baker could use for reducing his dependence and reducing the uncertainty involved, and many others are possible. For example, the baker may make a contract with the miller about future business and minimum supplies deliverable at a certain price. Another solution might be backward integration by acquiring the farmer and the miller and so maximise his influence on and power over the supply chain. The baker could also look for other bakers to join him in setting up his own milling operations by engaging in a joint venture. He could also ask the regulatory authority to limit the power of the miller on the business of bakers and to bring in a law that would give everybody access to supplies. The baker, the miller and the farmer could also agree on forming an alliance to control the entire market for bread and to get better margins for their products by eliminating potential competitors.

Case 2.1 The Farmer, the Miller and the Baker

This simple example was invented, but the illustrated behaviours can be observed in numerous cases[27]. The purpose of the illustration is to introduce different concepts that are discussed in depth in the following chapters. Apart from the natural dependencies that exist between the actors, some of the baker's strategic solutions and actions are illustrated in order to show the wide-ranging palette of possible behaviours that change the relationships

[27] In fact ,when writing this story I used the economics sections of a newspaper over one week in order to collect examples of possible behaviours.

between them. It also introduces the number of choices on a continuum between the market and the hierarchy, one discussion theme in this study. In sum, the case is a metaphor about how the firm is embedded in its environment and is related to important aspects of the task environment in which it chose to operate. It provides a general understanding of how the firm's rationales change depending on various situations. It also illustrates the multiplicity of possible solutions. Chapter Three goes into detail in terms of how relationships between the firm and its environment are constructed. The following section 2.4 defines the view of this study in terms of how inter-firm organisation is conceptualised.

2.4 The Concept of Inter-Firm Organisation

The section on the embedment of the firm in its task environment offered a systemic organisational model illustrating various subsystems (cf. Figure 2.1). This study is concerned with the formation and forms of these subsystems, which are seen as organisational systems that are created between two firms and are therefore called inter-firm organisations. This section 2.4 contains a thorough definition that delimits the concept of inter-firm organisation used in this study.

In the literature, the solutions that connect the firm with its environment are very often dealt with under the label inter-organisational studies. As such, the term is quite clear in that it reveals the purpose of *two or more organisations interacting with each other*. Nevertheless, my choice here is not to use exactly this term because the viewpoint is that of the firm. My reasoning stems from the way in which I define the firm (cf. 2.1), and above all the goal of the firm to grow. I therefore exclude inter-organisational systems that do not operate between business firms. The term I use in this study is *inter-firm organisation*[28] because I wish to delimit inter-organisational systems that are created between business firms rather than other types of organisations.

The term needs further clarification by outlining possible alternatives that are not addressed in my study. Inter-firm organisations as subsystems of the firm are created in order to *facilitate economic activity*. This does not include undirected social ties that might exist. They may form part of the current investigation if they are directed and materialised in more or less formal agreements between firms. Facilitating economic activity implies that actions between firms directly or indirectly lead to the fulfilment of goals. Inter-firm organisation may occur between two or more firms at the same time, and it is

[28] Grandori and Soda (1995) first brought the term inter-firm organisation to my attention.

the forms in which such organisations are developed that are of special interest for this study. Therefore I would like to introduce a continuum on which such inter-organisational forms are positioned.

For the theoretical background of the continuum I lean on the transaction cost approach, especially as put forward by Williamson (1975). In his seminal work "*Markets and Hierarchies*" he offers two end points for a continuum of inter-firm organisational forms. The basic premise is that the firm has two types of mechanisms to facilitate economic activity, the market and the hierarchy. One interesting detail in philosophical terms is that these two mechanisms are rather ideal types and, as such, are arguably artificial constructs rather than natural occurrences that can be found in the realities of firms[29]. In order to present a clear definition of the end points of the inter-firm organisational continuum I will introduce a synthesised definition of the firm as a legal entity (Coase, 1937). A firm is an institution that "*professionally conducts an organised economic activity for the production or exchange of goods and services*" (Grandori, 2001), and it is constituted in a "*specialised*" way for "*unlimited time*" with a "*degree of consciousness direction*" (Demsetz, 1991). According to Demsetz, a firm is constituted by a nexus of rights and obligations, defined in complex external and internal contracts and treaties, incorporating systems of internal and external laws and norms, and employing a vast and varying range of coordination mechanisms. The problem he points out is that of determining what cluster of contracts and coordination mechanisms is classifiable as a firm. An inter-firm organisation is the type of borderline case in which it is often difficult to draw the line between firm-like (a hierarchy) and market-like behaviour.

It is therefore useful to think in terms of economic behaviour that resembles more the behaviour of a firm (a hierarchy) or the behaviour of a market. Buckley and Michie (1996) summarise the distinctions between "*market-like* "and the "*firm-like*" behaviour, as illustrated in Figure 2.3.

The interaction of an organisation with systems of the environment as seen in the dichotomy of firm-like and market-like behaviour gives a good classification tool in revealing on which side of the continuum an inter-firm organisation is positioned. Inter-firm organisational forms may vary widely in the degree of abstraction. While some forms clearly indicate the separation of property rights, others have completely unified property rights, and yet others

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[29] Hempel (1965) inspires thoughts about the meaning of ideal types and extreme types. As such, a market/hierarchy dichotomy is understood to underlie rather an essentialist or nominalist view. As such, the dichotomy could also be expressed as a typology. I use the idea of a continuum between these ideal types, even though Hempel (1965) might disagree, because ideal types are not correct ordering devices, in the same way as extreme types are. Nevertheless, this mental picture is of help in seeing the space in between them.

have different degrees of shared property rights owned by two or more *contributors*[30] to the inter-firm organisation. The end points of the continuum between the market and the hierarchy also clearly define how coordination is achieved. Specific communication typically dominates firms, while markets coordinate mainly through prices and exits. Between these, a number of different coordination mechanisms are employed to describe the position on the continuum[31]. In this study, the role and the flow of information are seen as integral parts of coordination, and are discussed in depth in Chapter six. One point about information, however, is that markets deal with it in standardised ways, while the firm's usage is always context-specific and therefore involves a higher degree of complexity.

Firm-Like	**Market-Like**
- Unified property rights over assets (among shareholders, partners or entrepreneurs).	- Separate property rights over assets.
- Coordination and control mainly based on partner-specific communication.	- Coordination and control mainly based on exit.
- Information on different activities gathered directly and transferred ad hoc where useful.	- Information encoded in price and profit signals.
- Regulation of exchange and cooperation through incomplete contracts, and system-specific rules for evaluation, compensation and resource allocation.	- Regulation of exchange and competition through complete contracts, in the context of external regulation/legislation. -
- Residual resolution of conflicts mainly by resorting to the internal hierarchy.	- Residual resolution of conflicts mainly by resorting to the external judiciary system.

Figure 2.3 Firm-like and Market-like Behaviour as Nexuses of Coordination Mechanisms (adopted from Buckley and Michie, 1996)

[30] In this context I would like to introduce the term "*contributor*" as referring to a participant, partner or other economic actor who participates in common actions or exchange within diverse constructs of inter-firm organisation.

[31] I would like to point out here that certain inter-firm organisational forms have clear coordination mechanisms that state their position on the continuum. It is also obvious that many such forms use a number of different coordination mechanisms simultaneously. For reasons of simplification and to avoid difficulties arising from computational complexity later on in the study, I use the dominant coordination mechanism to find the right position on the continuum. There is a lengthy discussion on coordination in Chapter six.

Buckley and Michie (1996) classify the role of contracts as distinguishing between what is seen in this study as end points of a continuum. Given the role of information and the high complexity involved, it is clear that contracts cannot be produced to the last detail. Markets, on the other hand, use standardised information and therefore complete contracts can be produced. In between these two typical behaviours are a number of mixed approaches that are based on definable and non-definable *complexification*. Connected to contracts is the resolution of conflicts between contributors. Market-like behaviour relies on external judiciary systems, and firms resolve conflicts through their internal systems. Inter-firm organisational conflict resolution is brought about by adopting either an institutional or a combined approach.

Both ideal forms on the end points of the inter-firm organisational continuum inherently involve a number of possible complications. Coase (1937) refers to "*market failures*" such as opportunism or externalities[32], and "*bureaucratic failures*" occur on the other end. The size of the firm has been used in the literature as an example of bureaucratic failure (Williamson, 1975). The key point is that organisations become so large that they fail to grow because of the difficulties involved in managing them. A number of possible and potential inter-firm organisational forms exist between these ideal types that use combinations of coordination mechanisms in order to avoid the complications of markets and hierarchies. This study aims at putting in order such forms in order to explain their usefulness. Before commencing this investigation, I present an analysis of previous attempts to classify inter-firm organisational forms[33].

2.5 A Review of Inter-organisational Research

The span of inter-firm organisational forms on the continuum is high in content. Constructs that are more "firm-like", such as joint ventures, contrast with those that are closer to "market-like" structures, such as licensing[34]. The literature on the phenomenon of inter-firm organisation has been repeatedly

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[32] Williamson (1975) discusses "*market failures*" in detail. For a summary of the discussion on "*bureaucratic failures*", see Grandori (2001).

[33] This analysis by no means includes all attempts to classify inter-organisational forms. It rather gives an overview of different paradigms from where sense making about inter-organisational forms has been departing. A broader overview of inter-organisational theories is given in Appendix one.

[34] E.g., introducing the concept of franchising shows that, in fact, a large number of inter-firm organisational forms occur along the continuum that are treated as franchising in the literature. Organisational forms of franchising may be close to market-like behaviour (forms of licensing) and to the behaviour of a hierarchy (business-format franchising). An illustrative case is to be found in Boyle (1999).

classified under the broad label of network studies in recent years. The following sections of this chapter provide an introduction to and an overview of different approaches to explaining and classifying inter-organisational research.

2.5.1 Network Studies

Network studies became popular especially as a result of technological and social developments that lead to a high level of interconnectedness of organisational systems and of people[35]. Two determinants of these developments are to be found in the development of transportation and communication and information systems. Networks in these research streams are often referred to as "*flexible governance structures*" as opposed to markets and hierarchies (e.g., Achrol and Kotler, 1999). It is pointed out that networks are superior in adapting to their environments given their better information-processing capabilities. Easton and Araujo (pp. 68-71, 1996) summarise ten different streams of thought that contribute to our understanding of the nature of networks. They write, "The *network has acquired the status of a meta-concept, not like "system", and its meaning has to be determined within the cognitive communities that use it*". Latour (1993) introduces the network metaphor: "*More supple than the notion of system, more historical than the notion of structure, more empirical than the notion of complexity, the idea of network is the Ariadne's thread of these interwoven stories […], which remain more invisible than spider webs*". Easton and Araujo (1996) found in their comparison of ten network approaches the following schools of thought: (1) social networks, (2) inter-organisation theory, (3) actor-network theory, (4) networks of innovators, (5) network organisation, (6) policy networks, (7) networks in economic geography, (8) comparative studies, (9) entrepreneurship studies and (10) industrial networks. The backgrounds of these research streams include sociology, the science of technology, economics, organisational and business studies, internationalisation studies, political science, entrepreneurial studies, and marketing and purchasing. The orientation of most of them is towards organisational design in terms of structure and/or process.

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[35] Various authors combine this under the label "technological advance" and the subsequent social ramifications.

2.5.2 Economists' Network Explanations

Neo-classical economics tends to explain cooperative agreements[36] and networks by analysing the activity of firms attempting to *internalise economic externalities*. Colombo (1998) summarises four types of externalities that lead to cooperative behaviour among firms:

(1) Cooperative agreements and the internalisation of horizontal competitive advantages;
(2) Cooperative agreements and the internalisation of technological externalities;
(3) Cooperative agreements and the internalisation of vertical externalities; and
(4) Cooperative agreements and the internalisation of network externalities.

The "*profit-maximising firm*[37]", in this approach, bases its cooperative behaviour on the avoidance of externalities that cannot be handled by the markets. The **(1) *internalisation of horizontal competitive externalities*** is based on the notion that in a static framework with costless collusion, firms can do at least as well when colluding as when acting non-cooperatively (Jacquemin and Slade, 1989). Colombo (1998) argues that, in situations in which competitors (oligopoly) collude through cooperation, the firms increase their profits in a zero-sum outcome, with the consumers therefore negatively affecting the overall social welfare. This outcome occurs unless collusive agreements lead to supply/demand side-effects to do with reduced production costs or increased product variety (cf. Kwoka, 1992). Horizontal collusion is problematic because of the difficulty in reaching an agreement and the possibility that participants will *free-ride*. The transaction costs of reaching and monitoring such agreements may therefore be substantial. Another problem with the internalisation of horizontal externalities occurs in cases in which asymmetries in terms of production costs, product heterogeneity or diverting objectives and technological expectations exist. In such cases, opportunism may lead to the so-called *prisoner's dilemma game* (Luce and Raiffa, 1957). This argumentation, favoured by economists, partially explains why industries tend to concentrate in terms of proprietary arrangements, such as mergers and acquisitions, or in terms of contractual constellations, for instance strategic alliances that reduce competition (cf. Reitman, 1994). The

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[36] See the section in which "*organisation*" is defined for clarification about the term cooperation.
[37] See the definition of *firm* in this study for the distinction (cf. Chapter 2.1).

effect on the cooperating parties is reduced competition and higher levels of certainty[38] about the future. This, of course, implies that coordination mechanisms that avoid opportunism are put in place. The best solution in terms of uncertainty avoidance is therefore the total integration of competitors and the consequent elimination of cheating potential (cf. Colombo, 1998). This is difficult to attain in a real-life setting, however, because of external regulations (e.g., anti-trust regulations). Therefore firms that strive for the internalisation of horizontal externalities go for second-best solutions that include contractual arrangements such as strategic alliances. The economist's explanation illustrated here explains what marketing researchers (e.g., Achrol and Kotler, 1999; Galaskiewics, 1996; Powell, 1990) express in networking theories when they observe that networks of firms are increasingly competing against each other instead of fostering competition among other firms.

The second case of network formation or cooperative agreement is that of **(2) the *internalisation of technological externalities*** (cf. Colombo, 1998). In an oligopolistic industry[39] the costs of research and development (R&D) contribute either positively or negatively to the cost/demand of the firm's output. R&D investments result in process or product innovations, which lower the cost of production or increased demand. Negative R&D externalities arise when the innovators' products closely substitute for one another, thus increasing the cost of innovation (Hansén, 1981; Brander and Spencer, 1984). Additionally, if a firm devotes a larger amount of resources to R&D it is more likely to obtain able-to-patent intermediate results that lead to costlier and/or more hazardous innovation activity by other firms (Colombo, 1998). Positive externalities of technological R&D investments arise if the protection of intellectual property is weak and therefore the costs of imitation are low, resulting in spill-over effects that create a public-good aspect of inventions (cf. Katz and Ordover, 1990). Industrial organisations apply game-theoretic models. They illustrate the internalisation of positive and negative externalities of technological investments through collaborative arrangements. According to Kamien, Muller and Zand (1992), cooperation in R&D increases the amount of investments by firms through the sharing of risks and contributions in terms of competencies, therefore leading to increased social welfare. The opposite result, a negative result for social welfare, occurs when cooperation extends forward to the production stage and the amount of shared R&D is large. If the products of firms are close substitutes, the output reduction due to collusion engenders a loss of consumer surplus that is generally not compensated by greater profits (Colombo, 1998). In terms of uncertainty

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38 The concept of certainty and uncertainty, and how it materialises, is discussed in Chapter three.

39 Thought could be given to the notion that all advanced industries are oligopolistic.

avoidance, the micro-economic insight leads to the conclusion that firms in different stages of R&D investment experience different outcomes from cooperative arrangements. On the one hand, cooperative behaviour increases the willingness of firms to innovate because of better access to complementary resources (competencies) and the lower risk involved in investments based on sharing. On the other hand, the outcome of cooperation is negative, and it is argued here that this occurs especially when it is among competitors, when the joint R&D comes up with alternative products that closely resemble each other. The effect may be positive, however. One example of this is the development of semiconductors, which benefits a number of industries and the firms involved are not competitors: R&D activities are conducted by firms that are not in direct competition, but that use the results of R&D in their respective industries in order to produce new products (Brander and Spencer, 1984).

The third type of internalisation of externalities discussed by economists and leading to cooperative arrangements comprises **(3*) vertical externalities***. In cases of scarce resources under imperfect competition, there is negative vertical externality for an upstream monopolist owning *bottleneck facilities* that is connected to "double marginalisation" (Cournot, 1927 [1838]). The principle is that oligopolists owning a common bottleneck facility create surpluses for producers and consumers due to avoiding double marginalisation originating from combined mark-ups. Nevertheless, Colombo (1998) points out that vertical mergers or joint ventures and cooperative agreements may have a negative anti-competitive effect leading to collusion and an overall decrease in social welfare. Fusfeld (1958) provides evidence for this effect through the backward-integration practice of the steel industry to produce coal as well. An uncertainty-reducing firm attempts vertical inter-firm organisation when a resource is scarce because of the increased certainty of goal attainment.

The fourth reason for cooperative action from a neo-classical economist's perspective concerns **(4) *network externalities***. The principle here is that the value of each sold product unit increases with every unit of the product sold. This applies to fax machines, telephone subscriptions, SMS technology and email software, for example. Each new sold fax machine increases the value of all fax machines in use because, as a result, every owner of a fax machine has increased connectivity[40]. Katz and Shapiro (1994) distinguish direct and indirect network externalities. The direct effect refers to the two-way communication networks described above, and indirect network externality

[40] My discussion on network externalities stems from the question: "*What was the value (not the price) of the first fax machine?*"

occurs in the so-called hardware-software paradigm, when users need compatible hard- and software in order to use either product. This type of externality affects industries that produce system goods and network industries, and therefore there is a strong uncertainty-avoidance factor through the cooperative arrangements that are put in place in order to achieve compatibility and common standards.

Neo-classical economics are helpful in explaining why firms cooperate under certain conditions. Nevertheless, one shortcoming is that it does not explain *which firms cooperate* and how they *choose their partners*: the assumption is that, ex-ante, all firms have private incentives to cooperate (cf. Colombo, 1998). Another shortcoming is its conceptual nature and difficult operationalisation, even though the conceptual approach is helpful in understanding why firms cooperate and form networks for different purposes.

The discussion in neo-classical economics in this context goes further by attempting to determine *why firms use* cooperative agreements in order to avoid externalities, and why they do not use total integration in the form of mergers and acquisitions[41] in order to achieve the same result, thus having total control over their goal-attainment process. This approach could also be defended in terms of dependence [42]. Kay (1998) argues that, on a business-unit level, cooperative arrangements [joint ventures] represent only a second-best solution to M&A because a joint venture does not give a firm any additional advantage that it could not capture. He points out that setting up the contractual agreements needed for joint ventures is costly, and that there are inherent inefficiencies in joint ownership due to greater complexity of the control chain, problems of diverting objectives, and imperfect coordination. Additionally, the danger of spill-over threatens the competitive advantage of the firm. Colombo (1998) emphasises the corporate level, and describes two situations in which alliances are likely to be a first-best solution: (1) when the costs of setting up M&A are greater than those of an alliance, and when the management of a large organisation is inefficient (e.g., Williamson, 1975); (2) when the assets the firm wishes to acquire are only a small portion of the merger and acquisition target, or when the specific assets are an inseparable part of the collection of resources possessed by the target partner[43]. Under these assumptions, large companies that are highly diversified (in activity and location) are expected to resort to alliances rather than to M&A.

In sum, the economists' point of view provides a good explanation for why firms cooperate, but it falls short in helping us to understand which firms enter

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41 Mergers and acquisitions are included in the abbreviation *M&A*.

42 This is discussed in the section about the outside control of the firm.

43 Hennart and Reddy (1998) discuss this convincingly.

in inter-firm organisations, and on what basis they choose the other contributors. Nevertheless, many situations in which inter-firm organisation occurs are easily explainable, even though this school of thought has no specific theory[44] in this regard.

2.5.3 Ernst's Typology

Manuel Castells (1996) is the proponent of a vision of emerging network enterprises, and he criticises the approach of economists (such as Williamson, 1975) who attempt to explain the emergence of large corporations based on the optimal solution for reducing uncertainty and transaction costs by internalising transactions within the corporation. Castells refers in his book "*The Rise of the Network Society*" (1996) to empirical evidence that analyses the structure and practice of large corporations in global terms, concluding that visions of trans-national corporation are outdated and they should be replaced by the emergence of international networks of firms, and of subunits, as the basic organisational form of the informational global economy. Ernst (1994) summarises a substantial amount of empirical evidence concerning the formation of inter-firm networks in the global economy, and considers that most economic activity in leading industries such as the automotive and electronics industries, is organised around five different types of networks (Ernst, 1994):

(1) Supplier Networks
(2) Producer Networks
(3) Customer Networks
(4) Standard Coalitions
(5) Technology Cooperation Networks

The supplier network is defined as arrangements between a client, the focal company and its suppliers of intermediate production inputs, such as OEM car manufacturers and their first-tier suppliers, with subsequent relationships down the hierarchy.

Producer networks include all co-production arrangements among competitors entered into in order to pool their production capacities and their financial and human resources with a view to broadening the product portfolio and geographical coverage.

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[44] This is to the best of my knowledge.

Customer networks are defined as the forward linkages of manufacturing companies with their distribution channels, including logistics firms, wholesalers, value-adding retailers and users, either in the major export markets or in domestic markets.

Standard coalitions are initiated by potential global standard setters with the explicit purpose of locking-in as many firms as possible into their proprietary product or interface standards.

Technology-cooperation networks are defined as facilitating constructs for the acquisition of product design and production technology to enable joint production and process development, and to permit generic scientific knowledge and R&D to be shared.

Ernst (1994) suggests that international business networks are centred around a large corporation, or on alliances or cooperation between such enterprises. In his opinion, small and medium network enterprises exist[45] but they play a minor role on the global level. According to this viewpoint, oligopolistic concentration has apparently been maintained, and has increased not only in spite of but also because of the networked form of organisation. The explanation is that access to strategic networks requires substantial resources in the form of technology, finance and market share.

Such a view is supported in this study, even though I see little conflict in the notion that firms enter into cooperative forms for the purpose of "*network competition*"[46] as opposed to competition between individual firms. No conflict is seen in the notion that firms try to minimise their level of uncertainty by entering into such arrangements. The argument supported here is that firms choose a position between the market and the hierarchy in order to avoid different problems of coordination, depending on the situation. The typology of the five network forms fits very well in the overall concept of uncertainty reduction and *interdependence*[47], and does not conflict with the neo-classical view illustrated above. Supplier networks share certain similar advantages: cooperative agreements (e.g., Colombo, 1998) in order to avoid vertical externalities, and producer networks that are compatible with what neo-classicists refer to as the internalisation of horizontal externalities. Customer networks are, to some degree, comparable to the internalisation of network externalities[48], or to the vertical integration of externalities producing the same overall welfare effect. Standard coalitions and technological

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45 As in South East Asia, Japan or Northern Italy, for instance. Cf. Achrol and Kotler (1999).

46 In order to ensure common understanding throughout the text, I prefer to use the term *network competition* to describe competition between cooperative clusters of firms.

47 The concept of *interdependence* is crucial to this study and will be dealt with together with the concept of uncertainty in Chapter three.

48 Commonalities between the concepts are given when the structures of certain industries are taken into account, e.g., telephone operators.

cooperation networks are covered by the neo-classical discussion on technological externalities. What separates the different perspectives is that the neo-classicists attempt to optimise the coordination by internalisation in the form of proprietary arrangements. The view supported by Castells and Ernst is based on inter-firm organisational forms, which use either market-like coordination mechanisms or firm-like coordination, depending on the circumstances.

2.5.4 Achrol's Typology

Another approach is from the managerial marketing perspective and is supported by Achrol and Kotler (1999). They see leading industries becoming more dynamic and knowledge-rich environments. Hierarchical organisations become disaggregated into a variety of network forms, including:

(1) Internal Networks
(2) Vertical Networks
(3) Inter-market Networks
(4) Opportunity Networks

The different forms of networks in Achrol's (1997) classification are all centred on a single, often powerful, central firm or hub firm that is consciously establishing the network to serve its own interests in terms of controlling the key activities and resources.

Internal networks are designed to reduce the hierarchy and open firms up to their environments. They are distinguished by (a) layered networks that are composed of an operational layer of cross-functional teams on the one hand and a knowledge-creating layer of functional silos on the other, connected internally and externally through an extensive data bank of knowledge and transparent information flows; and (b) internal market networks that are firms organised within corporate units that operate as semiautonomous profit centres buying from and selling to, or investing in, other internal and external units that best serve their needs on market-determined terms of trade but subject to company policy.

A *vertical network* comprises a group of resource firms specialising in various products, technologies or services that constitute the inputs of a particular industry, organised around a focal company that focuses on monitoring and managing the critical contingencies faced by the network participants in that market.

Inter-market networks consist of institutionalised affiliations among firms that operate in several related und unrelated industries, centred around a bank and a traditional trading company, for instance, and held together by interlocking managements, shared resources and strategic decisions, periodic patterns of collective action, and strong social ties[49].

Opportunity networks, or customer-opportunity networks, are bodies of customers organised around a central information company. Such a body serves as a clearing-house for the marketing transactions it brokers and regulates on behalf of its member customers and participating suppliers. Opportunity networks represent a range of products, technologies and services. Good examples of this type of network are e-markets and electronic procurement markets[50]. They bring sellers and buyers of a certain industry together in order to facilitate market-like transactions where possible, depending on the complexity of the economic activity and the sophistication of the trading platform.

This approach uses sociological theory rather than neoclassical economic theory or power-dependence in order to explain different kinds of networks. The managerial approach uses the interdependence of ties between actors in order to explain why firms choose to use increasingly non-hierarchical means of coordination and control (Achrol and Kotler, 1999). The approach originates from the observation that value is increasingly created by intangibles that are loaded with knowledge resources (e.g., Kelly, 1998; Davis and Meyer, 1998; Rifkin, 2000). Therefore the organisational design has to respond to the requirements of information and knowledge, and the coordination in its centralised form is considered unsuitable in terms of efficiency. Networks, or organisational constructs between the market and the hierarchy, on the other hand, have the flexibility to use coordination mechanisms that correspond to the needs of knowledge-rich environments, which is an alternative to the neoclassical approach. The neoclassical perspective focuses on production costs, whereas the managerial network deals with intangibles such as knowledge, where the laws of production are fundamentally changed. *Unit-one costs* are a good example. In some industries, such as software, it is more obvious that once the first unit has been produced, all further units have negligible production costs that do not even enter the mathematical equation. It is less obvious but nevertheless existent in other industries. For instance, the automotive industry is one in which the production is heavily based on mechanics and physical products, but the value

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[49] This form of inter-firm organisation is very much used in East Asian economies, and in some European countries such as German-speaking central Europe where banks have a leading role in organising such networks.

[50] A strong network of this type in the automotive industry is Covisint (www.covisint.com).

of the product is increasingly determined by intangible elements such as innovations in materials, production processes, organisational aspects, marketing technology and patents. Mercer Management Consulting (2001) forecast that the value of electronics and software in passenger cars is set to increase from the current (2001) 22% to (2010) 35%. The managerial marketing-network approach, as this kind of network study could be classified, reflects these kinds of changes in a more direct way than the neoclassical explanation, even though the economists' view also provides some explanation for the internalisation of technological externalities with the special cases of R&D and standard setting. Ernst's (1994) network classification is also in line with the Achrol (1997) classification, the difference being that it places more emphasis on purpose and structural result than on the underlying developments that lead to the need for organising networks. Achrol's classification does not directly conflict with the uncertainty-avoidance approach or with the view on interdependencies underlying this study. One potential conflict with the network studies investigated so far, and with the approach I use in this study, concerns the systems view. It is in this context that I make an attempt not only to deal with interrelatedness, but also to look at the possible systemic challenges of networks[51], which receive little attention in the different approaches. The argument put forward by Simon (1969), that tightly coupled systems produce problems when disturbances occur, is given scant attention in most network approaches. An example helps to illustrate the downside argument of such networks. As Achrol and Kotler (1999) point out, some network forms[52] are widely used in specific cultural and geographical contexts. Given Simon's (1969) notion of system connectedness, and with reference to the Japanese economy during the 1990s, it is apparent that tightly coupled systems, as are found in the Japanese "*keiretsu*" economic model, lead to difficult-to-locate problems that have vast systemic effects that leave literally no industry unaffected by a state of crisis. From this point of view, it is also necessary to highlight the fact that a network economy has its problems. The firm, as the point of departure for this investigation, has to consider in its "*inducement-contribution*[53]" analysis what potential risks are involved in tight coupling[54].

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51 E.g., negative effects created through systemic interconnectedness.

52 To be specific, Achrol and Kotler (1999) use the term *inter-market networks*.

53 The "inducement contribution" of Homan (1950) is an economic explanation for why firms enter into inter-firm organisations. People (firms) join organisations when the expected benefits of entering outweigh the estimated costs.

54 Every business newspaper illustrates the effects of bankruptcies in terms of "follow-up" bankruptcies. The case of the effects of Enron's bankruptcy in 2002 in the United States underlines Simon's (1969) argument.

2.5.5 The Nordic Network School

Another interesting network approach is that of the industrial-network school (e.g. Axelsson and Easton, 1992; Håkansson and Snehota, 1995; Möller and Wilson, 1995). One of the school's classification attempts strives to answer the question of what value a network produces and what goals underlie its formation (Möller and Rajala, 2001). Möller and Rajala's preliminary study of strategic nets are classified according to five basic goals: (1) an increase in the functional efficiency of an existing value system; (2) modification of the value system involving limited innovation; (3) the creation of new value systems; (4) the creation of competitive alliance; (5) the provision of an institutional setting for networking. Goal-attaining organisational networks are classified in four different forms (Möller and Rajala, 2001):

(1) Vertical Supplier Net
(2) Vertical Customer Net
(3) Horizontal Net
(4) Space Net

This classification is similar to and different from the other approaches investigated so far. Similar features include the direction of cooperation from a value-chain perspective, whether vertical or horizontal. What is interesting in this classification is the separation between *supplier nets* and *customer nets*. Even though similar coordination mechanisms are used in both cases, there is still a distinction between forward and backward processes in the value chain[55]. This is an approach that has also been used by Ernst (1994). What is not clear is the reason for this distinction. From a systems perspective, with an input-transformation-output model it is of relatively little relevance whether the vertical inter-firm organisational structure concerns forward or backward activities in a value chain since the type of interdependence between the actors determines the coordination methods used to some extent. The Achrol (1997) classification that distinguishes between vertical and opportunity nets captures the same phenomena in a clearer manner. Horizontal nets in Möller and Rajala's study are sub-divided into (a) competitive alliances, (b) access alliances with competitors, (c) access relationships with institutions, and (d) R&D/technological project nets. The differences among them are based on the value-creation goals of different constructs. The last class of inter-

[55] It is not clear why such a distinction has been made because, in my view, it only varies in terms of point of view.

organisational forms in the study concerns what has been labelled *space nets*, which are distinguishable in hollow organisations and complex business nets using different coordination mechanisms in order to form what has been expressed in Achrol's (1997) classification as opportunity networks, or in Ernst's (1994), to some extent, as customer networks. This classification, like the ones described above, gives little attention to what could be called *diagonal networks*[56], which use the resources and activities of different players on vertical and horizontal levels for purposes such as R&D. What comes closest to *diagonal forms* is Achrol's (1997) inter-market network, which he claims places a strong emphasis on the cultural and geographical characteristics that trigger such behaviour.

2.5.6 The Grandori and Soda Approach

Grandori and Soda (1995) investigated inter-firm networks from the perspective of organisational mechanisms such as coordination, control and integration, to name a few. Their typology distinguishes between:

(1) Social Networks
(2) Bureaucratic Networks
(3) Proprietary Networks

Social networks are based on purely inter-personal and social relations in the sense that they are not outcomes of formal agreements of any kind. The question of how far social networks influence business behaviour is interesting but also challenging. Concepts such as "*trust"* are treated as a coordination mechanism[57]. Contractual agreements among firms, in a Western setting, certainly show little evidence of trust, and that is also understandable considering that the personal relationship is not necessarily consistent with the business relationship. An organisation as an institution cannot count on the trust of its members over a long-term period, although there are exceptions. Italy is famous for its small and medium-sized enterprises, which work to a

[56] By way of illustration I suggest the example of the creation of the video-cassette recorder (VCR). Different specific assets and specialised activities (electronics, chemistry, physics) had to be combined in order to develop VCRs.

[57] In this study I avoid concepts such as *trust* because they are very difficult to capture. Trust, in my view, is a subjective perception that provides a comforting reassurance. In my experience, it is important but in an inter-firm organisational context I assume contracts to be more relevant. A simple justification is that trust is mainly between people, but people change positions and companies. To rely on trust as the sole coordination mechanism would presumably be counter-productive in terms of avoiding uncertainty about the future.

large extent based on social networks and that operate successfully over a long period of time. What might be a further factor in this success is the entrepreneurial environment in which this is happening, and once the trust in the entrepreneur is disturbed, trust in the organisation is also decreased. In more general terms, this can hardly be supported because Western companies do not base their longer-term future goal attainment on personal relationships between organisational members. In that sense, the social networks described by Grandori and Soda (1995) are certainly valid in a particular context (e.g., Northern Italy, the Middle East, the Far East), but can hardly be generalised to all organisational realities. Social networks as a secondary mechanism in inter-firm organisations are more easily understandable since they increase the efficiency of other coordination mechanisms used[58].

Bureaucratic forms of networks are those inter-firm coordination modes that are formalised in exchange or associational contractual agreements. On the market – hierarchy continuum, a firm-like position is accompanied by similar sets of coordination mechanisms. Grandori and Soda distinguish between symmetric and asymmetric forms[59], which adds an interesting feature - also discussed in other approaches described above. The question here concerns who is driving the direction of the network, and whether decision-making is centralised or not. Associations, cartels or consortia are examples of symmetric forms, while asymmetric forms include licensing and franchising[60].

The third form of inter-firm organisational network is classified as *proprietary networks*. The essence of this distinction is not, as in bureaucratic networks, the contractual arrangement among the participants, but it is based on ownership rights and the influence on goal direction that such rights exert. Examples of this form of network include cross-capital holdings, joint ventures and arguably some forms of mergers and acquisitions. The approach by Grandori and Soda (1995) is very different from the other approaches described above since it is not the form itself that is investigated, but it is rather seen as an outcome of the underlying mechanisms that lead to a certain form of structures and processes[61].

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[58] Coordination is extensively discussed in Chapter six.

[59] The underlying concepts of power, sources of power, influence and control are discussed in Chapter six.

[60] Both business models vary to a large extent in their organisational forms, spanning market-like and firm-like organisational solutions. Additional insights are provided in Boyle (1999).

[61] I share the same approach in this study. The underlying principle is that the constituent parts can be analysed and explained. The combination of parts and their diverse natures creates a large number of possible organisational forms that in turn can be understood when the nature of the parts is clarified. I have found support for this approach in Pinder and Moore (1979) and Letiche (2000), for instance.

2.5.7 Comparisons of Different Theoretical Approaches

In this review so far I have analysed and compared some interesting streams of thought in order to establish the field and to find valuable insights in terms of attaining my goal of creating an understanding of inter-firm organisational formation and forms. The review has highlighted some of the outcomes, or organisational forms, of inter-organisational activity. The research streams described above have only indirectly addressed the formation process itself. One starting point is the reason for inter-firm organisational formation. The literature provides a long list of reasons emphasising different aspects, including[62] value creation (Doz and Hamel, 1998), transaction-cost reduction (Williamson, 1975), increase in power over important aspects of the environment (Pfeffer and Salancik, 1978), cost and benefit considerations (Powell, 1990[63]), the alignment of the firm's own interests with the interests of others (Freeman, 1984), obtaining legitimacy (Meyer and Rowan, 1977) and countervailing power (Galbraith, 1967), and the absorption of knowledge in order to create value (Hamel, 1991). The reasons for inter-firm organisational formation as listed above rest on certain theoretical approaches[64] including (1) the transaction-cost approach, (2) the resource-dependence view, (3) the stakeholder theory of the firm, (4) strategic-choice theory, (5) institutional theory, and (6) the organisational-learning approach. In my view, all of these approaches share one underlying reason for inter-firm organisational formation. Because the course of events and the state of the world in the future are, to a greater or lesser extent, unpredictable, inter-firm organisations are created for the avoidance of uncertainty. The transaction-cost approach can be interpreted to imply that optimising the transaction cost contributes to a better competitive situation and therefore provides brighter future prospects. In its emphasis on the "*outside control of the firm*", the resource-dependence view advocates uncertainty avoidance through inter-firm engagement. Inducement contribution (Homans, 1950) in strategic-choice theory could be interpreted as avoiding uncertainties in similar ways as in the transaction-cost approach. The stakeholder theory uses the concept of uncertainty as a basic motivator for inter-firm alignment. Organisational learning through inter-firm organisational engagement contributes to the promotion of technological advantage and therefore creates an increased perception of certainty. According to

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[62] It has to be pointed out that this list is not complete, and the references are also to be understood as examples of authors who emphasise one or more of the rationales.

[63] Homan (1950) can be counted as one of the original proponents of that line of thought.

[64] In the same order as the reasons were listed.

institutional theory, alignment with other firms provides uncertainty reduction in terms of appearing legitimate and conforming to prevailing social norms[65].

This brief review and analysis of different theoretical views and their explanations of inter-firm organisational formation reveals one more option for this study. Firms enter into inter-firm organisations because the future cannot be accurately anticipated[66]. The concept of *uncertainty reduction* is used as a bottom-line explanation of inter-firm organisational formation in the context of dependence on environmental aspects. All other external explanations or reasons are on a higher level of rationalisation, and are more specific than uncertainty avoidance[67].

Following this theoretical overview of inter-firm organisational formation, I will now turn to inter-firm organisational forms. While the above section deals with specific driven theories about inter-firm organisational formation, the following one places more emphasis on its specific forms. This distinction represents a thin line between the description and explanation of inter-firm organisational formation and the sense making of the functioning of diverse forms. The following discussion introduces a number of different contributions in order to scan the field and analyse the dominant parameters that underlie inter-firm organisational forms.

Barringer and Harrison (2000) provide a good overview of the most commonly described and discussed inter-firm organisational forms. They highlight six forms of inter-organisational relationship including: (1) joint ventures, (2) networks, (3) consortia, (4) alliances, (5) trade associations and (6) interlocking directorates. Chesbrough and Teece (1996) discuss inter-firm organisational forms especially concerning the design of the work system, and introduce their views on a centralised/decentralised continuum. They place (1) virtual companies, (2) alliances, (3) joint ventures, (4) corporations with autonomous divisions and (5) integrated corporations along a continuum featuring decreasing risk[68]-taking incentives and an increasing ability to coordinate economic activities. Another view of inter-firm organisational forms that it is interesting to include in this pre-understanding is Werther's (1999) organisational structure-based study on (1) hollow organisations and (2) virtual organisations. By way of contrast, the journal "*Zeitschrift für Führung und Organisation*", ZFO, (Chrobok, 1998) distinguishes inter-firm

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65 For this analysis I used the discussion offered by Barringer and Harrison (2000).

66 This depends on the situations and varies in degree. This will be discussed in later sections dealing with the degree of uncertainty as a limiting factor in the universe of discourse addressed in this study.

67 Other reasons for explaining the formation and choice of contributors are firm-based, and are discussed in Chapter four.

68 I deal with the distinction between risk and uncertainty in the section on *uncertainty*.

organisational forms based on (1) contractual relationships[69] and (2) ownership-based relationships[70].

Barringer and Harrison's (2000) investigation[71] provides a wide range of forms and also the broadest selection of underlying dimensions, all of which support our understanding of how inter-firm organisational forms function. Joint Ventures are seen in this approach as resource pooling for diverse inter-firm organisational-goal achievement in terms of internationalisation or technology transfer, for instance. Networks are explained through the management of interdependencies of participating contributors in this type of form. Consortia function based on their common goal-achievement need, and they are typically concerned with problem solving and research and development activities. Alliances are contractual arrangements between firms with the basic purpose of creating exchange relationships. Trade associations are guided by the principle of common interest and information sharing. Interlocking directorates serve the purpose of informal cooperation on the highest hierarchical and information-sharing levels. Barringer and Harrison's (2000) treatment is primarily concerned with the underlying purpose of organisational forms. In their view, in a nutshell, a "structure of the inter-firm organisation follows the individual goals of contributors and those determine the common purpose constituted in the inter-firm organisation". The classifying feature in their theoretical investigation is based on the systemic tightness of inter-firm organisational forms[72]. The classification divides forms into a "*tightly connected*" group comprising joint ventures, networks and consortia, and a "*loosely connected*" group including alliances, trade associations and interlocking directorates. Chesbrough and Teece (1996), in contrast, are primarily concerned with two distinguishing dimensions. They propose a continuum of inter-firm organisational forms that is quite consistent with the view I express in this study. They agree on emphasising a continuum between the market and hierarchy paradigms, and draw a line in between. The continuum[73] consists of virtual companies, alliances, joint ventures, corporations with autonomous divisions and integrated companies. Along this

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[69] ZFO defines contractual as (a) traditional forms such as supply contracts, franchising and licensing, and (b) new forms such as R&D agreements, and common supply management.

[70] Ownership-based forms are classified as (a) the creation of new entities such as dependent units (e.g., international sales organisations) and independent units (JV = joint ventures), (b) the dissolution of entities (e.g., M&A = merger and acquisition), and (c) no new entity, described as minority-equity and cross-capital holding.

[71] Their investigation is based on a wide literature review.

[72] Compare the above discussion about systemic coupling and tightness, and Simon (1969).

[73] The virtual company is closest to the market paradigm and opposite to the *integrated corporation,* which illustrates a position close to the hierarchical. According to Chesbrough and Teece (1996), those close to the market positions of inter-firm organisational forms represent a decentralised structure, and those close to the hierarchy positions on the continuum represent centralised structures.

continuum, the further the organisational structure moves away from a position close to the market paradigm, the lower is the incentive to take risks, and the further the organisation moves away from a hierarchy position, the lower is the ability to deal with conflict and to coordinate economic activity.

Werther's (1999) study follows the transaction-cost view in distinguishing two forms along the market and hierarchy continuum. *Make or buy* decisions are used in order to describe the difference between virtual and hollow organisations. These two forms are explained as evolutionary developments from traditional forms. Their inductive treatment includes the example of *Chrysler,* which transformed itself from an integrated corporation to a hollow organisation through the process of executing make-or-buy decisions. Virtual organisations, on the other hand, are exemplified through the case of *Smith Corona*, which basically out-sources all activities apart from the management function among contributing firms in inter-firm organisations. Werther (1999) bases the difference between the two forms on "*intent*" and "*extent*". "*Hollow firms seek economies within the current structure; virtual firms externalise all but core activities*". Before integrating interesting components of this view into my study I should emphasise the fact that Werther's investigation is mainly concerned with connected *work systems* that are created by inter-firm organisation.

The next contribution that is significant and influential for my study is the *ZFO* classification attempt (Chrobok, 1998). This is a refreshingly different approach to that in many other inter-organisational studies since it also reflects the German cultural background, which is in many ways different from the Anglo-Saxon tradition. The "*proposed definition*[74]" that ZFO provides for academics and practitioners is based on the systematic classification of more or less tangible constructs. Its main distinction is in branching out from the concept of cooperation. Cooperation in that sense is seen as the basic motivation for inter-firm organisational formation and form. From this starting point, their classification distinguishes basic forms of contractual arrangements and equity ownership. Both of these are easy to investigate because they are formally recorded. The two lines branch out into contractual relationships in traditional and new forms, and in ownership-based inter-firm organisational forms including the creation of new units, unit dissolution and the generation of non-new units[75].

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[74] From the German Definitionsangebot.

[75] In this context I would like to refer for broader reflection to Zettinig and Hansén (2002), Partner Selection in International JVs: Selection Variables for Strategic Long-Term Fit Between JV Partners. A Systemic Network Approach. In: Jorma Larimo (ed.) Current European Research in International Business. Vaasan Yliopiston Julkaisuja, Vaasa. Pp. 146-162.

Approach	Forms	Function	Dimension
Barringer, Harrison (2000)	• Joint Venture • Network • Consortia • Alliance • Trade Association • Interlocking Directorates	Resource Pooling Problem Solving Mgt Interdependencies Mgt Exchange Common Interest Informal Cooperation	Tight Coupling Tight Coupling Tight Coupling Loose Coupling Loose Coupling Loose Coupling
Chesbrough, Teece (1996)	• Virtual Companies • Alliances • Joint Ventures • Autonom. Corp. Units • Integrated Corp. Units	Risk Taking High Risk Taking Low	Conflict Solving and Coordination LOW Conflict Solving and Coordination HIGH
Werther (1999)	• Virtual Organisation • Hollow Organisation	Externalisation of Non-Core Activities Economies within Current Organisational Structures	Work System
ZFO, Chrobok (1998)	• Contractual - traditional forms - new forms • Equity - new entities - common entities - dissolved entities	Formality of Relationship	Time Horizon Interdependence Virtuality Independence Outside Own Identity Membership Access

Figure 2.4 Dimensions and Functions of Inter-firm Organisational Forms

This approach could also be integrated into a market and hierarchy continuum. ZFO provides tools for further classification among inter-firm organisational forms too, and the following dimensions facilitate such ramifications: (1) the time horizon of inter-firm organisation, (2) interdependence between contributors, (3) degree of virtuality[76], (4) degree of independence of action outside the inter-firm organisation, (5) degree of contributor identity and (6) access to membership in inter-firm organisations.

Figure 2.4 summarises the investigated forms with their functions and the underlying dimensions. One aspect of this far-from-complete investigation is the relatively small number of bottom-line explanatory dimensions offered in most cases.

While Barringer and Harrison (2000) investigate in depth diverse concepts, which they then distinguish based on their own set of characteristics, they conclude that one single dimension, systemic tightness, could be used to classify the overall differences between inter-firm organisational forms. Chesbrough and Teece (1996) also discuss a wider array of forms and

[76] Virtuality in this approach is seen as a function of coordinating the work process.

conclude that important underlying dimensions include risk taking[77] and coordination[78]. Werther (1999) bases his explanatory model of two emerging forms of inter-firm organisation on the organisation of the internal work process, and on how a shift from an integrated work system towards a market-based system results in new organisational forms. The dimension of work system he chooses, in fact, has a rich array of inherent explanatory variables. Chrobok (1998) provides a rich toolbox for building a classificatory framework for inter-firm organisational forms. The determining factor of time can be used to identify the strategic importance of an inter-firm engagement. Interdependence as such reveals many details of the formal or informal relationship between contributors. Virtuality reflects similar issues as discussed in Werther's (1999) study. There is an implicit power dimension in the concept of the economic independence of contributors. The access dimension comprises an important criterion in the formation process, and is contributor-dependent.

The above analysis of different approaches brought one fact to my attention. There are different explanatory models that are based on only a few dimensions. Such models do not always promote a satisfactory understanding of inter-firm organisational forms and taking into account a larger number of dimensions should contribute to achieving a better understanding. The downside of such attempts is equally obvious. The larger the number of explanatory dimensions, the higher is the computational complexity of such frameworks. Due to the fact that such complexities are difficult to capture and to express in an explanatory framework, my way of dealing with this challenge is to investigate the relative importance of a large number of dimensions and then to choose those with the highest explanatory power in order to provide equally interesting tools for practitioners and academic researchers.

If I may return to the discussion on different theoretical approaches to inter-organisational studies, I could offer a number of observations. There are not many theoretical approaches in this field that are holistic. Explanations why diverse inter-firm organisational forms are created are mostly narrow. Therefore neither of the theoretical approaches is fully able to provide a robust theory for inter-firm organisational formation or forms. On the other hand, each contribution provides a lot of different angles which, taken together, may

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[77] Risk taking in the spirit of this study could be expressed as a "low need to avoid or reduce uncertainties".

[78] Conflict resolution in my definition is an outcome of coordination. Coordination, as I discuss in a later section of the study, has three elementary determinants (the nature of information, the distribution of information and decision-making rights) that facilitate distinction between different coordination mechanisms.

result in a meta-framework and lead to the establishment of an acceptable theory. That such an attempt needs to be holistic and eclectic is supported by the fact that no approach with a single explanatory framework can capture the complexities. Further, I would like to propose that, given ideas of complexity theory[79], one also has to be aware that when dealing with such complexities, potential outcomes are many and they depend on the situation[80]. In order to meet this challenge, the business researcher can look outwards to other sciences and borrow methods that have helped in similar organisational tasks. Therefore creating a framework that provides mid-range theories might be justified in investigations of inter-firm organisations using taxonomic methods[81]. To conclude this section, I offer a quotation from Barringer and Harrison (2000): "As management researchers, we are hard pressed to think of another organisational practice [than inter-organisational research] that can be justified from such a broad range of traditions". The aim in this study is to use valuable approaches and to integrate them into a holistic meta-framework that allows mid-range theories of inter-firm organisational formation and form[82].

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79 Cf. Letiche (2000)

80 By "depending on the situation" I mean depending on the external environment of which the firm is part, and on the internal determinants.

81 Cf. Pinder and Moore (1979)

82 More complete overviews of Inter-firm organisational theory are given in the appendix.

3 AN ENVIRONMENTAL EXPLANATION FOR INTER-FIRM ORGANISATIONAL FORMATION

3.1 Rationales for including Environmental Explanations

I introduced the systemic model of the embedment of the firm in its environment in Chapter 2.3 (Figure 2.1.). In the same section on the organisation and its environment I investigated how the stakeholders of the firm select their domain as a combination of factors (a) involving what the firm chooses to do[1] (b) in the task environment (Figure 2.2.). Because I am using a systemic approach, according to which the wholeness of the firm is embedded in the environment, I acknowledge two explanatory causes that are intertwined. The first is *the nature of the environment* as a trigger and provider of rationales for inter-firm organisational formation, and the second is the firm's *internal nature* that influences such formation. The current section deals with the environmental explanation.

The primary reason and justification for including an environmental explanation is the need to understand the context of the firms involved in the formation of inter-firm organisations. The context in which such decisions are made is the environment and the dynamic developments that happen in it. Pfeffer and Salancik (1978) express this relationship of the firm with its environment accurately as follows: "*Organisations are inescapably bound up with the conditions of their environment*". This statement expresses the fact that the firm is dependent not only on the structure of the environment, but also on changes happening within it. Therefore, "*All organisations engage in activities which have as their logical conclusion adjustment to the environment*" (Hawley, 1950; Hansén, 1981). Hawley points to another important process in this statement, the adjustment of the firm to the conditions of the environment[2]. This leads me to the presumption that the dynamics in the environment cause adjustments in the firm that lead to inter-firm organisational formation. As the discussion on complexity theory (e.g.,

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[1] In further references to the concept "*what the firm chooses to do and what the firm does*" I use the term *specialisation*.

[2] The adjustment process is considered in the firm-based explanatory model of inter-firm organisational formation. See the section on the adaptation of the firm.

Letiche, 2000) in Chapters one and two implies, therein lies the challenge. In order to understand the reaction of a firm to environmental conditions I need to understand the underlying components of the environment. This section investigates different research approaches that provide explanations of inter-firm organisational formation with a view to selecting components that interact and create new contingencies.

3.2 Theoretical Contributions explaining Environmental Effects on the Firm

The theoretical literature on the formation of inter-organisational relationships is scattered across several disciplines (Contractor and Lorange, 1988; Osborn and Hagedoorn, 1997; Koza and Lewin, 1998; Barringer and Harrison, 2000). Barringer and Harrison (2000) summarise the findings of six theoretical contributions to the literature on inter-firm organisational formation: transaction-cost economics, resource dependence, strategic choice, the stakeholder theory of the firm, organisational learning, and institutional theory[3]. Discussion on these explanatory models has resulted in the notion that an underlying dimension that strongly influences inter-firm organisational formation is *uncertainty*. Uncertainty caused by environmental factors directly or indirectly results in a firm's behaviour that leads to the formation of inter-firm organisations. After reviewing different theoretical approaches (e.g., Backman, 1965; Galbraith, 1967; Williamson, 1975; Meyer and Rowan, 1977; Pfeffer and Salancik, 1978; Hennart, 1988; Backer, 1990; Powell, 1990; Powell and DiMaggio, 1991; Hamel, 1991; Harrison and St. John, 1996; Barringer and Harrison, 2000), I have decided to adopt a *resource-dependence view* of uncertainty as a basis on which to develop a framework of rationales behind the formation of inter-firm organisations. This choice was based on the perception that it provides a very rich understanding of the influence of the environment on the decisions the firm has to take. The model developed by Pfeffer and Salancik (1978) serves as a basis for finding a satisfactory explanation of why the environment causes firms to engage in inter-firm organisations. My framework, which is discussed at length in this chapter, is an attempt to integrate environmental explanations of diverse research streams into the departure point provided by the resource-dependence view.

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[3] In the section "inter-firm organisation" I briefly discussed the main points of each of these research streams and how they contribute to our understanding of inter-firm organisational formation. For further analysis, see Barringer and Harrison (2000).

A short review of very influential explanations of inter-firm organisation rationales provides an overview of the benefits and shortcomings of the different approaches.

The transaction-cost approach (e.g., Williamson, 1975, 1981, 1991; Pisano 1990; Kreps, 1990) investigates uncertainties that are caused by market failures. Market failures as such are seen as inefficient choices of inter-firm organisational form[4]. The focus of transaction-cost economics is on the boundary-spanning activities in which firms engage in order to minimise their total costs. The inadequacy of this approach in explaining inter-firm organisational formation is inherent in the purely economic rationale on the one hand, and in its rather static view on the other[5].

The strategic-choice approach[6] could be seen as a development of Homans' (1950) *inducement contribution,* and is as such a cost-benefit analysis. When the benefits of contributorship exceed the costs, then a firm will enter into an inter-firm organisation. As such, cost-benefit analysis appears to be too simplistic, even though I would argue that it has a definite role in the formation rationale. Contributorship benefits are based on the delivery of superior products and services, an increase in work efficiency or a decrease in competition, for instance. According to that rationale, uncertainty is perceived as lowered if the inter-firm organisation provides such benefits. The problem with the approach is that it is difficult[7] to put a monetary value on both the costs and the benefits.

The stakeholder theory of the firm[8] is focused on stakeholder dependence. The firm needs to consider an interdependent web of stakeholders and it carries a responsibility to consider their legitimate claims when making decisions and carrying out business transactions[9]. This view reflects an "*alignment motive*" to overcome environmental uncertainty. Firms form alliances in order to align their own interests with the interests of stakeholders and to reduce uncertainty[10]. This and the resource-dependence approach work

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4 By way of contrast, there are costs that stem from hierarchical inefficiencies.

5 In this study, as pointed out above, the aim is to construct a framework capable of taking multiple rationales into account.

6 On this research stream, see: e.g., Backman (1965) and Powell (1990).

7 This is especially difficult ex ante. Because cost-benefit analysis is based on outcomes of future events, all variables included in rationalising are expectations.

8 See e.g., Freeman (1984) and Jarillo (1988).

9 Achrol and Kotler (1999) illustrate this kind of view when discussing the "*competition of networks*" in contrast to "*competition among firms*".

10 Examples include *standard-setting alliances*. The nature of that type of alliance is that firms participating in it align with other firms, mostly from the same industry, in order to make sure that a certain standard they build their strategy on will become an industry-wide standard and therefore reduce uncertainties in that context. For example, the GSM standard alliance founded in 1987 set the GSM standard guidelines for developing the mobile-phone standard industry-wide, and made it possible later on to reap the enormous benefits of "*network economics*". For a historic overview, see www.gsmworld.com.

very well together. Goal attainment is a very strong consideration in both approaches.

Organisational learning theories[11] are concerned with the firm's ability to recognise the value of new knowledge, assimilate it, and apply it in a business setting. According to that view, environmental uncertainty is reduced if firms engage in dialogue with technological leaders in order to absorb new knowledge and to avoid a technological back-leap. One disadvantage of the approach is that inter-firm organisations not only give access to knowledge resources, they provide access to their own knowledge pool. The difference between this approach and others is that it is concerned with a very specific resource, knowledge[12].

According to institutional theory[13], institutional environments impose pressures on the firm to appear legitimate and to conform to prevailing social norms. The simplified interpretation of the theory is that firms enter into inter-firm organisations because other firms have entered and therefore they feel the pressure to conform to such behaviour. The uncertainty component of this theory is the concern that not entering for various reasons, especially to do with conformity and legitimacy, causes uncertainty.

All these theories appear to offer well-defined reasons why firms enter into inter-firm organisations based on the pressures originating from the environment. Before commencing my discussion on the resource-dependence approach as the core of the explanatory framework, I will define the concept of uncertainty and devote a section to different typologies of environmental conditions.

The central concept of environmental uncertainty addressed here is defined in the dictionary (Merriam-Webster Dictionary, 2002/2003) as "*not certain to occur*", "*unreliable*", "*not known beyond doubt*", "*not having certain knowledge*", "*not constant*" or "*not knowing what to do or believe, or (of a situation) not fixed or able to be completely known*". The concept of uncertainty[14] has been inherently expressed in theoretical concepts such as *bounded rationality* (Simon, 1972), as discussed earlier. As Arrow (1969) points out, environmental uncertainty occurs when "*the complete decision tree simply cannot be generated – in which event the bulk of meaningful future*

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11 Cf. Hamel (1991) and Doz (1996)

12 This school of thought gained momentum, especially during the 1990s. One possible explanation is that through the further development of networked computers and the "*commodialisation*" of knowledge, such considerations have become relevant.

13 Cf. e.g., Meyer and Rowan (1977), Camerer (1988), Powell and DiMaggio (1991).

14 Uncertainty is closely related to the concept of risk (e.g., danger, loss, harm). While I define uncertainty as an uncontrollable factor, risk is considered controllable. The firm makes decisions that carry a certain degree of risk. Therefore risk is calculated and accepted. Uncertainty cannot be calculated since the factors generating it are outside the influence sphere of the firm.

transactions cannot be carried out on any existing present market". To connect this to the concept of the *enactment process* (Weick, 1979), one conclusion is that uncertainty is a result of perception. In cases when firms and their managements trying to make sense of the environment and its dynamics lead to a future state, the perception is an aggregated collective perception. In my view, it is not uncertainty as such that leads to actions of the firm that may result in inter-firm organisational formation, but it is rather the *degree of uncertainty perception*. Before entering into that discussion, and before drawing up an explanatory model for inter-firm organisational formation caused by environmental uncertainty, I will present an analysis of typologies dealing with environmental conditions.

3.3 An Analysis of Environmental Typologies and their Components

The notion that the firm is an open system that is affected by and affects the environment is very well established (e.g., Katz and Kahn, 1966; Thompson, 1967). Hence, the firm is, to a great extent, influenced by conditions and changes in the environment. McKelvey (1982) describes environments as consisting of two components, climate and texture. The dictionary defines climate as "general weather conditions usually found in a particular place". When leaving out the word weather it very well describes the firm's task environment. Texture, in turn, is defined as "something composed of closely interwoven elements". Climatic conditions foster a non-purposeful milieu that surrounds the texture of all organisations in a particular environment (McKelvey, 1982). The climate consists of purposeful entities such as organisations, institutions and individuals and their interrelationships[15]. The following sections describe different environmental typologies with dimensions that further understanding of environmental conditions.

Emery and Trist (1965) offer a typology of four environmental states of causal texture incorporating four kinds of interdependencies[16]: (1) interdependencies among several components of an organisation, which cause changes within it; (2) interdependencies emanating from the environment, which cause changes in an organisation; (3) interdependencies emanating from organisations, which cause changes in the environment; and (4) interdependencies among the many components of the environment, which

[15] The term "purposeful" in combination with economic actors is defined in Chapter two. Texture as indicated above and interrelationships among elements can better be understood in the context of complexity theory in the introduction of this study, or by referring to Letiche (2000) as one of the proponents of that theory.

cause the components of the environment to become related to each other. The causal texture of the environment consists of the fourth type of interdependence. This well-known typology of environments (ibid.) includes four types: (1) placid-randomised, (2) placid-clustered, (3) disturbed-reactive, and (4) turbulent field.

A placid-randomised environment is the state referred to by economists as that of perfect competition[17]. All components of the environment appear totally independent and no interdependencies exist between them. Organisations in this environment survive by trial and error.

A placid-clustered environment is a simple and quite stable environment composed of independent clusters, each of which comprises interdependent components. Economists refer to this type of environment as imperfect competition.

Disturbed-reactive environments are more complex, dynamic and uncertain than the two types described above. They consist of clusters like the previous type, but not only are there clusters in the environment to contend with, but the focal organisation itself is also a member of a cluster of similar, directly competing organisations. The organisations belonging to the same cluster have the same goals and usually apply similar methods for reaching them as the competing organisations. Each organisation is aware of the others and knows that each move affects the other organisations, whose every move in turn affects its own goal achievement. Economists refer to this type of environment as an oligopoly. Because possible actions and reactions in such an environment are numerous[18], uncertainties are so high that participating firms will attempt to collude.

The turbulent field, like the disturbed-reactive environment, is dynamic and uncertain to a higher degree. The dynamism in the latter has its origins in the behavioural cycles of action and reaction in competing components of the environment. Change in the turbulent field occurs outside the immediate sphere of interacting components and it is beyond their power to smoothen the effects[19].

For the purpose of this study, more important than the typology itself are the defining components that determine an environmental condition. A number of authors have defined such components. Khandwalla (1977) uses climatic conditions in terms of non-substantive attribute dimensions.

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[17] I am adding economics terminology for clarification and in order to position the concept in an available knowledge pool.

[18] Cf. the example of a chess game in Chapter two: computational complexity, bounded rationality (Simon, 1969).

[19] To my knowledge, microeconomics does not deal with such situations.

- Turbulence
- Hostility
- Diversity
- Technical Complexity
- Restrictiveness

Khandwalla (1977) defines turbulence as a result of dynamic environments that fluctuate and are unpredictable. The degree of hostility is seen as a function of the degree of risk involved. Hostility as a condition also points to the degree of stressfulness and domination environmental aspects have over the firm. Diversity as a condition refers to the degree of heterogeneity, and as such indicates environmental complexity. Technical complexity, in turn, is concerned with the state of the environment in terms of technological sophistication within its domain. "*Restrictiveness*", as Khandwalla puts it, indicates the degree to which the environment places constraints on the firm to carry out its plans. Another view on climatic conditions stems from Aldrich (1979), who names six environmental conditions affecting the organisation:

- Resource Capacity
- Homogeneity – Heterogeneity
- Stability – Instability
- Resource Concentration – Dispersion
- Domain Consensus – Dissensus
- Turbulence

Aldrich (1979) describes resource capacity as an environmental condition , which for a firm is located on a continuum between a rich and lean resource base. Homogeneity and its counterpart indicate the diversity of the task environment. Stability and instability refer to the same definition that Khandwalla (1977) uses for his *turbulence* dimension. Resource concentration and dispersion differs from resource capacity in that it concerns the distribution of resources[20]. The domain consensus-dissensus dimension in Aldrich's typology refers to the legitimacy of territory. I interpret this to refer to the extent to which environmental systems accept the domain claim of a firm[21]. Confusingly, Aldrich's classification of environments includes the term

[20] The resource-dispersion dimension will be analysed as a function of power.
[21] In other words, this could also be expressed as "how tough is the competition?".

turbulence, which, in contrast to Khandwalla (1977), is defined as "*disturbance via increasing rate of interconnection*"[22].

Miles (1980), building on Jurkovich (1974), conceptualises environments as being composed of the following three dimensions:

- Statics
- Dynamics
- Receptivity

Statics as a dimension is aggregated from (a) the level of complexity of the environment, (b) the routines that have developed, (c) the interconnectedness of environmental aspects, and (d) remoteness, which I interpret as the distance of factors in the environment that have an influence on the firm. Dynamics is a dimension that contains (a) the rate of change and (b) the unpredictability of change. Miles (1980) defines receptivity as a function of (a) resource scarcity, (b) output receptiveness, (c) domain choice and (d) flexibility.

A comparison among the three approaches to identifying key environmental dimensions and their texture is made in order to select relevant widely discussed and accepted influence factors. By limiting the number of dimensions and their perceived degree of relevance, this will help to produce a manageable number of scenarios of cause-and-effect relationships. One important dimension that is used in each approach is environmental dynamism ("change versus static"). This directly influences the level of uncertainty based on the predictability and internal adaptation processes triggered in firms. Dynamism as it has been described (e.g., Thompson, 1967) has a strongly correlational effect on firms' organisational designs[23]. The terminology used by Aldrich (1979) further implies that stability and instability result from this dimension.

Hostility (or domain consensus – dissensus, and to some extent receptivity) as I interpret it, refers to the situation a firm is exposed to in terms of uncertainty based on competition. This uncertainty-creating factor is discussed

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[22] In this study, this dimension is included in the systems-view specification of "*tightness*" of inter-firm organisation; and as "*interconnectedness*" to express the general level of intertwined components of the task environment.

[23] Thompson (Pp. 70-73, 1967) suggests that the organisational design of a firm is influenced by "*the degree of change*" (stable vs. shifting environment) and the "*degree of sameness*" (homogenous versus heterogeneous environment). The design implications are reflected in the variables: a). Organisational complexity, b). Degree of centralisation, c). Preferred coordination (norms versus planning). The case of the Finnish banking environment (1995-2002) serves as an illustrative example. Koponen's (2002) analysis shows that the decentralised cooperative banks did not undergo a wave of mergers and acquisitions: in times of vast industry changes, with a heterogeneous overall market, local managements of cooperative banks considered local homogeneous needs on a case-by-case basis. Cooperative banks also have basically maintained a stable number of outlets, while the centralised banks have reduced them.

with a view to deriving a deep understanding of interdependences. The three approaches have different angles from which to view this dimension[24]. A further implicit factor is power, which is clearly distinguished by Aldrich's resource-concentration dimension.

Khandwalla (1977) and Aldrich (1979) directly address diversity through the classification of environments into those that include, with varying degrees of similarity, homogeneous and heterogeneous environments as key aspects. Miles (1980), in contrast, expresses such notions in terms of more underlying factors such as complexity.

Resource capacity in the terms of Miles (1980) and Aldrich (1979) refers directly to the degree of abundance of resources, while Khandwalla (1977) distinguishes between resource constraints (restrictiveness) and knowledge resources[25] (technological sophistication). The significance of the resource-capacity dimension is high because access to resources is important as far as inputs and outputs are concerned[26].

The above discussion on environmental dimensions provides a framework for deriving a clear understanding of the influence the environment has on the firm. I will use these dimensions and integrate them into the model developed by Pfeffer and Salancik (1978), which could be considered the basic platform for my framework. To conclude this section I will express my agreement with a statement by McKelvey (1982): "*While it might be good to have even more attributes [*to define the environment in which a firm is embedded*] it would be even better to begin using those already recognised as important".*

3.4 Environmental Conditions fostering Inter-firm Organisational Formation

Pfeffer and Salancik (1978) are strong supporters of the resource-dependence view[27], which is focused around the uncertainty created by the environment regarding the future state of the firm. They do not consider uncertainty problematic in itself - it is a problem for firms only when it involves

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[24] The resource-competition and legitimacy angle (Miles, 1980), the legitimacy angle (Aldrich, 1979), and the power-domination angle (Khandwalla, 1977).

[25] Technology as referred to in this study is closely related to *information* and "*contextual related and processed information*" (=knowledge). In general, it is defined as "scientific knowledge applied for a special purpose". In this context, cf. John, Weiss and Dutta (1999).

[26] Input resources such as materials or labour and output resources such as demand. The same view I put forward here is also held by Miles (1980), since his "receptivity" summarises resource scarcity and output receptiveness).

[27] Other contributions that followed Pfeffer and Salancik (1978) in that school of thought include Sinha and Cusumano (1991), Deeds and Hill (1996), Bartholomew (1997), Das, Sen, and Sengupta (1998) and Das and Teng (1998).

interactions with other key environmental elements, and when it involves an element of critical organisational *interdependence*.

The dictionary (Merriam-Webster Dictionary, 2002/2003) provides the following definition of interdependence: "*interdependence is a reciprocal determination with others*". It is a very interesting concept because it contains the term *dependence*, "*being dependent on someone or something*" and "*inter"*, an expression of reciprocal relationship. As such, interdependence is a systemic concept.

A firm that is dependent on aspects of the environment is vulnerable in terms of power and influence[28] to aspects it is dependent on. Relying on market transactions in situations in which asymmetric dependencies[29] exist implies a lack of both power and influence over the firm's own goal achievement, which is driven by the external environment. The strategy for the firm therefore is to convert dependencies on important aspects of the environment into interdependencies. An example of that transformation process is expressed through the "*theory of countervailing power*" (Galbraith, 1967). In brief, the theory states that less powerful entities join an organisation in order to countervail or balance the strength of a powerful entity. Allow me to revert to the example of the baker[30]. He joins an organisation of other bakers in order to bring his one-way dependence on the miller into balance so that the joint organisation (e.g., merged units, joint ventures, strategic alliances) will counteract the power of the miller by becoming an important aspect of the miller's goal achievement, and thus creating interdependence.

Interdependence is the state when seller A and buyer B are both, to some degree, dependent on each other to absorb outputs and deliver inputs. As the example of the baker (Illustration 2.1) shows, it also affects a second buyer C, given the situation that seller A is in a kind of monopoly situation. Buyer B is also interdependent on the actions of buyer C through *system interconnectedness*.

Interdependence is not a clear-cut concept since interdependencies may be different in nature. Therefore it would appear to be very important to investigate how interdependencies have been explained in the literature and to devise a classification proposition that allows for distinguishing between relationship-specific interdependencies. The classification path I am starting with breaks down the concept of interdependence into the sub-forms a)

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[28] Preliminary definition: Power is created through a source, such as resources. It renders a service in order to exercise influence and create dependence. The concept of power is discussed in depth in Chapter 6.

[29] Asymmetric dependencies are such where one firm is more dependent on another firm, for example, than the other way round (cf. Blomqvist, 1999).

[30] Cf. Illustration 2.1.

"*outcome interdependence*" and b) "*behaviour interdependence*" (Hawley, 1950, Thomas, 1957).

Outcome interdependence occurs when the purchasing goal of B depends on the purchasing actions of C, given that resources are scarce. That could be *competitive:* the two bakers are competing for scarce resources, which in turn will lead to *conflict*. Outcome interdependence per se is not by nature competitive, and may also be *symbiotic* when one actor depends on the output of another, as in the miller – baker interdependence (given that symmetry exists). Competitive-outcome interdependence as seen by economists is a pure zero-sum game in which a given output can only be divided into different parts. Symbiotic-outcome interdependence, on the other hand, is a win-win game in which actors only benefit if other actors also benefit.

The second sub-form of interdependence is known as "*behavioural interdependence*". The outcome of an organisation is dependent on the cooperative behaviour of other organisations or social actors. The development of videocassette recorders was the result of behavioural interdependence. It was only by combining (know-how) resources from electronics, magnetic physics and chemistry that the product could be developed. Another example is a surgical operation in which different specialised physicians are needed. If the anaesthesiologist is missing, the surgery team will not achieve its goals.

Pfeffer and Salancik (1978) provide an alternative typology of interdependencies. They base their distinction on the resulting activities of firms that have their origin in resources. Resources may be *exchanged,* which implies physical transfer, or they may be *shared,* which implies common use. The exchange and physical transfer of resources is called *transactional interdependence*. Williamson (1981) refers to this as the "*transfer of goods or services through a technically separable interface*". Thompson (1967) defines the simplest form of transactional interdependence as *sequential interdependence*, which incorporates symbiotic outcome interdependence known from Hawley (1950) and Thomas (1957), and describes transactions within a value chain, for instance. Thompson hypothesises that sequential interdependence could be efficiently regulated through programming mechanisms[31], implicitly assuming that transfers are subject to time constraints and to problems of balancing resource flows and utilisation in the different stages. Lorsch and Allen (1973) argue that, without the implicit additional assumptions, sequential interdependence may also be regulated by transfer prices and inventories. The sequential interdependence in unidirectional relationships is mostly simple and asymmetric. As Thompson

[31] This aspect will be covered in Chapter six, which deals with *coordination*.

(1967) points out it may also be symmetric when the relationship is bi-directional. This happens, for instance, when an automotive manufacturer subcontracts or outsources the design and production of one component. The subcontractor and the manufacturer have to interact both ways in order to fit the design of the component into the design of the larger system, and eventually corrections have to be made in order to guarantee the fit. The difference between this symmetric relationship and the sequential one is not the bi-directional nature of the transaction, but more the *information complexity* involved (Perrow, 1967). Therefore effective coordination mechanisms should permit interactions such "*as lateral relationships, boundary spanning roles or even groups"* (Thompson, 1967). Using Thompson's term for this type of relationship, Grandori (2001) defines *reciprocal interdependence* as "*transactional interdependence complicated by information complexity and specificity*[32]*, rather than simply by a bi-directionality of the transfer*".

Both transactional interdependencies described by Thompson may be classified as *symbiotic* relationships, while there are other forms of interdependencies that do not directly involve the transfer of goods or services and therefore are closer to the definition of behavioural interdependencies that Thompson (1967) terms *cooperative interdependencies*. Cooperative interdependencies[33] are different from both competitive and transactional interdependencies.

Thompson finds evidence of a form of cooperative interdependence and uses the term "*pooled interdependence*" to describe the situation in which several actors use common resources, thereby generating interdependence. Examples of this include the common logistics system used by different firms, as found in the pharmaceutical industry for instance, and when independent firms use the same brands in the form of franchising agreements. This pooling may be a pooling of resources[34] (e.g., a common car park), but could also involve pooling activities with mutual benefits (e.g., PR activities). This, again, is not problematic in the absence of information complexity. Coordination mechanisms similar to pricing are used in such cases (e.g., fees and queues). The real problem with pooled interdependence occurs when the actors' activities concerning the common pool are not observable, resulting in free-rider externality.

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[32] Specificity in this context refers to the situation in which an exchange takes place. It could also be expressed as a "tailor-made" situation.

[33] Cooperative forms have a slightly different meaning when game theorists use it. In game theory it is an incentive or the permission to communicate.

[34] Developments in e-business also brought a pooling of resource demand or access to demand. Internet portals are such resource pools from which a large number of firms can draw. Cf. www.amazon.com.

Cooperative interdependence on an even higher level of information complexity exists if actors have to define their individual actions in terms of mutual adjustments based on the information that emerges from the performance of every other action in real time (Grandori, 2001). Thompson (1967) used the term *intensive interdependence* for this kind of relationship. This being behavioural interdependence, the resources of each participating actor are highly specialised and therefore it takes a specified set of actors to produce an outcome. Within organisational boundaries, this intensive interdependence exists in the interplay of purchasing, production and marketing departments, for instance, while on the inter-firm level a construction consortium serves as example. Intensive interdependence occurs when resources and activities exist in common units focused on producing an outcome that is in line with the individual objectives of all of the participating actors.

Figure 3.1 is an attempt to illustrate the above discussion in order to provide an overview of the classification of interdependence types[35]. As the illustration shows, interdependencies are divided into outcome and behavioural interdependencies. Outcome interdependencies may be competitive and lead to conflict, or they may be symbiotic. The symbiotic types are divided into sequential and reciprocal interdependencies based on their nature in terms of specificity and information complexity. Behavioural interdependencies are split into pooled and intensive interdependencies. Symbiotic-outcome interdependencies are transactional in nature, while behavioural interdependencies are cooperative[36]. Given that interdependencies will be discussed in more detail later in the context of defining the dimensions of inter-firm organisational classification, one thing should be kept in mind. Even if there are strong arguments for basing explanations of inter-firm organisational formation and their forms on the nature of interdependence, this is not sufficient in itself to explain why firms form inter-firm organisations, or why certain organisational forms are the result. Nevertheless, it will prove extremely useful in explaining the environmental influence over the firm and the resulting inter-firm organisational conclusions.

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[35] An overview of their origins in the literature:
outcome and behavioural interdependence (Hawley, 1950; Thomas, 1957),
symbiotic and competitive interdependence (Hawley, 1950; Pfeffer and Salancik, 1978),
transactional and cooperative interdependence (Pfeffer and Salancik, 1978; Grandori, 2001),
sequential, reciprocal, pooled and intensive interdependence (Thompson, 1967, Perrow, 1967, Grandori, 2001).

[36] In this study I use pooled interdependencies to describe cooperative relationships that are "cooperation in assets" rather than "cooperation in activity", which is described by intensive behavioural interdependencies.

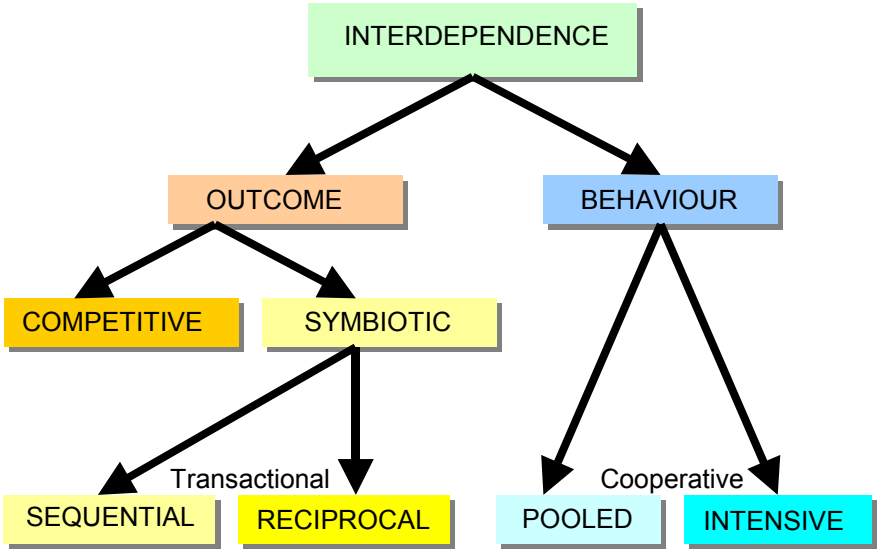

Figure 3.1 Classification of Interdependencies

As a brief summary to support this line of argumentation, I would like to remind the reader that the point of departure in terms of why the environment is forcing inter-firm organisational formation is *uncertainty*. Uncertainty is an outcome created through the *complex interaction of different elements* found in the environment. *Interdependencies* have been identified to support the description and explanation of the nature of relationships between elements of the environment. The following section of this study concerns the interrelated elements of the environment, organised in different dimensions in order to further understanding of its structural characteristics and the resulting contingencies that provoke uncertainty within the firm, and that lead to inter-firm organisational formation.

3.5 Structural Characteristics of the Environment

3.5.1 Concentration

Aldrich (1979) uses the term resource dispersion and concentration to describe the aspect of the environment concerned with the allocation of resources among the significant actors from the perspective of the firm[37]. Pfeffer and Salancik (1978) take a similar approach by analysing the *concentration of*

[37] Khandwalla's (1978) hostility dimension is also related to concentration .

resource control. An actor or group of actors who control an important resource still cannot ensure that it will result in dependency on the part of another firm. The dependence of one firm on another is also contingent on the extent to which a resource is controlled by relatively few firms, or only one, as in the case of the baker in Chapter 2.1. Economists use the measure of concentration in terms of "*the proportion of the market accounted for by the largest four or eight firms*" (Adelman, 1951). Concentration is, to some extent, related to Hawley's (1950) indicator of the concentration of power, which means that the more concentrated a market is, the more the economic power is in the hands of a few dominant firms. In organisational systems, concentration has been associated with the ability to achieve desired outcomes by the firms in the system (Pfeffer and Salancik, 1978). These two points of view on concentration lead to the conclusion that concentration of resource control is closely related to the definition of power. Power as a concept is "*the capacity to exercise influence on the behaviour of others in a desired direction*" (Dahl, 1957). The exercise of power in the form of influence is a means of achieving the desired result. Concentration reduces some of the complexity found in a given task environment for a firm. The rationale behind this is simple. Since a number of constituting actors with their resource control are found within a given task environment, the number of firms owning this control determines the number of possible systemic outcomes. In other words, the greater the extent to which a task environment is concentrated, the less the systemic complexity. This relationship between complexity and concentration is a very important one, since it determines the management task for the firm. The lower the complexity, the easier is the management within the task environment. The negative side of that relationship is that the lower the complexity based on the concentration of resource control, the fewer the opportunities in that task environment[38]. Concentration reduces some of the problems of complexity since it reduces the number of actors that have to be coordinated.

Concentration occurs for a multitude of reasons. In some cases a natural monopoly is the most extreme form, while the formation of a cartel possibly creates concentration tendencies, as M&A and strategic alliances do. Phillips (1960) states that coordinated action is also the result of concentration when

[38] As described above, there appears to be a trade-off between the "*ease of managing*", which is given in highly concentrated task environments, versus the "*number of opportunities*" found. An example is the development of the automotive industry: between 1990 and 1999 the number of OEMs in the industry was reduced from 30 players to only 17. For a firm producing components for OEMs the complexity of the task environment in this respect became easier to manage, while at the same time, the relative dependence on each of the players was substantially increased. For more information on the case see: "Fighting the right war?" by Ealey (2001a). For more on the above-mentioned trade-off, see Letiche (2000).

no communication occurs between the actors: "*When there are a small number of firms with similar goals and similar cost structures, implicit coordination is possible*"[39].

When concentration is low and control over key resources is shared by a large number of actors, the probability of conflict is high because complexity is high and the coordination of a large number of actors is difficult to achieve. Conflict as such is defined as "*a disagreement among the actors in a social system about the means or goals of the social system*" (Pfeffer and Salancik, 1978). Conflict and interdependence have, as such, an inconclusive relationship. From the classification given in Figure 3.1, conclusive relationships may be described as follows. Interdependence does not lead to conflict in cases of symbiotic outcome or behavioural interdependence. It fosters conflict only in situations in which competitive outcome interdependencies occur. To clarify these statements it should be added that conflict does not occur either if powerful firms exercise their influence over other firms, since by their behaviour they coordinate existing complexities[40] and create interdependencies that do not lead to conflict.

The relationship between concentration and uncertainty is therefore negative. The higher the level of concentration in a task environment, the lower is the perceived level of uncertainty over the future states of the environment. The explanation from a complexity-coordination point of view would indicate that the higher the level of concentration, the lower the complexity of the task environment and therefore coordination is easier, which in turn makes future developments more foreseeable.

As such, concentration of resource control in the task environment is an important determinant of uncertainty. Although concentration provides a high level of predictive power, it has to be admitted that this determinant alone is not sufficient for explaining environmental uncertainty. Therefore the next section focuses on the amount of resources in a given task environment, and the influence of resource quantity on the uncertainty perception of a firm.

3.5.2 Munificence

Pfeffer and Salancik (1978) use the term "*munificence"*. It is defined in the dictionary as "*plentiful*" and is also known in business theory as an "*abundance of resources*". Every firm with an open system has to acquire,

[39] According to Phillips' (1960), it is possible to achieve coordination in concentrated task environments without any direct communication between actors when business actions are covered in depth by different specialised media.

[40] Coordinate complexities by limiting the number of possible outcomes.

transform and release some form of resources. In an optimal case, the firm would have unlimited access to any type of resources[41]. Because this optimal case is rarely found over a longer period of time, the firm faces some degree of lack of abundance. This lack of abundance is a serious factor in terms of goal achievement, and is therefore taken into account in this study. Studies by Khandwalla (1978), Aldrich (1979) and Miles (1980) focus extensively on the resource capacity of a given task environment.

The chapter in this study that deals with the organisation and its environment defines the term resource, and in broad agreement with Penrose (1959), stresses the fact that resources and their services have to be seen separately. This leads to the conclusion that there are potential alternatives for any given resource[42]. In my view, this conclusion should be kept in mind in further discussion about the munificence of the environment.

Resources do not create uncertainty as such. They only create it if they are scarce in a given task environment. A lack of abundance creates conflict between interdependent actors. Here, too, the relationships between resources and interdependencies have to be investigated separately. The question is: in what cases does a lack of resources create conflict? First of all, natural conflict occurs between actors that are characterised by competitive outcome interdependence. A given number of firms who compete for input factors that are not sufficient to completely serve everybody's needs are in a situation of competitive outcome interdependence. This, again, reflects the sample case described in Chapter 2.1, where ten backers compete for the output of the miller that only covers 80% of the resource needs. The ten firms are in a relationship of competition for input resources. This creates a conflict each firm will attempt to avoid in order to decrease the level of uncertainty stemming from such a situation. A direct relationship between a high level of uncertainty and a lack of resources can therefore be assumed. The same conclusion could be drawn on the output side when firms compete for a given level of demand.

The next relationship to be investigated is between symbiotic outcome interdependencies and resource abundance. The question to be answered is this: when does a lack of resources create conflict in symbiotic outcome-interdependent relationships, and therefore increase the level of uncertainty[43]? Unlike the first relationship described, this one creates vertical conflict. One

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41 Input resources such as labour, finance, materials, space, machinery and energy, and resources on the output side such as demand and access to demand.

42 Porter (1980) draws the same conclusion from a different point of view through his "*substitute*" factor in "*elements of industry structure*".

43 The relationship between competitive outcome interdependence and a lack of resources creates conflict on the "horizontal" level. In the baker-miller case, the conflict is between bakers.

miller can only serve eight of the ten bakers. Therefore, since this is a situation of monopoly, there is a conflict based on symbiotic outcome interdependence. In order to avoid this conflict, each of the ten bakers attempts to secure access to resources in order to limit this type of uncertainty. Because each of the bakers is dependent on the miller, different avoidance strategies have been drawn up[44]. Successful solutions are based on the creation of some form of cooperative interdependence with other firms in either a horizontal or a vertical direction.

One limitation of the uncertainty-producing element of resource scarcity is when it is foreseeable that resources are in short supply, and this fact is taken into consideration in the goal-setting process. In sum, the lack of abundance creates uncertainties based on competitive-outcome interdependencies on the horizontal level, and on symbiotic-outcome interdependencies on the vertical level. The lack of resources creates uncertainty only when it is unpredictable or based on a lack of alternatives. The firm under such constraints attempts to create behaviour interdependencies with other players in order to achieve agreement over access to resources[45]. So far, two structural dimensions of the task environment have been investigated. Both dimensions provide an explanation for how uncertainty is created in the firm. The following section focuses on the system's environmental structure with a view to furthering understanding of the influence of this dimension.

3.5.3 Interconnectedness

Organisations and their managers have the motivation to control important aspects of their environments in order to make the future foreseeable. Therefore they try to connect their internal units with the units found to be critical for attaining their goals. For instance, securing the supply of critical resources by tying the supplier to the organisation is one strategy for making an important aspect of the environment more predictable and controllable. One effect of such a connection is that with each new link established, the interconnectedness of the system intensifies[46]. On the other hand, systemic

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44 Cf. Illustration 2.1

45 In that context, the relationship between the provider and the absorber of resources is interesting. As Hickson et al. (1971) note, there is a power/influence component inherent in this relationship. "*Power accrues to those in the organisation able to reduce uncertainties for the organisation, and the more central the uncertainty and the more irreplaceable the actor, the more influential he will be*". This relationship can be taken out of an internal organisational context and projected onto inter-firm relationships.

46 Miles (1980) included this measure in his "Statics" dimension; Aldrich (1979) refers to it as an integral part of his turbulence dimension; Khandwalla (1978) to some extent implies this influence in the restrictiveness dimension.

interconnectedness is not exclusively a deterministic approach, but occurs through complex interactions of dependent and depending factors. These exist both inside and outside of the task environment of the firm [47].

Interconnection is defined in the dictionary as "*two or more things being connected with or being related to each other*". In recent years, an increasing number of studies have been conducted in which the investigation shifts away from analysing the strategic actions taken by single organisations to considering the design of "*networks of organisations*"[48]. Some authors see networks as a new paradigm and an alternative to hierarchies and markets (e.g., Powell, 1990, Galaskiewicz, 1996). In marketing literature (e.g., Achrol and Kotler, 1999), some emphasis is placed on the emergence of large-scale managed networks as a basis for this paradigm shift – a move away from studying networks as informal social structures to studying them as formal governance structures that represent a legitimate alternative to markets or hierarchies. The logic of this paradigm shift is that the industrial revolution gave way to hierarchies by increasing the complexity of production technology, therefore the costs of coordination through market interfaces became too high and resulted in the evolution of the hierarchical firm. Information technology, as advocates of the new paradigm suggest, is driving the evolution towards a network organisation.

The position in this study is that the market and hierarchy paradigms are still valid, and comprise a continuum along which the firm takes a position when adapting to environmental uncertainties. Inter-firm organisations[49] are to be found on this continuum, since the firm enters into inter-firm activities on the basis of either transactional or co-operative relationships[50]. The central argument that leads to this viewpoint is based on the need of the firm to reduce uncertainty in order to survive and grow. Any firm will want to maximise its control over its own task environment. The maximum control can be achieved if the dependence on environmental aspects is minimised, meaning that external control of the organisation is also minimised. External control is greater in inter-firm organisations since interdependencies are created with various actors or aspects of the environment. One argument in support of this is that the dependence found in the market model is internalised in the hierarchy model, and its dependence-creating aspects are therefore internalised within the boundaries of inter-firm organisations. This alone does not appear to be sufficient to support a shift of paradigm, and I rather view it as a position on the market-hierarchy continuum. The rational firm that has survival and

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47 E.g., a war or threat of war creates this effect.
48 Chapter two of this study deals with these aspects.
49 I prefer the term specific forms of network constructs.
50 Cf. the classification of interdependencies in Figure 3.1.

growth as goals will always attempt to maximise control over the important aspects of its task environment in order to avoid uncertainties. Since it cannot survive as a closed system in which control would be greatest, it has to deal with dependencies and interdependencies among aspects and actors in the environment.

Connecting with important aspects of their environments leads to interconnectedness, which results in problems for firms because the greater the level of system connectedness the more uncertain the environment becomes[51]. In connected systems, a disturbance coming from any point of the larger system may lead to unanticipated consequences. Changes in one part of the system have effects in other parts. Simon (1969) argues convincingly that systems that are loosely coupled are more likely to survive since disturbances in the larger system can be located and corrected more easily. In a system with *n* elements, the number of possible connections between them is *n(n-1)/2*. If each link were actually effective, if the systems were tightly interconnected, then any disturbance coming in at any point would quickly affect every element in the connected system. If the connections were loose, disturbances would have more chance of being localised and the system would be more stable and more certain (Simon, 1969). This phenomenon also greatly influences the adaptation process of subsystems in the interconnected system. The higher the level of interconnectedness, the lower the possibility of adapting because the number of constraints is higher (Simon, 1969). In that case, a high level of interconnectedness contributes to an increased level of uncertainty.

Pfeffer and Salancik (1978) provide an alternative view. They argue that a high level of interconnectedness creates a situation in which highly interconnected elements have a strong and predictable impact on the whole system. Therefore, loose coupling is perceived as a problem by management since such systems are less responsive to interventions.

Given these two strong and convincing views about the effects of interconnectedness on perceived uncertainty for the firm, it would be useful to make some distinction between them in terms of when interconnectedness leads to higher or lower uncertainty.

1. A high level of interconnectedness leads to an increased level of uncertainty in cases in which the firm seeks stability. Firms in need of stability interpret loose coupling as being more

[51] One explanation could be that too many interconnected systems influence each other so that a large number of possible outcomes create a multitude of equilibria.

autonomous and less dependent on the behaviours of other actors in their task environment[52].

2. A high level of interconnectedness leads to a decreased level of uncertainty for firms that wish to introduce change. Firms introducing change interpret strong interconnectedness as an assurance of predictability and the means to influence the task environment, and therefore as a substitute for concentration[53].

Firms in the first group, which avoid interconnectedness in order to reduce uncertainty, are not taken into account in this study. My argument for excluding them is based on the world we live in today. Firms must be open systems and the possible uncertainty deriving from high interconnectedness needs to be avoided by creating *positive interdependencies*[54] among important aspects of the task environment. As open systems, they create strategies that build on behavioural interdependencies[55], which in turn are based on high interconnectedness and therefore reduce uncertainty[56]. The miller-baker example (Illustration 2.1.) outlines some strategies that create uncertainty-limiting interdependencies.

The following short summary provides a bridge to the next section. Firms choose positive interdependencies in order to connect to elements in the task environment. Tight coupling, creating a large number of links and a high degree of interconnectedness, is perceived as a positive contribution to the avoidance of uncertainty. One of the main explanations of why interconnectedness has a positive relationship with uncertainty avoidance is based on the perceived influence the firm can induce in a highly connected system. Conflict occurs through the interconnectedness of elements that are based on competitive outcome interdependencies. The solution of conflicts derives from generating positive interdependencies among important aspects of the environment. The following two sections cover the dimensions of homogeneity and dynamism found in the environment. The dynamism dimension is particularly closely related to the interconnectedness dimension.

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[52] An example of firms that see high interconnectedness as an uncertainty generator I refer to monopolies. Because their power derives from concentration, high interconnectedness would increase complexity and therefore decrease predictability. Interconnectedness creates conflict for such firms.

[53] Firms that interpret high interconnectedness as an uncertainty reducer include high-technology firms. They depend on a high degree of interconnectedness in order to influence the entire system. Firms that introduce "change" into a system reduce their uncertainty through high interconnectedness.

[54] In sum, positive interdependencies include all forms of symbiotic outcome and behavioural interdependencies.

[55] Recent decades have witnessed a wave of M&A, strategic alliances, JV and other forms of similar strategies.

[56] Related aspects are discussed in the section dealing with environmental homogeneity (3.5.4.).

The homogeneity dimension is closely related to the complexity issue discussed before in the context of concentration.

3.5.4 Homogeneity

Environmental homogeneity from the perspective of the firm is, like interconnectedness, not conclusive per se, as this section illustrates. The dictionary defines the term *homogeneity* as "*the state of having identical distribution functions or values*", and as "*something of the same or similar kind or nature*". The opposite of a homogeneous environment is a heterogeneous one[57]. Environmental complexity in the context of concentration is a major influencer in the management of the firm. A highly complex environment refers to heterogeneity and it is defined in my study as "*dissimilarity of external elements relevant to the firm's operations*", following Draft (1998). As mentioned above, Thompson (1967) uses the "*degree of sameness of the environment*" as a strong influencing factor in organisational design, and I offered some support from a recent study by Koponen (2002) in Chapter two of this study.

Homogeneity of the environment means that the firm looks at its task environment and interprets that its customers, competitors, suppliers and other important factors contributing to its goal achievement are similar in nature to a large extent. As such, homogeneity somewhat reduces the degree of complexity. Since many of the key aspects of the environment can be clustered according to their similar natures, the "self organisation[58]" of these constituent parts has a lower number of possible outcomes and therefore the degree of predictability is higher. It is easier to build scenarios and prepare for contingencies in homogeneous than in heterogeneous environments.

Heterogeneous environments are such that the constituent elements of what the firm perceives as important aspects are more diverse in nature. Therefore the number of alternative possible outcomes from a process of "self organisation" is larger and the management task is more demanding.

The relationship between homogeneity of the task environment of the firm and its contribution to perceived uncertainty is of interest. The question is how heterogeneous environments affect the firm's dependence on important aspects: how it relates to interdependence and in what instances it creates uncertainty.

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[57] Khandwalla (1978) defines the continuum between homogeneous and heterogeneous as degrees of *diversity*; Aldrich (1979) uses the terms accordingly, and Miles (1980) includes it in his "*Statics"* dimension.

[58] See the discussion on complexity theory in Chapter two.

Thompson (1967) uses the dimension of homogeneity indirectly to determine the extent to which a firm is differentiated and integrated in the overall system of the task environment. In view of the complexity involved in environmental heterogeneity, he suggests that dependencies on important aspects of the task environment are higher than for homogeneous environments. This is explained through the larger number of elements and their varying natures. The challenge for the firm confronted by a heterogeneous environment is to generate power, since it has to influence a larger number of different aspects. The effect heterogeneous environments create lead to a higher level of uncertainty[59]. Homogeneous environments are easier to predict based on the similarity of aspects. Actions by and changes in important aspects can be avoided through the establishment of positive interdependencies.

The idea of heterogeneity being "*difficult to manage*" appears very reasonable, but is contradicted by the idea that heterogeneous environments have uncertainty-reducing capacities. The uncertainty-reducing approach could be described as follows. Firms that have a large portfolio of activities that are allocated along dissimilar environmental aspects provide some degree of uncertainty balance. This balance is a result of lower relative dependence on any particular aspect or cluster of aspects, since other aspects balance uncertainty-creating aspects. This explanation is supported from the power perspective. Because firms in homogeneous environments need to generate a strong influence over few aspects, and during changes in the environment, dependence is greater. Firms in heterogeneous environments can avoid uncertainty by spreading different degrees of influence in different clusters of important aspects.

Again, two alternative views are presented. The "*difficulty to manage*" view opposes the "*portfolio*" view. Both provide good explanations, and therefore some distinction has to be made in terms of the type of firm in which environmental diversity creates less uncertainty.

1. Firms with high specificity in assets and a strong specialisation[60] of activity perceive reduced uncertainty in homogeneous environments. This is supported by the view that firms with such

[59] This explanation also touches on bounded rationality or the limited capacity to deal with complexity. Cf. Simon (1972).

[60] Specificity in terms of assets and activity specialisation is treated in depth in Chapter four.

natures have adapted themselves to a certain cluster of important aspects on which the entire organisation is focused[61].

2. Firms that perceive reduced uncertainty in heterogeneous environments are characterised by organisations with portfolios of specific assets and specialised activities. Firms with such a nature have adapted themselves to a heterogeneous portfolio of diverse homogeneous clusters[62].

If the uncertainty-creating effect of those two positions is compared, it appears that, in general, homogeneous environments are to be preferred in order to limit uncertainty. The difference between the two might simply be in organisational design[63]. While case-1 firms, which prefer homogeneous environments, lower complexity through focusing on homogeneous elements, the same cannot be assumed for case-2 firms, which are organised according to their portfolio. On the corporate level, heterogeneity lowers uncertainty overall, while on the business-unit level, homogeneity guarantees increased ease of management.

Trends in corporate behaviour during the last decade indicate that firms that enact their environment in a way that displays a higher level of homogeneity have been more successful in achieving their growth goals. Conglomerate organisations with heterogeneous environments and many clusters of important environmental aspects, on the other hand, have been on the decline. This suggests that, from an effectiveness point of view, managing homogeneity lowers the level of uncertainty. This argument is strengthened by the case of the Finnish firm Nokia, which used to be a large conglomerate engaged in many industries. Conglomerates faced tremendous problems in formulating and attaining growth goals at the end of the eighties. By concentrating on the telecommunications industry, a former division, and by using the financial resources from divestments, the firm has enacted an environment that is more highly homogeneous, with a good growth potential but a by-no-means certain future (see: Pulkkinen, 1997). The management has been able to focus on the uncertainties this environment provides, and to build a large number of inter-firm organisations with its important aspects that made

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[61] As an example I would like to mention start-up firms, which receive venture capital (VC) funding. The VC view is that a start-up firm needs to have a strong focus on a homogeneous environment.

[62] Examples of this type of firm are big industrial firms with diversified activities. For instance, the "Lipobay" crisis in Bayer AG in 2001 did not lead to bankruptcy because of its diversified activities (e.g., Der Standard (2001).

[63] To some extent, this also relates to the size of the firm, because organising for a complex environment also requires organising a complex organisation. Complex organisations tend to be of larger size (cf. Thompson, 1967).

the concern at one point (spring 2000) the most highly valued company in Europe. Similarly, other firms of the former conglomerate managed to improve their growth goals and attainment, as the case of the former rubber division, Nokia Tyres, demonstrates[64].

A similar conclusion can be drawn from the recent history of the automotive industry. Since the 1993 crisis it has been constantly reducing its heterogeneity by disintegrating its internal organisations and therefore reducing its complexity. In the resulting three-tier industry structure, the first supplier level has taken over the complexity of the OEMs to a great extent. These developments result in a more homogeneous environment with a lower number of important aspects, thus creating strong positive interdependencies between the OEMs and their direct suppliers[65] that reduce the uncertainty level and lead to new forms of inter-firm organisation[66].

Therefore, the assumption made in this study is that, given the mechanisms of "bounded rationality" and "self-organisation", a highly homogeneous environment provides an overall higher degree of predictability and a lower degree of uncertainty. This is supported by a study of franchising systems that illustrates the development of oil-retailing franchisers in the UK over two decades. In order to win back market share from independent and diversified oil retailers, the oil companies expanded their operations into grocery forecourt stores. Diversification was accompanied by tightening the franchising contracts and by converting them from a largely license type of agreement to more of a business-format franchise[67]. After initial success, "*By the mid-1990s the petrol retailing environment in Britain had become so complex and uncertain that it was no longer cost-effective for the oil companies to try to control it through even tighter franchise contracts. Thus, although the oil companies are still anxious to have convenience stores operating in their forecourts, rather than try to manage them themselves they are increasingly calling on the assistance of specialist food retailers*" (Boyle, 1999). This is taking the form of joint ventures and other cooperative arrangements.

In conclusion, I would like to emphasise that homogeneity in important aspects of the task environment is an uncertainty-reducing element, which provides a lower level of complexity and therefore fewer possible outcomes from processes of self-organisation. The firm reduces possible outcomes and converts them into probable outcomes through the creation of

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64 These examples serve for illustration only.

65 System suppliers, which in many cases have been former divisions of OEMs.

66 Cf., for instance, Kochan (1997), Collins, Bechler and Pires (1997) and Noori and Lee (2000).

67 Licensing types of agreement are closer to the market paradigm, while business-format franchising is closer to the hierarchy paradigm.

interdependencies, which lead to forms of inter-firm organisations[68]. The following section on environmental dynamics draws a strong connection to homogeneity and provides a framework for the evaluation of uncertainty.

3.5.5 Dynamics

Environmental dynamics or stability is used in the literature as a dimension to determine the impact on an organisation's structure and processes (Thompson, 1967). A centralised structure is attributed to organisations that perceive their environment more on the stable end of the continuum of change. Decentralised organisations, on the other hand, are found where environments seem to be highly dynamic. Thompson argues that decision-making processes rely to a higher degree on rules when the environment has been perceived as stable, and planning is more important when the level of environmental change is perceived as high.

Environmental dynamics or change has been set equal with uncertainty (Osborne and Hunt, 1972). Nevertheless, it is reasonable to say that an environment may be highly dynamic and change may occur rapidly without creating uncertainty. This is the case if the rate of change is known and its nature is foreseeable[69]. Therefore it is not change, but rather the pattern of change that causes the uncertainty. In situations in which the firm anticipates change because the pattern is known, it will adapt[70] to it and therefore uncertainty will be low.

"*Dynamics"* is defined in the dictionary as "*an underlying cause of change or growth*", and the same source defines "*change*" as "*to make or become different, or to exchange one thing for another thing*". The phenomenon of change is nothing extraordinary, even though it is often perceived as such. From a historical perspective, change is something regular, and in many cases follows certain patterns, as on stock markets[71].

In my analysis of change and dynamic environments, two factors appear to influence uncertainty-producing effects in connection with change, "*timing*" and "*direction*" (see Figure 3.2).

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[68] I perceive a high level of support from Hansén (1991) and Mintzberg (1994) in distinguishing between possible and probable states of the future. This view is also in line with complexity theory.

[69] Hayek (1945) observes, "*As long as events continue to be the same, or at least continue as they were expected to, there will be no new problems that require a decision*".

[70] Adaptation by the firm to environmental change will be considered in depth in Chapter four.

[71] Some sources suggest that predictions for future events can be produced on the basis of change patterns of historic events. Chart analysts on stock exchanges have so far failed in terms of accuracy, but retain their claims. Popper (1968) however, argues strongly, with good reason, against such "historicism".

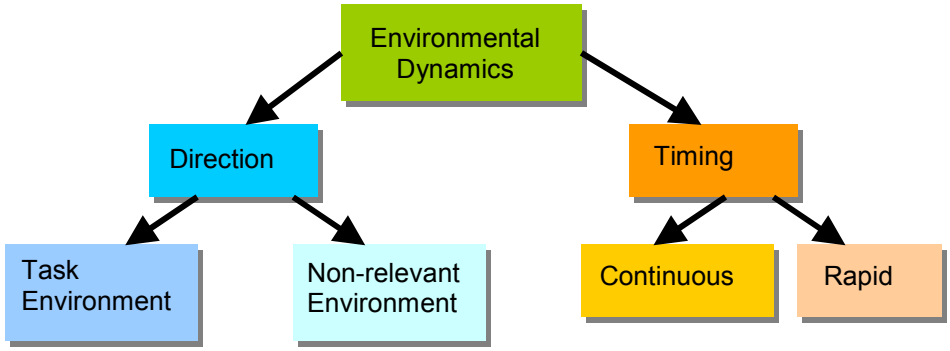

Figure 3.2 Patterns of Environmental Dynamics

If the firm can predict when change occurs and from which part of the environment it will emit, then a changing environment will not produce problems. Uncertainty is the result of change when the time of its perception is delayed or blurred, or when the nature of it creates cognitive dissonance. The *timing of change* is often referred to in terms of the "*parable of the boiled frog*"[72], which describes its effects when it happens suddenly as opposed to change that occurs in small steps.

In classifying the timing of change I suggest two categories: "*continuous change*" that might not be perceived if no special attention is paid to it, and "*rapid change*", which creates a form of crisis that is easily noticed.

The enactment process described by Weick (1979) can be used as an explanation of continuous change. As pointed out in the two previous sections, the enacted environment refers to the fact that meaningful environments are outputs of organising, not inputs to it. The enactment process itself segregates possible environments that the organisation could clarify and take seriously, but whether it actually does so is determined in the selection processes. In the case of continuous change, the enactment produces an equivocal situation instead of reducing confusion about the change. The enactment is action that produces the "*raw material*", which can then be made sensible. Sense making happens in retrospect[73]. Sense is made of previous actions and of things that have already occurred. In the next step of the enactment process, the firm uses the equivocal information that continuous change provides, and through a process of selection it determines what the new information means to the existing reality. In cases in which the equivocal information is perceived not to change the picture of the environment, then no retention of new information

[72] The parable of the boiled frog: one puts a frog into a pot of cold water and starts to heat up the water. The likely result will be that the frog will not perceive the incrementally increasing temperature and will be boiled to death. This does not happen if one tries to put the frog into a pot of boiling water. The hot water will make the frog attempt to jump out of the pot immediately.

[73] For a deep analysis of this process, see Weick (p. 133ff, 1979).

occurs and change is not included in the sense making of the firm's environment. Thus continuous change, at least in that phase, will not be detected by the firm and therefore does not create uncertainty[74].

The fact that continuous change, in many cases, does not create uncertainty is, at the same time, the problem. If it is detected, uncertainty might be the result. This is mainly dependent on the internal information-gathering and -evaluation process. If the firm has monitoring systems in place and uncertainty occurs, then it will introduce measures to reduce the uncertainty. The same phenomenon of continuous change with the result of no reaction or adaptation can be explained using the concept of *cognitive dissonance*. According to this theory (Festinger, 1957), there is a tendency for individuals[75] to seek consistency among their cognitions (e.g., beliefs, opinions). When there is inconsistency between attitudes or behaviours (dissonance), something must change to eliminate the dissonance (Festinger, 1957). Three alternative solutions are offered: (1) reduce the importance of the dissonant beliefs, (2) add more consonant beliefs that outweigh the dissonant beliefs, or (3) change the dissonant beliefs so that they are no longer inconsistent. Applying this knowledge in the case of continuous change would imply that an organisation has different solutions for eliminating the dissonance[76]. Management may disregard the role of changing factors and interpret it as a short-lived fashion, it could try to find more reasons that support the established picture of the environment, or it could change its perception of its environment and acknowledge the change. Only in the third case will the firm perceive uncertainty that leads to corrective actions.

In the case of rapid change, the firm perceives a much stronger indicator and equivocal stimulus that lead to a selection process, which provides acknowledgement of the fact that the environment has changed. Therefore actions are triggered to reduce uncertainty. In terms of cognitive dissonance, this case would illustrate that the dissonance in beliefs of what comprises the environment is too strong to ignore or outweigh.

The other component of the pattern of change in this framework is labelled *direction of change,* which distinguishes the sources. The argument that the direction of change is important in this contextual framework is based on the domain-consensus concept in which the firm defines the task environment[77].

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74 I should repeat that uncertainty in my approach is taken from the firm's perspective.

75 Individuals and collective decision makers are assumed to produce the same reactions in that respect.

76 The dissonance between what is believed to be the environment and what is changing in it.

77 The task environment consists of relevant and potentially relevant aspects of the total environment of the firm. The rest of the environment is left out of consideration and has been labelled the non-relevant environment.

When change occurs in the relevant environment, the probability of detection will be higher[78]. In this case, two scenarios are possible: (1) change is detected and does not create uncertainty because the firm can adapt to it; (2) change is detected and creates uncertainty because no meaningful conclusion can be made. The same argumentation can be transferred directly to the potentially relevant environment, and therefore to the whole task environment[79].

How is uncertainty produced when change originating from the non-relevant environment hits the firm? One argument could be that change in this part of the environment does not affect the organisation since it carries no important implications for the firm. According to systemic argumentation, however, this is probably not the case. Change in the non-relevant environment can have substantial effects on the firm. Simon's (1969) tight coupling discussed above illustrates such effects. Disturbance in a tightly coupled system can have effects on any other part regardless of its origin. A simple scenario suffices to illustrate this. Occurrences happening in the non-relevant environment are systemically connected to the firm's relevant environment. For example, converting industries create a situation in which a firm faces new unexpected competition or cooperation possibilities that had not been considered prior to their appearance. Porter's (1980) "new entrants" is another case of systemic connectedness, which introduces that type change. According to the same five-forces model, "substitutes" may, depending on the situation, also lead to the same result.

Figure 3.3 summarises the patterns of change and their consequences for the firm's uncertainty perception. When change occurs in the task environment, two forms of uncertainty perception result from the sense-making process. Continuous change leads to an initially unclear picture of the consequences for the firm. Therefore uncertainty is low and adaptation is considered only as a precaution. The different interpretations within the firm of the consequences lead to disputed sense making, meaning that opponents and proponents of different scenarios compete for the initialisation of adaptation. Only in cases in which proponents of an influential change scenario gain in persuasiveness does the firm perceive uncertainty that triggers adaptation processes that can foster inter-firm organisational formation. An example of this type of change in the automotive industry[80] is technological

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78 The detection of change depends on boundary systems, which are discussed later. In short, boundary systems have the function of monitoring and providing essential information to the decision-making units of the firm.

79 Given that the firm employs monitoring systems to that part of the task environment.

80 Ealey (2001b).

change. ABS braking systems[81] have been known to the OEMs for decades. The decision to include this type of brake in standard vehicles has been delayed by industry players because consumer preferences have been unclear. OEM players have included this technology as optional equipment in their offerings and demand has been slowly growing. A real need to adapt and commit substantial resources to this technology was only perceived after substantial momentum was detected. It is only through continuously growing interest and demand for the technology, and uncertainty about competitiveness, that agreements with technology providers have been forthcoming.

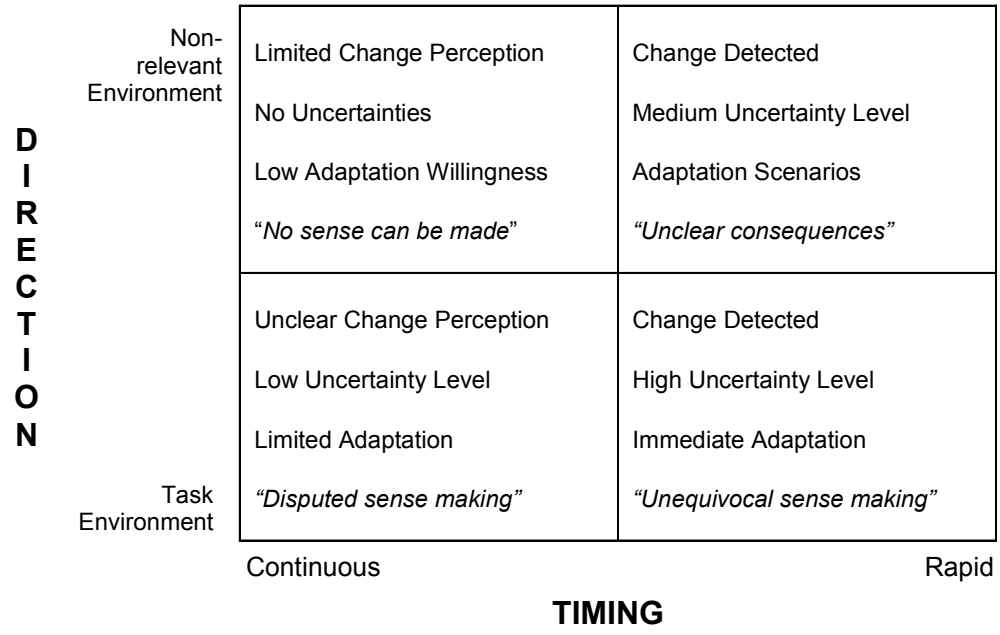

Figure 3.3 The Perception and Action of Dynamics Patterns

The situation is different when rapid change occurs in the task environment. The acknowledgement of change is unequivocal, therefore uncertainty is triggered leading to an atmosphere that favours inter-firm organisational formation. Another example from the automotive industry shows how intense customer pull can lead to a strong change perception. This is seen in the case of the electric self-starter, which achieved full market penetration within two years of its introduction (Ealey, 2001b). A case in the same category would be an edict from the regulatory authorities. For instance, through such a mechanism the introduction of exhaust catalyst systems achieved immediate

[81] ABS is an abbreviation for anti-blocking-system.

total implementation in new cars. The acceptance of a new law that requires new cars to include catalyst systems was a rapid change[82], which triggered uncertainties and lead to R&D or inter-firm organisational formation with respective technology providers[83].

The dynamics in the non-relevant environment of the firm may have systemic effects, as pointed out above. This makes the uncertainty perception in such cases worth investigating. When change continuously occurs in the non-relevant environment, no immediate uncertainties are developed within the firm, and adaptation is assumed to be limited. The environmental-protection movement, for instance, grew slowly from a very moderate beginning in the 1970s. At that time, the trend for consumers actually to realise the pollution impact of combustion-engine-driven vehicles did not have a direct uncertainty impact on OEMs. It was only when this movement found support within political parties that systemic effects lead to actions, as described above in the case of exhaust catalyst systems. Rapid change has a much more immediate effect in the non-relevant environment. Changes in the political landscape of the Middle East, for instance, may create overnight changes that are outside of the task environment, but that have immediate effects on the demand for vehicles. The gulf wars and oil crises illustrate systemic effects[84]of this type. Such a change pattern has enormous potential for creating uncertainty, and immediate adaptation is probable. Inter-firm organisational formation can be assumed to result from such change patterns by accessing alternative technologies that make vehicles independent of oil, for instance. Other consequences include a downturn in the overall economy and therefore a decrease in investment consumption. In such an atmosphere, the weaker OEMs tend to face higher uncertainties through take-overs, and it is favourable to all kinds of proprietary and contractual arrangements within the automotive industry.

The dimension of environmental dynamics is the fifth determinant of uncertainty perception in the firm explaining inter-firm organisational formation, and adds to the complex picture drawn in this study. In order to deal with such complexities, I have attempted to make major distinctions within the environmental dimensions with a view to illustrating divergent

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[82] Such regulation, when it is accepted, is most likely to be anticipated by firms in the industry. Therefore it could be argued that rapid change perception might already occur when majority support for such laws is perceived.

[83] Examples of technological change are described in more detail in Ealay, L (2001): Can "yester-tech" help predict the future?" at www.autoassembly.mckinsey.com.

[84] It could be argued, however, that this is a weak example, since OEMs are probably very interested observers of such trends. Nevertheless, I do not consider such events as taking place in the OEM's task environment because there is little influence over them.

views on each individual dimension and to discussing, in part, the relationships among them. The following section summarises the relationships between the structural dimensions and the consequences for social actors. The result should provide an explanatory overview of how levels of environmental uncertainty that lead to inter-firm organisational formation are created.

3.6 The Effects of Structural Characteristics and Relationships in the Environment

This section investigates diverse interactions among structural characteristics of the environment. In arriving at a useful overview of cause-and-effect relationships, I offer some different "possibility trees" that illustrate how uncertainty is produced[85]. Further, I provide for each "possible branch" solutions that give an environmental explanation of inter-firm organisational formation.

3.6.1 Inter-firm Organisational Formation based on Concentration

Pfeffer and Salancik (1978) argue that high concentration leads to lower potential for conflict, and therefore the uncertainty perception of the firm is reduced. I agree with their argument in general, but the following illustration (Figure 3.4), which is based on the above discussion of concentration, shows a differentiated view of this relationship. The implication is that Pfeffer and Salancik's (p.68, 1978) model is applicable only in general terms. When a "possibility tree" is drawn, uncertainty may result from concentrated and non-concentrated environments depending on which aspect is taken into consideration[86]. When concentration leads to uncertainty, then positive interdependencies are generated in order to avoid it. The outcome of such behaviour is inter-firm organisational formation.

The undifferentiated view of concentration and uncertainty in the original model of Pfeffer and Salancik (1978) is based on only one part of one aspect of the firm's environment. Only when the task environment is broken down into vertical and horizontal aspects may different conclusions about the concentration-uncertainty relationship be revealed. In managerial terms, we

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[85] "Possibility trees" is a term I use here to illustrate different scenarios that grow out of an environmental characteristic. Of special interest are the underlying mechanisms and explanations that result in an interrelationship among social actors.

[86] By this I mean the perspective of the firm on the horizontal (competition) or vertical (backward or forward value chain) level.

can see that a lower complexity environment has an uncertainty-reducing effect on the horizontal level because the actions of competitors are easier to predict. This perception may change, however, when management considers the impact that each move manifests in terms of stronger relative competitive outcome interdependencies. Thus every move of the competition has a much greater influence on the firm. On the vertical level, a concentrated market for many types of firms results in higher relative dependence on a few actors.

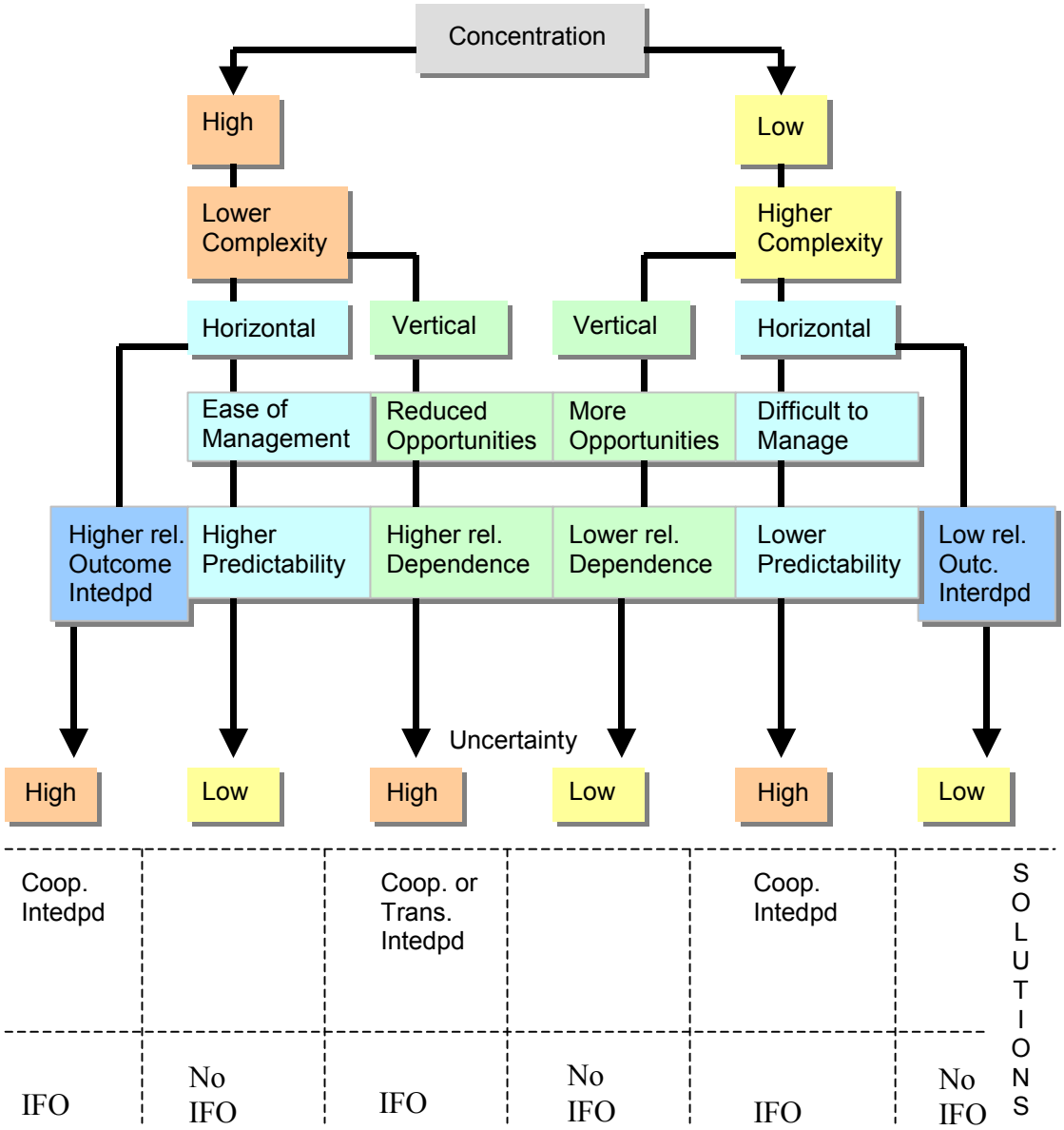

Figure 3.4 Environmental Concentration and the Formation of Inter-firm Organisations (IFO)

As example I would like to give the typical high-technology SME[87]. When such firms look for potential business clients in a concentrated market, they often find themselves dependent on only a few absorbers of their output. Therefore there is great relative dependency on each of them, and success or failure is highly dependent on forming an inter-firm organisation with at least one of the firms. As with all of the other dimensions discussed in this study, I place great emphasis on making such distinctions and on developing "possibility trees" that differentiate the view of such relationships. As in the current case, it is not possible to make a clear statement about how concentration affects uncertainty perception. Nevertheless, it is possible to give an explanation of why firms follow a certain branch of logic. This notion is supported by Pinder and Moore (1979), who call for this kind of differentiation in their discussion of mid-range theories. Letiche's (2000) interpretations of complexity theory also suggest a similar procedure. One clear criticism here is that I obtain an explanation but I am not able to make a prediction. This criticism is probably valid, since we do not know which firms would follow which logic. The above review of Weick's (1979) enactment process also carries an explanation as to why this seems impossible, because environments are outputs of organising and not inputs to it. As such, a complex internal sense-making process leads to uncertainty perception. As far as concentration is concerned, six different sense-making processes have been explained, and three of them lead to uncertainties that may be resolved through inter-firm organisational formation based on different forms of positive interdependencies.

3.6.2 Inter-firm Organisational Formation based on Munificence

Pfeffer and Salancik's (1978) model represents negative relationships between munificence and conflict and between munificence and interdependence. Again, given the above classification of interdependencies (Figure 3.1) and by distinguishing between the vertical and the horizontal levels, no such clear relationship can be found, although Pfeffer and Salancik's argumentation is very reasonable from an undifferentiated viewpoint. Figure 3.5 illustrates the logic behind my model.

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87 SME is an abbreviation for "small and medium-sized enterprise".

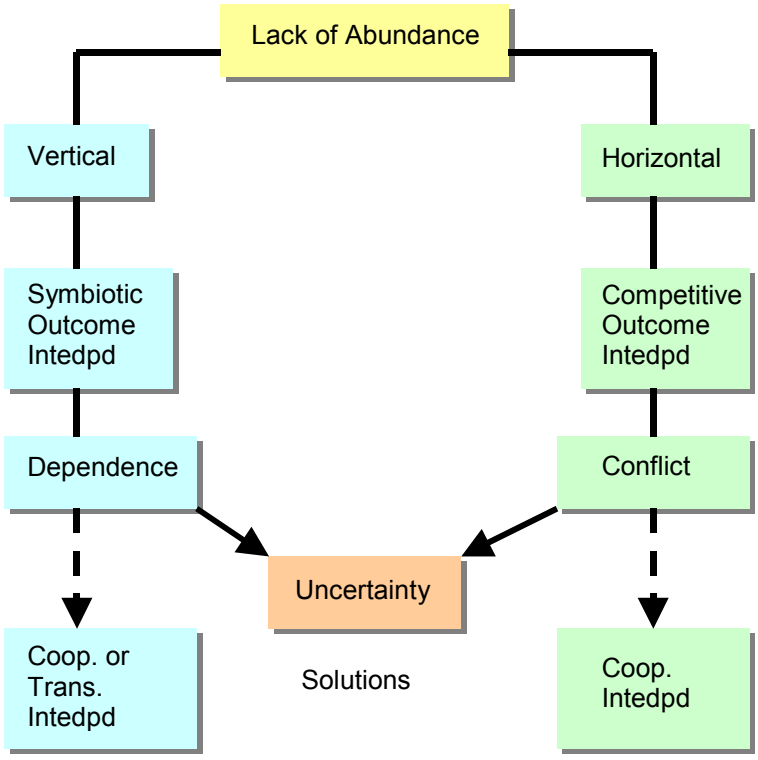

Figure 3.5 Environmental Munificence and the Formation of Inter-firm Organisations (IFO)

On both levels, horizontal and vertical, the argumentations lead to the foundation of inter-firm organisations. Along the value chain the supplier and the firm are in a relationship of symbiotic-outcome interdependence. This form of outcome interdependence does not provide uncertainties under normal circumstances, as Illustration 2.1 shows. Uncertainty in this scenario is the result when resources become scarce so that the firm becomes dependent on the supplier. In that case, cooperative behavioural interdependencies may increase predictability. Such cooperative interdependencies take various forms on the continuum close to the hierarchical end[88]. Contractual arrangements made in order to create transactional interdependencies may also have the same effect.

On the horizontal level, a lack of abundance leads to competitive-outcome interdependencies among firms competing for a resource. The resulting conflict leads to a search for cooperative forms of interdependent relationships

[88] Predictability is greatest in this case when backward (or forward) integration is achieved. The problems mentioned above that are inherent in this approach are widely discussed in Colombo (1998).

among competitors in order to increase interdependence as far as suppliers are concerned[89].

3.6.3 Inter-firm Organisational Formation based on Interconnectedness

Pfeffer and Salancik (1978) explain the relationship between interconnectedness and interdependence as a positive relationship that leads to conflict. According to them, a high level of interconnectedness leads to high interdependencies and conflict, which increases the uncertainty perception of the firm. My modified explanation is in broad agreement with that view. Nevertheless, in order to further understanding of inter-firm organisational formation, the nature of interconnectedness needs to be distinguished. As with most dimensions, the separation of "possibility trees" is based on the classification of interdependencies (Figure 3.1)[90].

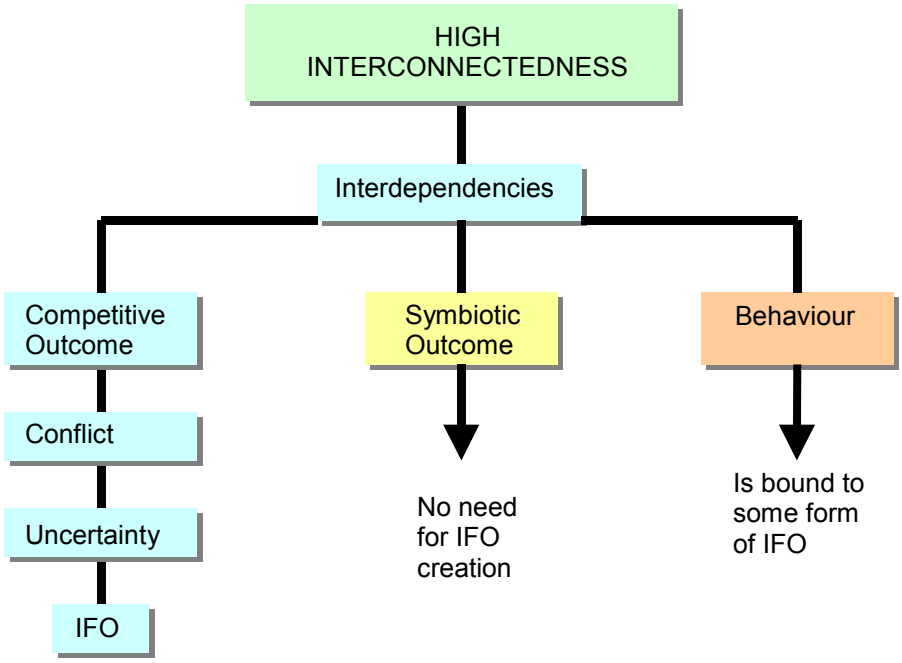

Figure 3.6 Environmental Interconnectedness and the Formation of Inter-firm Organisations (IFO)

[89] Substitutes have a special effect that may change these scenarios. Porter (1980) is the best-known source discussing these contingencies.

[90] At this point I should remind the reader that firms that avoid uncertainty through seeking systemic stability and inherently trying to keep interconnectedness low are basically excluded from this examination.

Figure 3.6 illustrates highly interconnected environments and distinguishes between competitive-outcome interdependencies, symbiotic interdependencies and behavioural interdependencies. Competitive-outcome interdependencies occur mostly on the horizontal level and are characterised by zero-sum games. This leads to conflict and uncertainty. By forming inter-firm organisations the uncertainty about the future state can be reduced. Markets with stagnant growth and an oligopolistic structure serve as an example. In many consumer-product markets, for instance soda markets, a small number of firms fight for market share. A competitive move by an actor affects the other actors and therefore competitive-outcome interdependence exists. This type of interdependence functions without any direct communication between the actors, and is determined by the reactions of the market. In order to avoid uncertainties, firms facing such interdependencies may choose from among various types of inter-firm organisational forms to make their goal achievement more certain.

Interconnectedness, which is characterised through symbiotic-outcome interdependencies, is found along the value chain. The very fact that actors are interconnected through this type of interdependence does not create any form of uncertainty. Uncertainty is only created when other dimensions influence the perception of it. This may be combined with a lack of abundance or a concentration of symbiotic interdependent firms, or with a high level of systemic interconnectedness on the horizontal level that leads to the aforementioned interconnectedness between competitors. This kind of combination is to be found in the relationship between the chemical industry and the automotive industry[91].

The third type of interconnectedness is observable on the horizontal and vertical levels. In cases in which it is based on behavioural interdependencies, the single fact of interconnectedness does not lead to uncertainty perception by the firm. It is only in combination with other dimensions that uncertainty is created. Moreover, behavioural interdependencies in themselves are, in most cases, based on some form of inter-firm organisational formation. The increased specialisation of work processes in the automotive industry is an example. In order to build cars, a group of players needs to work together on certain projects. Defining the roles in the project and entering into legal or

[91] The chemical strategies partnership between OEMs and paint suppliers changed from a market-based-transaction model in that some chemical firms altered their offering to provide a painting service (including investments and management on the site of the OEM) instead of selling paint. Through IFO formation with the customer, such strategic behaviour reduces uncertainties deriving from competitive-outcome interdependencies and zero-sum games. These solutions could be classified as symbiotic-outcome-interdependent along the value chain. For more information, see: www.chemicalstrategies.org. (2002)

ownership-based agreements leads, in most cases, to the formation of inter-firm organisations[92].

3.6.4 Inter-firm Organisational Formation based on the Degree of Environmental Sameness

In the original discussion on the outside-dependence view introduced by Pfeffer and Salancik (1978), environmental sameness was only considered an inherent part of other characteristics[93]. In my view, sameness, or the degree of homogeneity, appears to be a decisive element. The nature of the sameness of the task environment of the firm may contribute to high uncertainty perception and may therefore trigger inter-firm organisational formation. Figure 3.7 is an attempt to illustrate the nature of environmental homogeneity in order to determine the "self-organising" influence of this characteristic.

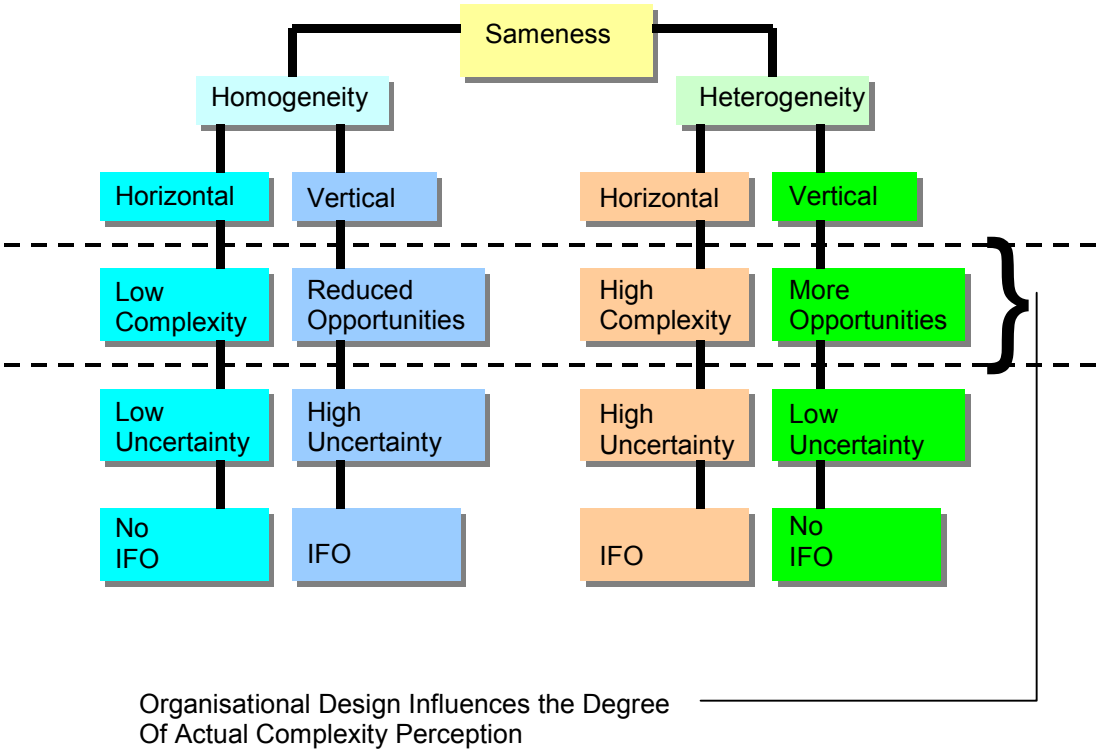

Figure 3.7 Environmental Homogeneity and Inter-firm Organisational Formation

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92 A well-illustrated example is the case of modular consortia in the automotive industry. More details are provided in Collins, Bechler and Pires (1997).

93 Other authors have especially emphasised the homogeneity characteristic of the environment. For instance, cf. Thompson (1967).

The task environment of the firm is grouped in two degrees of sameness, homogeneous and heterogeneous environments. Homogeneous environments in a horizontal perspective provide a reduced degree of complexity, which does not cause a high uncertainty perception and therefore does not lead to the need for inter-firm organisational formation. An example of this type of environment is fast-food franchising. Consumer needs for this type of service are, to a large extent, standardised and therefore result in a high degree of sameness for each type of fast-food service offering. The competitors within a category are very similar and therefore predictable. Inter-firm organisational formation among them is therefore not based on homogeneous environments.

On the vertical level, a homogeneous task environment is considered problematic because of the reduced number of opportunities. The relative dependence on categories of the task environment is high and therefore high uncertainty perception may lead to inter-firm organisational formation. This relationship may occur in forward and backward directions. For example, the automotive OEM considers systems suppliers, which also go through a process of concentration, to be very homogeneous in different product groups. This increases the relative dependence and pressure to work together with the increasingly similar and few automotive systems suppliers for each group of component systems[94]. In turn, this reduces the opportunities to develop totally new systems, which could produce competitive advantage for longer time periods. Therefore homogeneous task environments may lead to a number of different inter-firm organisational forms that create new productive opportunities. Such inter-firm organisational formations very often occur outside of the industry concerned, and therefore lead to strong external influence.

Heterogeneous task environments on the horizontal level create a highly complex environment for the firm. Inter-firm organisational formation may result from high uncertainty perception. The fast growth of the Internet during the end of the 1990s had such a result. In a very short time, established industry players had to face a large number of clusters of businesses that, to some extent, threatened their business. Because many different new business models and forms of organisation appeared to compete with their established ways of doing business and the products and services they offered, high uncertainty was the outcome. Many firms had problems predicting the state of their future and went into inter-firm organisations with start-up firms in order to reduce this uncertainty[95].

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[94] The term component system refers, for instance, to platform production or interior design.

[95] Some firms have been successful especially in the book-retailing business, travel services and banking/insurance markets.

On the vertical level, heterogeneity increases business opportunities and choice. A firm with a heterogeneous task environment on the vertical level has many different clusters of potential customers to which to sell their output. The same argumentation is valid on the backward vertical level. In such situations, the relative dependence on one cluster of important aspects of the task environment is very small and therefore the firm's overall future state does not appear uncertain.

As mentioned previously, there are some limitations in this kind of classification of interrelationships between the characteristics of the task environment and relationships to other actors. I have pointed out that firms' uncertainty perception regarding the sameness dimension is strongly related to the complexity issue, and therefore one logical conclusion is that firms that have a complex internal organisational design might very well have low uncertainty perceptions in highly complex environments. The "possibility trees" I have drawn could be interpreted as typical logical outcomes of the dimension of environmental sameness. In interaction with other dimensions such as concentration, which is closely related to the homogeneity dimension, the lack of abundance, the degree of interconnectedness and the rate of change "emergence" may take a number of forms. The important question, which has been answered, concerns how homogeneity influences the pressure to form inter-firm organisations.

3.6.5 Inter-firm Organisational Formation based on the Nature of Environmental Dynamics

Dynamism of the task environment leads to inter-firm organisational formation along two distinctive "possibility trees", as illustrated in Figure 3.8. The principle classes are separated by dynamics, which are a feature of the task environment and of the non-relevant environment.

In the task environment, continuous change creates an atmosphere of disputed sense making. Different groups within the firm interpret changes that happen at a slow rate differently. My assumption is that when change happens in such a manner, then the uncertainty perception is low, given human nature and the "*resistance to change*"[96]. The outcome is hardly inter-firm organisational formation. It is only when stimuli for change become stronger that this is seen as a possibility. That can only happen, as discussed above, when cognitive dissonance carries more weight.

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[96] Human behaviour in "*resistance to change*" is analysed in depth in Patti Hathaway's (2000) book.

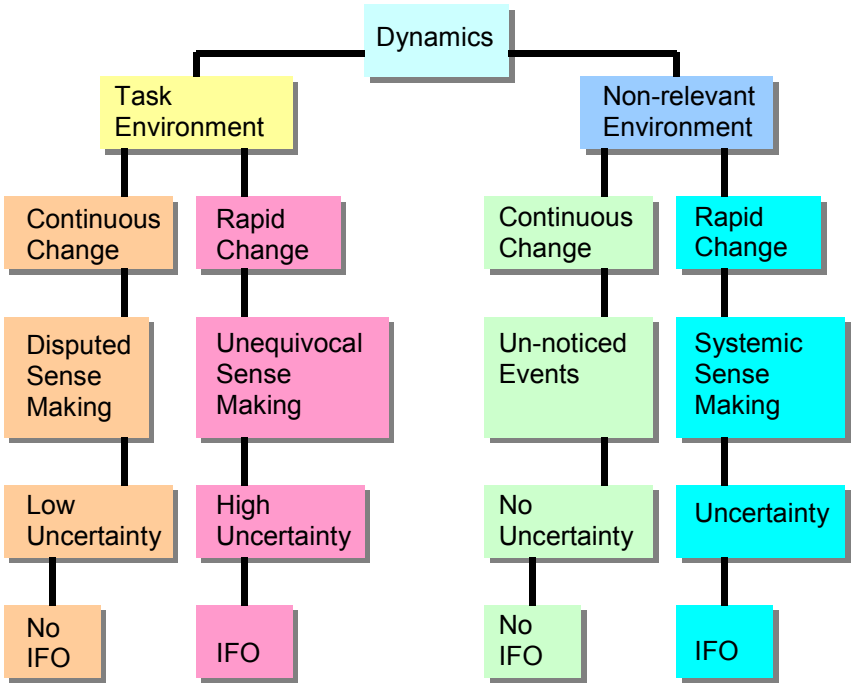

Figure 3.8 Environmental Dynamics and Inter-firm Organisational Formation

Rapid change in the task environment leads to unequivocal sense making within the firm, and high uncertainty is the trigger for inter-firm organisation. The limitation of this argument is the predictability of rapid change. If change can be anticipated, then rapid change does not lead to high uncertainty.

In the non-relevant environment, continuous change is assumed to have little influence within the firm because it most likely does not pay attention to aspects that cause it. Therefore I assume that inter-firm organisational formation stemming from continuous changes in the non-relevant environment is rather unlikely, and it is disregarded in this study. The relationship between rapid changes in the non-relevant environment and the formation of inter-firm organisations is assumed to be different. Given the conclusions about indirect systemic cause-and-effect relationships, a degree of uncertainty may exist, and therefore inter-firm organisations may be formed as a result of this kind of environmental dynamics.

3.6.6 Interrelationships of Environmental Dimensions and Corporate Behaviour that Lead to Inter-firm Organisational Formation

Figure 3.9 below gives an overview of the environmental dimensions that create "*outside control*"[97] for the firm, and it illustrates the main influencing interrelationships between the actors within a given environment.

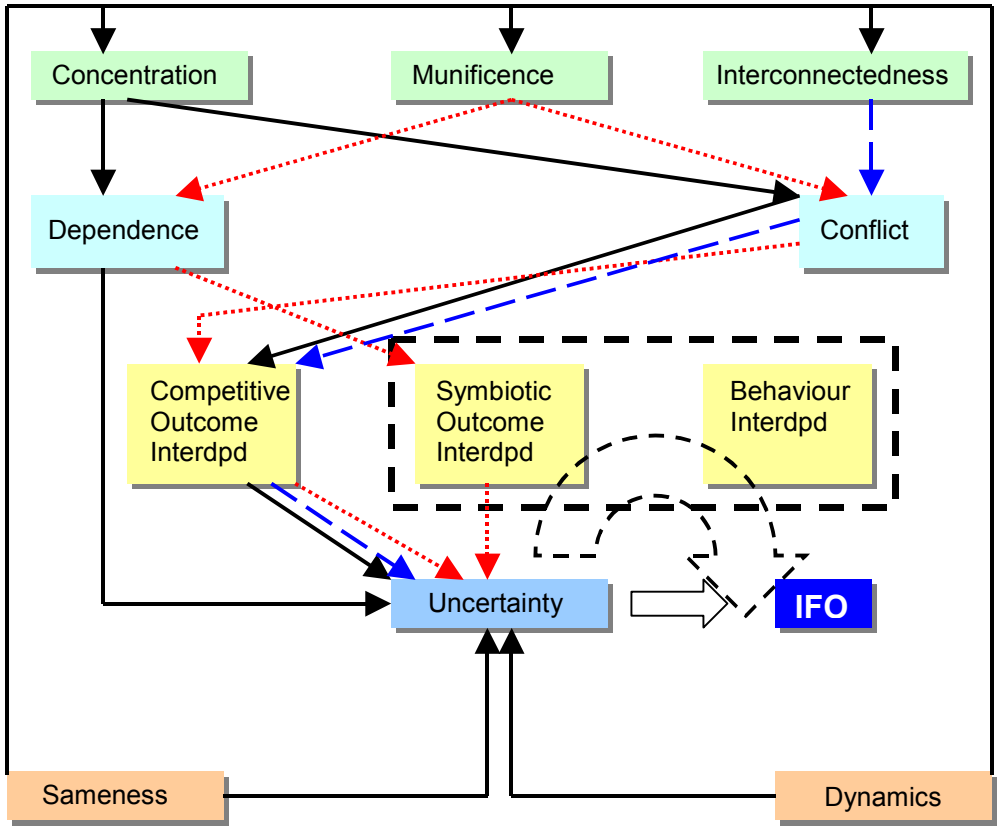

Figure 3.9 An Overview of the Environmental Constellations Leading to IFO

Figure 3.9 summarises the main "possibility trees" along which environmental constellations lead to uncertainty that triggers interest in the formation of inter-firm organisations with important actors in the firm's task environment. A central role determines the concept of interdependence and the distinction between different forms of interdependencies, as outlined in Figure 3.1. Interdependencies cause uncertainty in different scenarios at the same

[97] The outside control of the firm is an expression I have taken from Pfeffer and Salancik (1978) in order to describe the influence the environment has as a limiting factor over the firm's independence in its decision-making and operations.

time as they can be used to increase the level of predictability about the future state of the environment.

The model I present here illustrates the variety of possible explanations of inter-firm organisational formation caused by dimensions of the task environment and beyond. It differs from the resource-dependence view and Pfeffer and Salancik's model (p. 68, 1978) in three ways.

First, the above model goes further by considering the nature of change and the homogeneity of the environment. The homogeneity discussion in particular illustrates an important link to the internal organisational design of the firm and the variety of explanations of how uncertainty can be interpreted by it.

Second, the current model distinguishes between two views of the environment and the creation of value in this context. Separating the influence of environmental dimensions into vertical and horizontal value-influencing factors changes the uncertainty perception in terms of a few very simple considerations[98]. This also contributes to the overall complexity of the model, which on the one hand provides a clearer picture of the effects of structural characteristics of the environment, while on the other hand it is closer to reality and more useful than the original.

Third, the model presented here includes a classification of interdependencies as a core element. Without a clear definition of different forms of interdependencies, it would be very difficult to argue how uncertainty that leads to the consideration of inter-firm organisational formation would be created within the firm.

This treatment of the external environmental control of the firm was based on the principal philosophy of emergence. It could be conceptualised as a modelling via computational experiments of how events "self-organise". This is a view that stresses an evolutionary approach to why firms engage in different forms of inter-firm organisation. The point of departure is a set of elements, which I have attempted to isolate based on their assumed and documented importance. Each of the elements has a number of natures. The social actor who deals with the elements only creates the nature of each one[99]. The interactions between the different natures lead to scenarios that influence certain behavioural patterns. Patterns of inter-firm organisational formation are of interest in this study. Therefore, it is not only the elements of the environment, which I see as the strongest determiner of the firm's direction in the pursuance of goal achievement, but also the nature of the firm and the perception created within it that are relevant in my framework. This brings us

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[98] These include complexity, in the sense of computational complexity that is limited by bounded rationality, and the availability of alternatives and number of opportunities found.

[99] With reference to Weick (1979): the environment is the output of organising and not an input to it.

to the following chapter, which concerns the nature of the firm. In conclusion, I would again like to point out that future developments cannot be accurately predicted from the nature of the constituent parts if self-organisation really produces qualitative changes in systems. "*Scientific laws can only apply to defined and consistent universes. If the universe being studied changes so radically that it substantively becomes a new universe, then old laws no longer apply*" (Letiche, 2000).

4 A FIRM-BASED EXPLANATION OF INTER-FIRM ORGANISATIONAL FORMATION

4.1 Explanatory Dimensions of the Firm

4.1.1 Selection of Dimensions

The previous chapter built a framework charting the origins of environmental uncertainty. As I attempted to show, the creation of uncertainty is a process that is stimulated by the structure of the environment and by interaction between different dimensions in the collective perception of the actors within the firm. The outcome of inter-firm organisational formation, however, is based on the relationships, intended or not, between the social actors in a given environment. For some constellations, the formation of inter-firm organisations appears to be a probable and successful move in the process of avoiding uncertainties. I have also discussed the "other side of the coin" of environmental uncertainly, namely the opportunities found in the environment[1]. Such opportunities are equally based on constellations of different environmental dimensions.

My aim in this chapter is to integrate different firm-based explanations of why firms engage in inter-firm organisations. Environmental uncertainty or opportunity is seen as a triggering factor, while the firm's nature constitutes the other side of the equation illustrating why they form organisations with other actors in order to engage in economic activity. A combination of both intertwined explanatory approaches provides an eclectic framework aiming at creating a rich understanding of a contemporary phenomenon that is given top priority by business managers and academics in various fields[2].

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[1] Uncertainty and opportunity are seen as different aspects of the same phenomenon because they are based on the same dimensions and on interaction outcomes between different dimensions. This view is directly or indirectly supported by a large group of authors, including Child (1972), Pfeffer and Salancik (1978), Madhok and Tallman (1998), Koza and Lewin (1998), Beverland and Bretherton (2001).

[2] The call to investigate inter-firm organisational formation and the resulting forms has come from a large number of researchers. Barringer and Harrison (2000) emphasise the integration of different explanatory models of inter-organisational formation; Beverland and Bretherton (2001) advocate integrating resource dependence and Austrian economics in order to emphasise the uncertainty/opportunity effect that leads to inter-firm organisational formation. Hagedoorn (2001) investigated the formation phenomenon from a historical perspective.

The starting point for building the firm-based explanatory framework is general organisational theory, with special emphasis on the systems/contingency approach (e.g., Beer, 1959; Woodward, 1965; Galbraith, 1970), and summarised by Hodge and Anthony (1988). From the broad selection of corporate dimensions, I choose to limit myself to following organisational building blocks: (1) the goal system, (2) asset specificity, (3) corporate specialisation, (4) firm boundaries, and (5) the adaptation system. The literature on organisational theory also refers to other components[3] that have been used to explain the nature of the firm. These components have become integral parts of one or more of the chosen dimensions, or then they are dealt with in the sixth chapter of this study. The selection criteria for the dimensions were based on their explanatory powers.

4.1.2 Goals

It was pointed out in Chapter two of this study, in the section that defined the nature of the *firm,* that the overall goal of the firm is its own survival, which is secured by its aspiration to grow. The unifying growth goal that secures undivided support by major stakeholders has been defined as the increase in the firm's value over a longer time period. The goal of the firm is the starting point for building an organisation, and it is the benchmark for measuring its success. Every member of an organisation seeks personal need satisfaction or goal accomplishment from his or her association with it (Hodge and Anthony, 1988)[4]. The firm's goals are defined and pursued quite separately from the members' individual goals, and therefore the firm takes on an identity of its own with its own goals. According to Etzioni (1964), the firm's goals serve three purposes. (1) They establish a future state that the organisation attempts to realise, and thus they set down guidelines for the organisation to follow. (2) They legitimate the firm's existence. (3) They provide a standard for assessing its efficiency and effectiveness.

The idea that the firm's goals are vehicles for establishing a desired future state is widely supported by many authors (e.g., Hansén, 1991, Mintzberg, 1994). The process of goal setting is a decision-making process in which the

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[3] Other components include structure and process, power, technology, information and culture. Even though these components are considered equally important in terms of determining the firm's entry into inter-firm organisations, they become an integral part of the formation itself and exert great influence over the form of organisation. Many of these dimensions are therefore discussed in Chapter six.

[4] This basic assumption is considered valid for the firm as such, and also for inter-firm organisations in which the individual satisfaction that ought to be achieved is that of the contributing firms.

"*current situation of the firm*" is a natural ingredient of its desired future state. This process can take two alternative forms, which are differentiated in this study[5]. The first approach to defining the desired state of the firm is incremental, according to which the firm grows within multiple parameters. It sets achievable goals based on the current understanding of the situation. Since the future is not known to anybody, uncertainties are created when environmental constellations change.

The second approach to goal setting does not emphasise the limitations of the current state of the firm, but rather attempts to identify possibilities and convert them into probabilities by selecting desired probable outcomes[6] (the revolutionary approach). Firms with such collective mindsets consider uncertainties as opportunities and, as discussed above in relation to the environmental explanation of inter-firm organisational formation, the constellation of the environment provides a different rationale than for the firm with the *incremental type* of goal-setting mechanisms[7]. This distinction in the goal-setting process is strongly interrelated with the adaptation approach, the nature of the firm's boundaries, and its view on its reservoir of assets and its specialisation.

The further description of Etzioni's (1964) firm's goals has legitimacy as the second component. The firm has a right to exist because it satisfies some need that is attributed to its stakeholders or society at large. In that context, it contributes through its actions to an increase in wealth. In my view, especially the second type of firm, the one with a revolutionary approach, contributes greatly to wealth creation because it is the type that creates real innovations[8]. The uncertainty-avoidance perceiving firm, in contrast, adopts an incremental approach, which is based on improvements and imitations.

The third component of Etzioni's (1964) description is the measurement of the firm's goals. Its success is measured by comparing the set goals with the attained goals. This happens on two different levels, by investigating if it went in the right direction (effectiveness), and if it did so in the right manner (efficiency). Hansén (1991) provides a useful taxonomy of strategic thinking

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5 Support for this view is also to be found in the following: Beverland and Bretherton (2001), Koza and Lewin (1998), Kirzner (1997) and Machovec (1995).

6 The perspective of distinguishing future states as possible, probable and desirable is widely used in strategic management. Another scientific discipline that focuses on these aspects is Futures Studies. The current research has been widely influenced by Futurists such as Masini (1982), May (1996) and Glen and Gordon (1997).

7 This two-type goal-setting typology was greatly influenced by discussions with and the work of Hansén (cf. Hansén, 1991), by the work of Minzberg (e.g., 1994), and in discussions with Jan Inborr (CEO of Ahlstrom Capital, February and March 2002).

8 Innovations are seen in a Schumpeterian way as resulting from ideas, which are translated into inventions and ultimately developed into innovations when they create substantial value for the end users. This value then directly reflects the firm's value growth.

in relation to outcomes, in which he distinguishes between functions of visionary management and strategic management. The visionary-management function provides an abstract vision of possible outcomes of future states of the firm and its environment. It is a creative act that is based on different factors determined by the firm's management, such as the ability to be inspired coupled with previous experiences and an experimental mindset. The strategic management that complements the goal-setting task is a selection process embarked upon in order to determine which of the possible future states can be attained and under what circumstances. The selection is influenced by the perception of how the implementation can be achieved. The firm that emphasises an incremental approach to goal setting will rely much more on efficiency measurements in order to determine successful goal attainment[9]. Firms that emphasise opportunities will take effectiveness as a critical measure of success. Figure 4.1 illustrates the two goal-setting approaches. However useful this distinction of goal setting is, I would like to emphasise the assumption that a firm may take both approaches simultaneously[10].

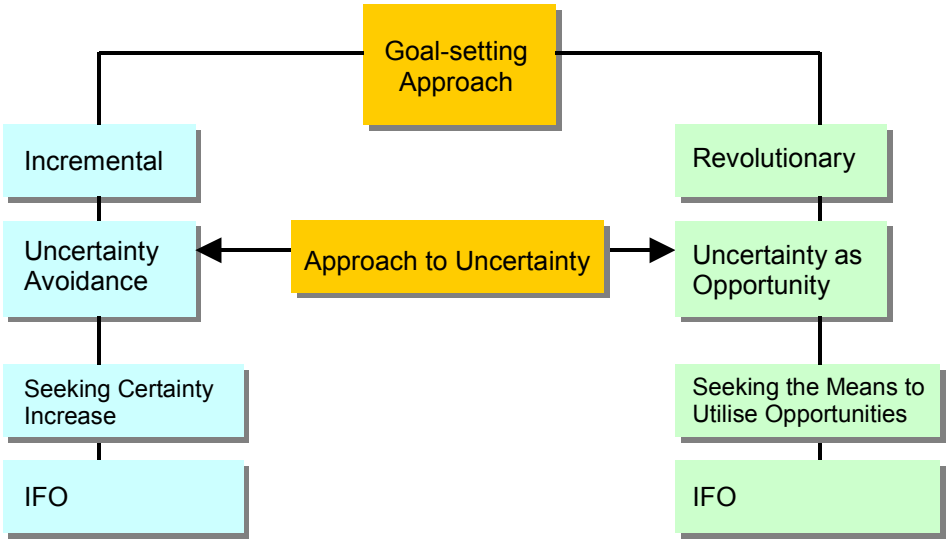

Figure 4.1 A Typology of Goal-setting Approaches

[9] An incremental improvement in different parameters (e.g., sales, production costs).

[10] A firm may take both approaches based on its specialisation. While it might have a conservative approach with incremental growth aspiration for certain products, divisions or activities, for others it may adopt a visionary management approach. This view appears more reasonable in the context of life-cycle models (Vernon 1966) classifying various product stages, divisions or activities (cf. The Boston Consulting Group Matrix: "Cash Cow" vs. "Baby", Stern and Stalk (1998)).

The previous chapter on environmental constellations that trigger inter-firm organisational formation illustrated how different constellations create uncertainty effects. This section distinguishes between perception and sense making with regard to uncertainty in terms of the goal-setting approach or mindset of the firm (cf. Weick, 1979, Olson, 1965).

The firm with an incremental goal-setting approach will respond to uncertainties triggered by a low level of concentration, for instance, by entering into inter-firm organisations with key actors in order to increase the level of concentration. This gives such firms increased influence over their own incremental improvement strategy. Inter-firm organisational formation could therefore be regarded as a strategy for fulfilling the firm's own set goals for efficiency improvement.

The firm taking a revolutionary approach in its goal setting, on the other hand, sees environmental uncertainty as an opportunity[11]. As in the case of environmental concentration, this kind of firm perceives additional value from a wider choice, which is provided by low concentration. Having a fragmented environment means that larger numbers of diverse constellations can be created, which leads to new productive opportunities[12]. Therefore, the firm enters into inter-firm organisations in order to add valuable resources and to open up opportunities for achieving its own goals.

As pointed out above, the distinction between firms with a revolutionary approach and those with an incremental approach is not black and white. As elsewhere in this study, here, too, a continuum is assumed and firms that perceive uncertainty tend to place it closer to one or the other end of it. The intention behind establishing this continuum and distinguishing between ideal types (cf. Hempel, 1965) of revolutionary and incremental goal setting is to arrive at a higher theoretical level (cf. Pinder and Moore, 1979) of explanation of goal-based approaches in inter-firm organisational formation. This is in contrast to other approaches that create frameworks of specific explanations for goal-based motivations[13].

One approach that focuses on specific explanations is a study by Varadarajan and Cunningham (1995). They put forward eight blocks of reasons why firms enter into strategic alliances: (1) related to market entry and market position, (2) product-related, (3) product/market-related, (4) related to market-structure modification, (5) related to market-entry timing, (6) related to resource-use efficiency, (7) related to resource extension and risk reduction,

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[11] Interpreting uncertainties as opportunities is an approach that has its limitations. The previous chapter illustrated such scenarios.

[12] "*Productive opportunities*" is a term that has been taken from Penrose (1959). The concept was discussed briefly and will be dealt with in more depth in the following section (on specificity).

[13] For instance, Varadarajan and Cunningham (p. 285. 1995).

and (8) related to skill enhancement. While such a classification of reasons for engaging in inter-firm organisation is very illustrative and points out the underlying goal that is aimed at, it provides little explanation as to why firms do not make alternative choices. For instance, product differentiation or value adding is listed under product-related motives. If one were trying to predict which firms would enter into a strategic alliance for reasons of product differentiation, it would be rather difficult to achieve that with such a classification. Therefore my aim in this study is to define the very nature of a firm's goal-setting approach and to combine this with various other dimensions in order to arrive at such a conclusion. The following section represents a crucial step forward in my attempt to understand a firm's engagement in inter-firm organisations.

4.1.3 Specificity

I define the specificity of resources as "the specific mixture of resources, capabilities and competencies a firm possesses"[14]. Boulding (1956) writes that the resources that the firm possesses influence a manager's *image*. This image gives rise to the "*subjective*" productive opportunity, which comprises all of the productive possibilities that its "entrepreneurs" see (Penrose, 1959). In other words, the specificity of the firm creates a number of opportunities of which it can take advantage in order to attain its goals. This finding has been used to explain heterogeneity (diversification[15]) in firms, but it could also explain the potential contribution of a firm to an inter-firm organisation in terms of specific assets, which in turn creates a new climate for what Penrose terms *productive opportunities*, in joint organisation with other contributors.

The issue of firm-specific assets is also widely discussed in economics. Kay et al. (1987) and Hennart (1988) argue that *one potential impediment to acquisitions is when the desired assets are hard to disentangle from non-desired ones*. This factor plays an important role in influencing the form of inter-firm organisation. From an economist's point of view, the preferable form is the merger of two or more organisations, but the indivisibility of assets and resources often makes it difficult to realise in cases in which only a specific part of the assets are desired. Therefore the advantage of greater

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[14] As defined in Chapter two, resource is used as a blanket term for every input factor, physical or intangible, which the firm needs to access in order to deliver its outputs. Resources, as mentioned, also include demand or access to demand, because that is among the most critical factors in the delivery of outputs. They are also synonymous with assets in this study, and the specificity of resources includes resource bundles characterised as capabilities or, on a higher level, competencies.

[15] E.g., Mahoney and Pandian (1992), Rugman and Verbeke (2002).

control that a merger provides generates fewer benefits than the cost of keeping or transacting the non-desirable assets acquired[16]. Thus, other forms of inter-firm organisation are chosen, such as joint ventures (proprietary) or strategic alliances (contractual). In connection with asset specificity, Hennart and Reddy (1998) discuss three solutions to the problem of obtaining specific assets that are possessed by other firms: (1) inter-firm organisation[17], (2) the replication of specific assets, and (3) the acquisition of specific assets. The acquisition of specific assets in a transactional manner is only possible in cases in which a market for specific assets exists. Replication is feasible in cases in which the firm possesses specific resources (e.g., knowledge) in order to replicate (e.g., R&D results), and only makes economic sense if it is specialised in that field. Under these conditions, inter-firm organisation is a feasible way of gaining access to specific resources from other firms. The form[18] is dependent on the specific situation (its own resources and the nature of the organisation possessing the desired assets) and the level of uncertainty that a lack of the desired assets would imply for the future state of the firm. One important factor in determining the form of joint organisation is the threat of spill-over. *Spill-over* is the effect of an externality on other parties, a consequence that has not been considered in the analysis. An inter-firm organisation may bring asset-specific advantages to the firm, but that has to be balanced against the potential threat of spill-over[19] through intimacy with other firms (Colombo, 1998)[20]. This is an important determinant of relationship tightness among contributors in a joint organisation, with practically no risk of spill-over in mergers[21] and a higher risk in intensive contractual cooperative forms (e.g., R&D cooperation).

In sum, the formation of inter-firm organisations is triggered by the need for certain resources that are essential in terms of goal achievement. It provides three basic options for accessing such resources. Based on the firm's pool of assets, it is an outcome when transaction costs favour such a procedure or when no market for given resources is available. The specific forms, which are

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16 This approach was discussed above under the term "inducement contribution" (Homans 1950).

17 Hennart and Reddy (1988) define inter-firm organisations more narrowly as joint ventures.

18 For economists, these lie mostly on a continuum from total merger to loose contractual forms of inter-firm organisation.

19 In this case, a positive spill-over for others, with negative effects on the emitting firm.

20 Organisational learning theory considers spill-over from a more positive perspective (e.g., Hamel, 1991, Doz, 1996). The inter-firm organisation has as one of its aims to absorb as much knowledge as possible from a partner and thus ultimately add value to the firm. The key factor in this theory is absorptive capacity, which is the firm's ability to recognise the value of new knowledge, assimilate it, and apply it in a business setting. For further analysis, see Barringer and Harrison (2000).

21 Except the risk of losing employees who possess knowledge.

discussed in Chapter six, are greatly influenced by power considerations and the need to control the firm's environment.

From another perspective, the firm's own specificity of resources needs to possess attractiveness in order for it to find willing candidates for entering into a common organisation. This attractiveness is considered in the form of *complementarities of specific assets*. As Penrose (1959) argues, the potential services of resources provide the uniqueness for each firm, and "*strictly speaking it is never resources themselves that are the ´inputs´ in the production process, but only the services that the resources can render*". Thus the uniqueness of each individual firm is due to the dynamic interactions among managers, resources and services of resources, which provide a "productive opportunity". Therefore complementarities of specific assets among potential contributors to an inter-firm organisation are given when the individual firms see new productive opportunities in terms of combined resources and the services such resources can produce.

This approach is very closely linked to the initial discussion on goal-setting attitudes. A firm with an incremental approach reduces its uncertainty by entering into an inter-firm organisation, and thus perceives higher predictability about its own goal achievement and efficiency.

The firm following a revolutionary goal-setting approach takes an active role in defining the productive opportunity its own resources can provide. Inter-firm organisation is used to complement the firm's own productive opportunity with that of other firms. The necessary ingredient in this approach is an *opportunity-seeking attitude* (Chandler, 1962) driven by an *entrepreneurial mindset*[22]. The entrepreneur seeks to neutralise market and environment constraints (Machovec, 1995) by discovering new knowledge through interacting with others (Hayek, 1945; Kirzner, 1997). From a dynamic perspective, innovations, especially in terms of new resource combinations, can substantially contribute to sustainable superior results (Rugman and Verbeke, 2002). Inter-firm organisational formation provides the means to flexibly connect resources in order to render services, which then leads to new productive opportunities that support the growth of the firm.

In an economic world that produces most of its economic value based on intangibles and knowledge[23], the relevance of the approaches discussed above is clear. The firm enters into inter-firm organisation with other firms that have

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[22] The entrepreneur as the driver of innovations is a tradition of the Austrian School of Thought (e.g., Hayek, 1945, Kirzner, 1997). Penrose (1959) ascribed similar functions and processes to management. In Penrose's (1959) view, human capital in firms is not entirely specialised and can therefore be (re)deployed to allow diversification into new products and services (Teece, 1982).

[23] Cf. Dunning (1998), who describes three stages of the Western model of market-based capitalism.

a resource motive. While the economists' view mentioned above focuses on alternatives for avoiding the dilution of control over its own goal achievement, Austrian Economists emphasise the opportunity that is waiting to be discovered and utilised. In Penrosian terms[24], this could be provoked by combining anew the firm's own resource services with those of the contributing partners in an inter-firm organisation. The specificity explanation for the formation of inter-firm organisations is therefore very rich and, together with the Austrian School's view that "*searching, risk taking, and discovering through interacting with other market participants characterise the market process*" (Hayek, 1945), provides a good framework for understanding the phenomenon.

4.1.4 Specialisation

Specialisation, the activity a firm carries out, is based on the resources it possesses. Penrose's (1959) *productive opportunity* is a function of the resources the firm has access to, the different services each resource can render, and the combination of these services that are applied for a special purpose. Therefore the sum of productive opportunities defines the possible specialisations the firm can commit to. The necessary ingredient, as Penrose, Austrian Economists (e.g., Hayek, 1945) and systems theorists (e.g., Boulding, 1956) point out, is "*entrepreneurial or managerial imagination*"[25]. This is also the driving force in the domain-consensus process, which was discussed earlier in Chapter two, and which is responsible for determining which part of the environment contains important aspects and is therefore the task environment of the firm. The outcome of the domain-consensus process defines *what* the firm does and *how* it conducts its business. In other words, it is the specialisation of the firm.

In this study, the specialisation of the firm is assumed to be based on the perceived competitive capabilities it has. In more simple terms, a person who knows how to cut hair and who knows how to build a business around it determines the specialisation of his or her firm. Hence, it is built on a combination of resource services that produce competitive capabilities[26]. The firm might possess these capabilities, but they might not be sufficient to face

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[24] And, based on that view, a strategic-management view and a resource-based (capability, competence) view.

[25] According to Boulding (1956), "entrepreneurial imagination" is the expectation of productive opportunities and is influenced by past experiences of interactions between managers and resources.

[26] Competitive capabilities in this study are the sum of services that originate from resource combinations. They alone do not make a firm able to compete per se, but are a fundamental ingredient.

the competition because they lack some components that are necessary within the type of business or industry it engages in. For instance, a number of firms in Finland are currently specialising in diverse work tasks within the biotechnology industry. These firms have resource-service combinations that enable them to execute part of the complete value chain within the industry. They may, for instance, specialise in research to discover new proteins. They may also have other essential resources as well as scientific knowledge, laboratory space and patents. The combinations of services these resources can render determine the outputs that are achieved with them. Even though these firms might possess competitive capabilities within their specialisation, they might not be sufficient to ensure their survival and the achievement of their growth goals. In many respects, the specialisation itself is only sufficient if a wider set of resource services is used. These resource services, as in the case of some Finnish biotechnology firms, might not include the ability to commercialise their specialisations. Therefore the specialising firm is forced to develop positive interdependencies with other actors. Only the successful creation of positive interdependencies creates the specialisation because other actors support it. Therefore specialisation, regardless of the resource specificity, provides an explanation of inter-firm organisational formation. The reason why I distinguish between resource specificity and the specialisation of the firm is based on complexity theory (cf. Letiche, 2000). It is not only the different natures of the contributing elements that determine the outcome of self-organisation, but also their interaction. Specialisation thus serves as an explanatory dimension of inter-firm organisational formation, and also of the resulting organisational forms that are established.

One further aspect of specialisation is the basis of the competitive capabilities. What groups can be classified in this explanatory framework?

Porter's (1980) typology of generic strategies provides an overview of how firms generate competitive advantages. It does not focus on the specialisation issue, but rather reflects the outcome of the interaction between asset specificity and specialisation with a view to generating competitive advantage[27]. The view in this study is that competitive capability[28] may give competitive advantage if the firm specialises in one or more aspects of conducting organisational work. Figure 4.2 summarises specialisations of organisational work that contribute to competitive advantage. The model is

[27] Firms cannot achieve sustainable competitive advantage, in my view, because it is a product of the interaction of a larger number of elements. A firm that creates competitive advantage produces a favourable constellation of interactions between elements that are absolute for the given constellation. The reason why it cannot be sustainable is the fact that when elements or their interactions alter over time, the same formerly favourable constellation of productive opportunities will not give the same result and therefore sustainable (over long periods of time) competitive advantage is not feasible.

[28] According to the definition given above.

based on the systemic organisational model presented in Chapter two (Figure 2.1). According to this view, a firm may specialise in two ways, or in a combination of both: their capabilities may involve (1) access to resources[29] or (2) technology. Those involving access to resources are based either on the acquisition of input factors or on serving/creating demands. Capabilities in technology are divided among process technology and product technology. In many industries, increasingly specialised firms are carrying out the tasks that are performed along the value chain. Each one does its part of the work that is needed to produce and deliver the industry's outputs. A *staircase model* of the value chain has been emerging in the biotech industry (Brännback and Mäkinen, 2000). The work the industry does is roughly divided into (1) discovery and early research, (2) pre-clinical testing, (3) clinical testing and (4) marketing and post-marketing testing. Within this value chain, a number of work processes are conducted by specialised firms, which are either technology oriented or access oriented.

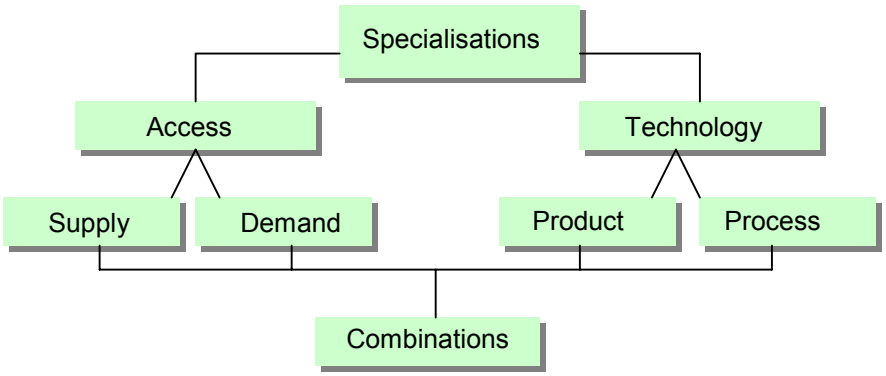

Figure 4.2 The Specialisation of the Firm

Competitive capabilities provide a basis for specialisation. As Figure 4.2 shows, a basic distinction between two groups of specialisation can be drawn. While some firms in the biotechnology sector unify specialisations in access and technology, such as the big pharmaceutical firms, others have been specialising in technology or trade and marketing.

The automotive industry illustrates the specialisation issue very well. Automotive OEMs have traditionally covered a large part of the automotive value chain, from producing basic components to ready automobiles, which are marketed globally through partially-owned sales organisations. The

[29] Demand and its access are counted as a resource in this study.

industry is going through an ongoing phase of concentration on horizontal levels (Ealey, 2001a), and at the same time waves of vertical disintegration have been observed[30]. The role of the OEM has, in many cases, changed from being specialised in engineering and manufacturing work to being more specialised and focused on the access side[31] of the industry. The resource specificity of the firm is only responsible for the specialisation to some extent. The productive opportunity develops based on combinations of resource services, and the field of employment is based on the entrepreneurial imagination that can fuel productive opportunities.

4.1.5 The Boundary of the Firm

According to Thompson (1967), "*Rational organisations seek to seal off, or at least protect, their core technologies from environmental influences*". The function of protecting the technical core from the outside environment is a function of the boundary of the firm. Since *sealing off*, in Thompson's terminology, can be understood as *closing out,* I prefer the term *protect*[32]. The term core technology refers to the system the firm employs in order to produce the primary utility. Therefore it is the primary work system, a system that depends on the resource services and the choice of productive opportunities it is following in order to realise its specialisation. The boundary system has been described by Hodge and Anthony (1988) as the units of the firm that surround the technical core and moderate the flow of inputs to it and outputs from it.

An important sidetrack in the discussion on the boundary of the firm and the work system it regulates is the function of information. Information is the raw material, which is connected and related, required in the acquisition of knowledge, which when employed for useful and goal-directed purposes becomes technology. Arrow (1962) sets information and technology equal, and therefore in his approach information leads to innovative performance, which is traced back to the asymmetric availability of information. This view of the boundary of the firm is consistent with that of Thompson in that the function is to maintain and increase such asymmetry. One problem I see with this approach would surface when the environment of the firm is very dynamic and therefore possession of a specific technical core could only provide

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30 Utting and Sands (1999).

31 Many players emphasise the management of production partners, access to customer needs and to the actual demand for the output of the industry. Cf. Ealey and Troyano-Bermúdez (2000).

32 In line with the discussion on the systemic-organisation view in Chapter two of this study, a *sealing off* would lead to a closed system and entropy, which is not in the interest of the firm.

advantages over a limited period of time. If core technologies are too isolated, adaptation to changes might be difficult. This is an issue that is covered in more detail in the next section dealing with adaptation.

Contractual theorists[33] envision the firm as a *processor of information* (Colombo, 1999). Contributors to these theories consider the origin and nature of the firm as a more or less efficient response to information-related problems (Fransmann, 1994). Following this approach would make the boundary of the firm the gateway to the integration of new knowledge and to protection from spill-over, as discussed in a previous section. This view is also consistent with the views of Arrow (1962) and Thompson (1967).

From a systems perspective, the organisation establishes mechanisms in order to gain access to environmental information, which is gathered, analysed, synthesised and interpreted. The results of these information processes are the basis for decision-making and for the coordinated execution of work. During this process new information or knowledge is produced and emitted to the environment. In order to understand the mechanisms that produce the boundary of the firm we need to distinguish between the different types.

One approach to understanding boundary types of firms is to break them down into some kind of "*purpose boundaries*". Grandori (2001), for instance, distinguishes the firm's boundaries in terms of property rights, contracts, and resources and activities. Another useful approach is to distinguish between "*firm-like*" and "*market-like*" behaviour (Demsetz, 1991). A firm has basically these two ideal-type (Hempel, 1965) approaches to defining its boundaries. A market-like approach is taken to establish clear borderlines between the firm and the actors in the task environment. Exchange in this type of boundary is clearly regulated by coordination mechanisms in the market[34]. The firm-like approach is typically more complex and may involve a number of different coordination mechanisms.

For this study, in which an attempt is made to explain inter-firm organisational formation, the boundary system has great explanatory power. According to the discussion so far, there are basically two types of boundary systems (Figure 4.3). I term the first type the *boundary-spanning unit*, which has been used by many organisational theorists, and which I have acquired from Hodge and Anthony (1988). In this study, boundaries that consist of boundary-spanning units are characterised as follows:

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[33] Contractual theorists are known to follow approaches from transaction-cost theory, agency theory and incomplete-contract theory.

[34] Chapter six is concerned with coordination and investigates its definition and different mechanisms. Market coordination refers to the processing of information that is local and commonly codified (e.g., in prices), and where the decision-making is unilateral.

> *Boundary-spanning units* have the function to protect the technical core as defined by Thompson (1967). Its goal is to maintain an information asymmetry as discussed by Arrow (1962). Boundary-spanning units therefore regulate the market-like behaviour of the firm (Demsetz, 1991).

The second type of boundary system I distinguish in this study is the boundary link, which is characterised by the following features:

> *Boundary links* are systems the firm is building in order to connect its technical cores with the technical cores of other firms. Their function is to enable resources[35] to flow between different sub-systems, and they are therefore systems that foster firm-like behaviour in the firm.

Boundary Systems	Boundary-spanning Units	Boundary Links
Function	Protecting Core Technologies	Connecting Technical Cores
Goal	Maintaining Information Asymmetry	Interconnection of Resources
Behaviour Type	Market-like	Firm-like
Importance for the Firm	Operational	Strategic

Figure 4.3 Boundary Systems of the Firm

Both types distinguished here are not either/or characteristics of the firm. They may be used exclusively, but may also be used simultaneously by the same firm for different economic activities.

The boundary system is a useful tool in determining why firms pursue inter-firm organisation and what form of organisation they are likely to prefer for engaging in economic activities with other firms. Since the choice of inter-firm organisational formation and the type of boundary system is rather like the "chicken and the egg problem", another dimension needs to be introduced

[35] Resources as defined in this study.

in order to draw conclusions about why firms' boundaries trigger the formation of inter-firm organisations.

This additional dimension is the preferred inter-firm organisational form. Mentzer, Min and Zacharia (2000) discuss inter-firm organisational forms in terms of strategic and operational involvement. Firms that tend to favour operational involvement have a shorter time horizon in terms of the particular inter-firm organisation. My assumption is that such firms are not willing to expose themselves to spill-over and are determined to protect their technological core. Therefore their boundary system, for this specific relationship or function, is a boundary-spanning unit. On the other hand, firms open up their core technologies and build boundary links with other firms in cases in which the inter-firm organisation has strategic importance. Strategic or operational importance reflects back to the nature of the firm's goals, as discussed previously.

In sum, the nature of the boundary system gives an explanation as to why firms enter into inter-firm organisations with other firms. When the opening up of its technical core is executed through boundary links, the firm is attaching strategic importance to economic activity. In cases in which the exchange is of operational importance only, it operates via boundary-spanning units, which guarantees that the core technologies are protected. This view is strictly from the firm's perspective. When the discussion turns to inter-firm organisational forms in Chapter six, it becomes clear that the view of importance differs within this construct. One contributor to an inter-firm organisation sees the engagement as operational, while other partners may see strategic importance. This difference of perception is reflected upon in the discussion on inter-firm organisational goals, and is influenced by the power distribution among the contributors. The following section is about adaptation. The nature of the boundary system is related to the adaptation approach. The question of how firms adjust to the dynamics of the environment is seen as crucial in terms of inter-firm organisational formation.

4.1.6 Adaptation

The boundary system of the firm incorporates the mechanisms with which it is connected to important aspects of the environment. Adaptation is the process of adjusting the firm's internal systems to uncertainties and changes in the task environment. This section is an investigation into the foundation of inter-firm organisations based on the adaptation approach. Many theoretical approaches have been concerned with adaptation, and it therefore seems appropriate to elaborate on the findings reported in some of the influential literature.

In the field of alternative microeconomics, *biological theories of the firm* have been developed to discuss the adaptation process the firm is dealing with. These theories are basically divided into (1) *homeostasis theories,* or theories that explain short-term changes, and (2) *viability theories*, which emphasise long-term changes. Both are analogous in that they compare organisations with organisms that are born, grow, create successors and eventually die (Curwen, 1976). Firms, like organisms, attempt to lead a stable life (homeostasis), and because uncertainties threaten their basic goal achievement, the organism necessarily goes to great lengths to adapt to the environmental dynamics. As Boulding (1950) wrote, there is "*some state of the organism which it is organised to maintain, and any disturbance from this state sets in motion behaviour on the part of the organism which tends to re-establish the desired state*". The notion of equilibrium in this cybernetic view is more general than that of classical profit maximisation, although Boulding's argument is that there will always be some firms trying to maximise profits even when most others are pursuing "*the line of least resistance*". As far as viability theories are concerned, the principles of biological evolution and natural selection are core concepts that apply to an organisation. Alchian (1950) interprets the economic system as an adaptive mechanism, which chooses among exploratory actions generated by the adaptive pursuit of "success" or "profits". This was discussed by Eliasson (1996) as an alternative in the decision-making process, and implies acceptance of the postulation that, "*in an uncertain world, profit maximisation is a meaningless guide to specifiable action because realised positive profits, not maximisation of profits are the mark of success and viability*" (Tintner, 1941). The assumption is that surviving firms must have adapted themselves to their environment. Alternatively, they may not have done so, in which case they may have been adapted by their environment. For this reason, Alchian (1959) does not regard the survival of a firm over a long period of times as *prima facie* proof of adaptability.

From a behavioural point of view, the organisation builds up *organisational slack* (Cyert and March, 1963). It forms internal and external coalitions whose members (e.g., employees, suppliers, shareholders, creditors and customers) are paid in excess (respectively charged less or paid more quickly) of their opportunity costs. Wages, salaries and profits are generally higher than they need to be in order to make coalition partners satisfied. At times when the firm is achieving better than its predicted goals, it will allow slack to accumulate internally and at their coalition partners. If it underachieves, it sets free accumulated slack payments (e.g., by reducing managerial perks, rejecting

wage claims, raising prices and increasing productivity)[36]. This theoretical approach promotes understanding of how organisations are able to reach set goals or, in the language of Cyert and March (1963), how they achieve their aspiration levels. At the same time, building up organisational slack acts as a buffer for the organisation to deal with environmental uncertainties. If competitors make a move to lower prices, the organisation removes slack (e.g., lowers its prices, divests itself of inefficient production, removes managerial benefits or lowers intermediaries' commissions) in order to remain competitive.

From a competence-based perspective, firms develop core competencies, which are made into a routine (Colombo, 1998). The positive side of "*routinisation*" is that it acts as a memory bank in which firms store their knowledge. Routines are, from an internal change perspective, responsible for the preservation of distinctive capabilities in spite of the fact that individual members of the firm come and go (Winter, 1988). On the negative side, it may lead to "lock-in effects". A successful firm tends to conserve its routinised distinctive capabilities even if a shift in the environment would require adaptation (Colombo, 1998). From a competence-based perspective, firms with different capabilities interpret and react differently to the signals and stimuli from the environment, and therefore it is not easy to use benchmarking approaches to chart adaptation processes.

In Darwinian terms (Hodgson, 1994), long-term survival is guaranteed only for the fittest firms. These are firms that possess the set of specific assets and core competencies that are most suited to the characteristics of the competitive environment. Unfit firms progressively decline and are finally eliminated from the market. Nevertheless, they struggle to modify their assets and competencies in order to adjust to the environment and to adhere to what they consider the dominant pattern of success. This process of adjustment, in turn, changes the characteristics of the economic environment and influences the result of the competitive actions (Colombo, 1998). In the light of these arguments, the process of adaptation is two-dimensional. On the one hand, the organisation is trying to identify sources of uncertainty in order to adapt to them, and on the other, it is trying to optimise its own goal achievement, assets and processes, and thereby changes the realities of its environment. As already mentioned, Weick (1969) termed these processes enactment processes. The organisation *creates* the environment to which it adapts as a system. It does not *react* to the environment. The line between creating and reacting suggests

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[36] An announcement by the Ford Motor Company serves as a practical example. The CEO announced that he had "*asked executives to find $1bn in overhead cost reductions "over and above" the existing target of $1.5bn*". This initiative was an attempt to restore the confidence of its investors. See The Financial Times, 22nd October 2002.

that the organisation pays attention to parts of the environment and, at least temporarily, disregards other parts. An enacted environment implies a *proactive* approach. The choice of domain and an active and aggressive role is inherent in such a definition. On the other hand, organisations may *react* to the environment by having important environmental factors that define its reactive actions.

Eliasson (1992) discusses the strategic-management process in terms of information on which assumptions are made in such a way that decision makers adopt a *prior equilibrium model* of the world to create enough order to enable them to make the necessary decisions.

Alternatively, firms may disregard the forecasts. They simply operate on the assumption of possessed knowledge (the experiment, experimental economy) and correct any decision if it turns out wrong (Eliasson, 1996).

Adaptation is a process through which the firm responds to uncertainty. Since uncertainty is a probabilistic description of the different states of nature, and of the outcomes of the possible courses of action under those states (Knight, 1921), the firm has, arguably, two ways of dealing with uncertainty. It may decide to (1) influence the environment and the changes happening in it by actively seeking solutions that reduce uncertainty, as when it creates inter-firm organisations with important aspects of the environment; or it may prefer to (2) create sufficient flexibility in order to react quickly when the state of the external environment changes[37]. I define the first approach as the *proactive adaptive approach*, and the second as the *reactive adaptive approach*. While the proactive adapting firm pays more attention to forecasts about future states, the reactive firm is more experimental in its approach. The proactive philosophy is that sufficient information can be gathered in order to make a qualified judgement about the present state of the environment and to forecast its future state. The reactive firm acknowledges that information complexity is too vast to make accurate forecasts and therefore flexibility and experimental trial are the guiding principles.

Distinguishing these two adaptive approaches is helpful in the pursuance of an adaptation-based explanation of inter-firm organisational formation. The proactive contributor actively seeks to avoid uncertainties by engaging important aspects of the environment in a joint organisation. The reactive contributor enters inter-firm organisations experimentally in order to determine the outcomes of such actions. Airline alliances illustrate different adaptive behaviours. While some airlines proactively try to build up countervailing power by joining an inter-firm organisation in order to avoid

[37] Adaptation approaches greatly influence the nature of company work systems. Centralisation and decentralisation are two characteristics that are reflections of this approach.

uncertainties and to define potential future states of the environment, others switch alliances depending on their perception of the gained benefits that membership brings at any given time. A case in point was Finnair when it switched from Staralliance to OneWorld at the end of the 1990s. The inducement contribution of joining such an organisation is determined prior to the act of joining by setting clear goals for such an engagement for the proactive adaptor (in this case Lufthansa, for example). The reactive contributor assesses the benefits and costs in the process, and eventually corrects its decisions.

Adaptation is not a black-and-white phenomenon, but rather a continuum on which a firm operates, with one end being proactive and the other reactive. Some argue that firms may adapt both reactively and proactively (e.g., Miles and Snow 1978, Chakravarthy 1982, Hamel and Prahalad 1994, Sandberg 2001) at the same time. While being rather proactive in some functions, it may be reactive in others. As Weick's (1978) *enactment process* suggests, "being proactive" is primarily a thought process. There have been a number of publications mentioning characteristics that indicate the proactive "*state of mind*" of firms, and respectively of their managements[38]:

(1) Active collection of information (Morgan, 1992; Drucker, 1997)
(2) Industry foresight (Hamel and Prahalad, 1994)
(3) Opportunity-seeking attitude (Hamel and Prahalad, 1994; Morgan, 1992)
(4) Seeking a leader position (Dvir, Segev and Shenhar, 1993)
(5) Forward-looking attitude (Morgan, 1992)
(6) Converting negatives into positives (Morgan 1992)

These six characteristics mentioned in the literature provide a good framework for testing the position of a firm on the proactive – reactive continuum. In this study, adaptive behaviour is seen as important in the process of engaging in inter-firm organisations. This behaviour may offer conclusions about the role of the firm in the process of establishing an inter-firm organisation. The proactive firm in such a situation is more likely to be the initiator than the reactive firm. This fits the typology of adaptors put forward by Hamel and Prahalad (1994), in which they suggest that firms are either (1) *drivers* (proactive), in which case they will use the inter-firm organisation for reducing uncertainty or capturing opportunities, (2)

[38] A broader discussion on this issue can be found in Sandberg, B. (2001), a conference paper entitled "Strategic Adaptation and Strategic Flexibility in the Proactive and Reactive Behaviour of a Firm"

passengers (reactive), experimenting in the form of participation in the inter-firm organisation, or (3) *road kills,* firms that do not react at all. The third type is a firm with a more or less closed system, which was labelled *passive insulator* in Simon's (1969) terminology.

To sum up, the adaptive behaviour of the firm can take two distinct forms. With a view to explaining why firms form inter-firm organisations, two adaptive approaches are distinguished - as illustrated in Figure 4.4.

Adaptive Behaviour Of Firms	Proactive	Reactive
Approach to Uncertainty	Planned avoidance; capturing opportunities	Experimental avoidance
State of the Future	The future is a consequence of one's own actions	The future is unknown outcome
Resources	Planned creation of competencies	Competencies as a result of adaptation
Organisation of Work	Likely to be centralised decision making	Likely to be decentralised decision making
IFO Formation	Creation of the environment; realising the anticipated state of the future	Mechanism to adjust to uncertainties

Figure 4.4 Adaptive Approaches of Firms

The proactive adapting firm has a planned approach to uncertainty avoidance. The firm following such an approach envisions possible future states and builds its goal achievement based on this perception, as discussed in section 4.1.2 above. It perceives the environment as the raw material on which to build the desired state of the future. Therefore the future is a consequence of its own actions. In order to achieve this desired state, the firm actively develops its resource services in order to acquire competencies that increase the likelihood of attaining goals. In order to focus its realisation efforts, the decision-making, which reflects the organisation of the work systems, is more likely to be centralised. The reasoning behind forming inter-firm organisations with important aspects of its environment is to do with active participation in the creation of a favourable environment that supports the realisation of its desired future state.

The reactive adapting firm takes an experimental approach in order to avoid environmental uncertainties. It acknowledges that the future state of the environment is an unknown outcome, and therefore flexibility is an

organisational characteristic, which is reflected in decentralised decision-making[39]. Productive opportunities are evaluated during the adaptation process. This ensures that the firm develops capabilities from its resource services as a result of adaptation. It uses its participation in inter-firm organisations as a means of adjusting to environmental changes.

4.2 A Firm-based explanatory framework for IFO formation

The previous chapter, Chapter three, addressed the question of why inter-firm organisational formation happens from an environment-based perspective. The current chapter charts how environmental uncertainty and opportunity are tackled from the firm's perspective, leading to the formation of inter-firm organisations. This approach addresses the second part of the question why firms form inter-firm organisations.

Reviewing different approaches in the literature highlights a variety of rationales for firms to engage in inter-firm organisations. There are an equally large number of reasons why such action is potentially disadvantageous[40]. This section analyses the fundamental differences and commonalities of the rationales, related to the approach I have taken in this study of five interwoven dimensions. The dimensions selected provide a far deeper understanding than most theoretical approaches. The difference between the explanation of inter-firm organisational formation presented here and explanations as summarised and discussed by Barringer and Harrison (2000) lies in their situation specificity. The approach in this study is to analyse the constituent dimensions and their interrelationships that influence inter-firm organisational formation in uncertain environments. This offers a large number of explanatory possibilities that are not situation-specific, thus leading the way to a mid-range theoretical level. This is a level lower than a general theory, which in my view could hardly be achieved given such social constructs. The reason for this is that when laws for a certain "universe of discourse", in this case inter-firm organisational formation, are constructed, they exclusively apply to the "universe of discourse" that was the basis for their identification. When the universe changes, which it constantly does in social systems, then old laws do not necessarily apply to new universes. Therefore the current approach

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[39] Mintzberg (pp. 270-285, 1979) supports this statement to some extent, and extends it to the environmental explanation. His empirical findings indicate that more decentralised structures are applied in complex environments. His statement, the current discussion on pro-and reactive adaptation, and the discussion of dynamics in Chapter three are mutually supportive.

[40] Barringer and Harrison (pp. 384-385, 2000) engage in a useful analysis of the theoretical approaches and of their view on the advantages and disadvantages of inter-firm organisational formation.

emphasises important dimensions that construct universes, and identifies the nature of these dimensions. It thus opens up a variety of explanations, which are based on the fundamental natures of the chosen dimensions and are neutral to changes in the "universe of discourse". On the other hand, it is also different from specific explanations, which always relate to certain conditions that might be shared by a large population of social actors, but which in my view only deliver understanding within a certain time frame. Figure 4.5 illustrates the dimensions that are considered fundamentally important in terms of explaining inter-firm organisational formation from the firm's perspective.

Dimensions	Natures	Explanations for IFO Formation
Goal System	Incremental Revolutionary	Uncertainty avoidance Opportunity seeking
Specificity	Resource needs	Extending prod. opportunities through resource services
Specialisation environment	Access Technology	Firm's role in the task
Boundary	Boundary-spanning Boundary-linking	Operational, market-like Strategic, firm-like
Adaptation	Proactive Reactive	Creating a future state Adjusting to changes

Figure 4.5 Firm-based Explanations for Inter-firm Organisational Formation

The selection of dimensions is a choice that could be extended through other dimensions, or there may be alternatives. Such additional dimensions have been considered and are inherently reflected in the combinations. At least two further important organisational dimensions, power and work systems, entered the explanatory framework, but are not discussed in depth in this section of the study.

Power has traditionally been considered in the literature a very strong explanatory factor[41]. In terms of why firms engage in inter-firm organisations, power provides a very good explanation through the framework developed by Galbraith (1967), in the *theory of countervailing power*. This theory basically states that firms enter into organisation with other firms in order to countervail

[41] Power is defined in Chapter six, which deals with inter-firm organisational forms.

the power of important aspects of their environment[42]. Power is implicitly included in the current framework. A firm combining specificity and specialisation creates a source of power. Applying this power creates influence. The power factor is a very important one, and it is used in order to classify inter-firm organisational forms in the chapters that follow. The resource basis of the firm and its application for a purpose within its specialisation is seen as constituting factors of power. The lack of such power leads to behaviour aimed at countervailing power through the formation of inter-firm organisational constructs with other firms. The formation of inter-firm organisations works in two ways in terms of this explanation. It enables two or more firms to extend their productive opportunities based on combinations of resource services. New productive opportunities allow the contributing firms to exert more control, a factor of influence, on their external systems. Secondly, it is based on interdependencies. By combining resource services, the inter-firm organisation that is founded achieves a higher influence level by creating more demand together, allowing the better utilisation of access resources, or devising resource-service combinations that increase the dependence of environmental aspects on the inter-firm organisation. Alliances of airlines have shown this effect. By joining the alliance, the contributing parties increase dependence on, and thus create power over, key players such as airport operators, travel agencies and governments. At the same time, they multiply their productive opportunities by offering a higher service level, such as more destinations, to a combined pool of demand.

The other dimension, which implicitly results from combining the five chosen dimensions, is the work system of a firm, which may be understood by relating asset specificity, specialisation and the boundary framework. The work system in these terms explains which part of the environment the firm chooses to serve by combining certain resource services in order to create productive opportunities. It is thus connected to important aspects of the environment through boundary-spanning units or boundary links. It is dealt with at greater length in Chapter six when the constituent elements of inter-firm organisations are investigated.

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[42] This could be cooperation between competitors in order to challenge a dominant market player. An example is the joint venture (2001) between Sony and Ericsson to challenge the market leadership of Nokia.

5 THE EMBEDDED FIRM IN INTER-FIRM ORGANISATIONAL FORMATION

5.1 The Merger of two Perspectives

Chapters three and four of this study address the question why firms form inter-firm organisations. An "open-systems" approach has been taken in order to create a holistic picture, while the firm as a central social actor was defined in Chapter two. The study combines intra- and inter-firm aspects, or in other words defines the firm as an open system, which is embedded in its environment.

The big challenge in creating a framework that is based on firm and environmental aspects is complexity. A combination of a vast number of dimensions dictates why firms enter into inter-firm organisations. This presents an investigative challenge, which phenomenal complexity theory as devised by Bergson (1932) helps to meet. This theory explains why and how phenomena emerge, and how the process of self-organisation creates new realities (cf. Letiche, 2000). Emergent qualities are realised when self-organisation transcends the elements from which it has developed. The challenge from this viewpoint is to create a meaningful general theory that concerns social constructs such as organisations or firms because, in order to arrive at a general theoretical level, the "universe" being studied has to be defined and consistent. If it is not, the scientific laws that emerge through self-organisation apply to a different universe. Moreover, social theories tend to be falsified once a higher level of organisation incorporating qualitative changes has emerged. There are two ways of meeting this challenge.

The first one is to use taxonomic principles to create theories that are on a higher level than specific theories, and that reach a mid-range theoretical level[1]. This would avoid producing theories that are easily falsifiable by employing evolutionary principles that describe the process of emergence over time. The often-expressed dissatisfaction with taxonomies is to do with the

[1] A specific theory in this context would be one that refers to a specific firm. The mid-range theoretical level, according to Pinder and Moore (1979), refers to a certain cluster of firms, while a general theory claims to cover all firms at any time.

low explanatory power of *taxonomic systems*[2], which could be defined as descriptions of certain groups of occurrences.

The second option for meeting the challenge posed by emergence in social systems is to select important dimensions and to define a set of inherent elements and their natures. Thus a set of explanations could be extracted based on the relationships of the dimensions and elements, which would increase understanding of certain types of organisational behaviour. The advantage of this approach is that it allows going beyond the observable. It concerns not only past and present universes of organisational discourse, but also organisational solutions between firms that have not yet been formed.

For this reason, I took the following levels into account in Chapter three, which investigates the outside control of the embedded firm in terms of (1) its structural characteristics, (2) the relational characteristics between the actors in a given environment, and (3) the effect both factors have on the firm, uncertainty. Each of the structural characteristics of a firm's environment, concentration, munificence, interconnectedness, the degree of homogeneity and the environmental dynamics, may have natures that produce conflict and different types of dependencies between the economic actors. Investigations into the different characteristics and the relational characteristics have suggested possible outcomes in terms of uncertainty levels that are produced inside the firm. A classification of interdependencies has proven to be useful in distinguishing between positive interdependencies and competitive-outcome interdependencies. Positive interdependencies may occur as a result of self-organisation when different aspects create certain constellations, or they may be used as an active tool to deal with uncertainty about the future state of the firm. Given the level of uncertainty a firm perceives and the solutions available in the form of creating positive interdependencies between actors, inter-firm organisational formation has been explained from the environmental perspective.

The firm-based explanation of why firms form inter-firm organisations put forward in Chapter four suggested the following five dimensions to generate discussion on a higher theoretical level: (1) the goal system, (2) the specificity of resources, (3) the specialisation of the firm, (4) its boundaries, and (5) the firm's approach to adaptation.

Systemic connections between the two explanatory approaches are feasible. The structural characteristics of the environment and the resulting relationships among the actors create uncertainty within the firm. Firms interpret uncertainty differently. Not knowing its future state or environment influences its goal making. This may result in two extremes in terms of seeing

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2 Cf., for instance, Meredith (1993).

the future as not predetermined and therefore as an opportunity to create new realities as one nature, and as reacting to uncertainty about future states with uncertainty-avoidance behaviour. In both cases, the firm attempts to build positive interdependencies with important aspects in its relevant environment in order to avoid uncertainties or to capture opportunities.

From that starting point, the structural characteristics of the environment become intertwined with other dimensions of the firm discussed in Chapter four.

The state of munificence or the abundance of resources is closely related to the specificity of the firm. The uncertainty-avoiding firm seeks to engage in inter-firm organisations, which provide necessary resources on both sides, supply and demand, in order to secure a desirable future state. The opportunity-seeking firm views other firms' resources as valuable ingredients to be combined with their own resources in order to extend its productive opportunities and to render new services.

In that process, the firm's specialisation becomes more refined, focusing on primary work that is concerned with access or with technology. This refinement of the role of the firm in its environment increases the dependence levels between the actors. In securing its own future state, it supports complexity reduction through inter-firm organisational formation, which ultimately increases the concentration level within the environment via increased specialisation.

The firm's boundaries are defined by *preferences* concerning the types of interdependencies among other actors. The choice is between connecting and protecting its technical core. Protective behaviour results in transactional rather than behavioural interdependencies that seek to connect technical cores[3]. The connecting of technical cores is likely to lead to the higher degree of blurred firm boundaries found in cooperative types of interdependencies[4].

The goal system of the firm sets its desired future state and is an expression of how it views uncertainty, while adaptation is the process that is closely related to implementing the desired future state. The direct connection between the firm's adaptive nature and its environment is illustrated in how it approaches environmental dynamics. The proactively adaptive firm follows a path that suggests that its future state results from its own actions, and therefore it attempts to introduce change into the environment in order to achieve a desirable future state. The reactive adapting firm avoids uncertainties by creating a flexible organisation that can change once

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[3] Given the natures of reciprocal symbiotic-outcome interdependencies and pooled -behaviour interdependencies, a more refined view is presented in Chapter six.

[4] This subject is dealt with in detail in Chapter 6.

environmental changes have been detected. In both cases, inter-firm organisational formation provides the means to achieve successful adaptive behaviour.

This approach to explaining inter-firm organisational formation is in contrast to many others, most of which result in "lists" of reasons that include risk reduction, economies of scale and/or scope, technology exchange, co-opting or blocking competition, overcoming government-mandated trade or investment barriers, facilitating international expansion and the opening of markets, linking complementary contributions of partners in a value system, and the achievement of synergies[5]. The difference in the approach in this study is in defining the underlying dimensions and their elements, which may take different forms, in order to illustrate logical explanations of why firms form inter-firm organisations. Thus I claim that this explanatory approach is not situation-specific, but is on a higher theoretical level. The combinations between dimensions, elements and their natures are abundant, and they can be used to explain past, current and future occurrences of inter-firm organisational formation, and therefore go beyond the observable.

This study could therefore be seen as a study of the multiplicity of rationales behind inter-firm organisational formation, and further as a study of the multiplicity of forms of organisation among economic actors. The classification presented in Figure 3.1 and the accompanying explanation of interdependence illustrates such multiplicity. The theoretical contributions made by a number of authors during the last five decades have resulted in bifurcations of the core concept of interdependence, and in different rationales that change the behaviour of economic actors. By understanding such choices and such emergent phenomena it is possible to understand why firms do what they do and how people within them form their rationales. Therefore this approach is a more radical one than one that is limited by observation.

5.2 A Holistic Framework for Inter-firm Organisational Formation

5.2.1 Explanatory Frameworks for Inter-firm Organisational Formation

Firms are polymorphic constructs, which are able to assume different forms. My aim in this study is to discuss and promote understanding of their underlying elements and natures, which provide, in their combinations, multiple solutions in given situations. The firm is a complex system embedded

[5] Cf. Contractor and Lorange (1988), Ring and Van de Ven (1992), Varadarajan and Cunningham (1995).

in a complex environment. Starting out with the question of why they enter into inter-firm organisations with other firms offers a challenge in terms of finding answers that increase understanding of this phenomenon. Since this study is not limited to a certain type of environment, industry or firm, a reasonable way forward would be to find the constituent elements. To claim that the elements chosen are the best, or all that there are, would be naïve. They are included on the basis of their explanatory usefulness. As a result, two conceptual frameworks are drawn that merge different concepts in order to achieve a higher explanatory level. The two frameworks provide concepts of dimensions and elements of the firm and the environment in which it is embedded, and provokes discussion on the relationships between them. Both frameworks have their own explanatory power, capturing a number of different theoretical approaches and tying them together on the basis of their different aspects. On the other hand, they can easily be related to each other, which is a good sign in a holistic approach. The question that remains is what to do with these frameworks. What is their value and how can they be used?

5.2.2 Theoretical Implications

The first research question in this study was inspired by inter-organisational studies. The article by Barringer and Harrison (2000), in particular, strengthened my conviction that the questions I am tackling are indeed useful ones. Barringer and Harrison provide an analysis of the field of inter-firm organisational formation from a diversity of approaches[6]. They investigate six theoretical paradigms and their contributions to this field. Each of the six paradigms provides strong explanations of why firms enter into organisations with other firms. Transaction-cost economics, resource-dependence theory, institutional theory, stakeholder theory, organisational learning theory and strategic-choice theory all promote understanding of the process of inter-firm organisational formation. Even though none of these approaches is holistic, it is quite impressive that inter-organisational formation can be justified from such diverse angles grounded in diverse fields such as economics, social exchange, business ethics and sociology. They all approach the formation of inter-firm organisations from a relatively narrow perspective. Therefore the single greatest theoretical contribution of this study is to set in motion the development of a robust theory of inter-firm organisational formation. The core of this theory is based on the concept of uncertainty, and the aim is to tie together the origin of uncertainty in the environment of the firm and the nature

[6] Their article has also contributed to other studies, e.g., Olkkonen (2002).

of the firm dealing with uncertainty. In order to do that, a multiplicity of theoretical sources is consulted in the search for solutions. The challenge is to obtain a sufficiently deep understanding of a variety of concepts and paradigms in order to feel comfortable handling very different approaches to some extent, and to bring them into one framework. The attempt charted in this study should therefore be seen as a departure point in the creation of a theory of inter-firm organisational formation.

The theoretical contributions are clearly based on *theory-building* objectives and do not provide theory testing. Since there is no central theory of inter-firm organisational formation, this study could be viewed as a starting point for discussion, and later for testing. Another challenge met during this research process was the confusion of terms in the different fields that were encountered. Certain concepts such as "networks" have been interpreted in many different ways, and each field has its own definition of what a network is and what it does. Another example is alliance, or strategic alliance. While used widely in theory and practice, there are diverse opinions about its definition, content and extent. Even the term strategic is not used completely consistently in all fields[7].

The theory-building nature of this study is based on characteristics of the environment and dimensions of the firm, and on how relationships between actors are rationalised based on the concept of uncertainty. As mentioned above, the breaking down of the phenomenon into constituent elements serves to take us beyond the observable. This means that it should be possible to test the framework through the behaviour of operating firms[8]. Beyond that, it should also be possible to take future developments into account. Such developments include organisational innovations on the firm or industry level. Converging industries are used throughout the study for illustrating organisational innovations within and between firms.

The next logical step towards forming a theory would be to complete an iteration cycle and test the framework in order to refine it. The challenge of making the framework operational lies in the complexity of the approach. Carrying out operational testing requires additional work directed towards refining the variables. While good suggestions are available for some components of the framework, such as the extent of environmental

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[7] This is understandable in many cases because it is not so much the concept of strategic alliance itself that is confusing, but the perspective from which it is looked at. For instance, the strategic importance of cooperation between large and small firms is often perceived differently, especially when looked at from the corporate versus the business-unit level.

[8] Thus it should also be possible eventually to falsify the approach or parts of it. This is one of the major requirements of scientific investigation (cf. Popper, 1968).

concentration, other dimensions are somehow difficult to measure, e.g., the firm's adaptive nature[9].

Further, the framework serves researchers who aim to investigate specific forms of inter-firm organisation, such as virtual organisations. It provides them with an explanatory basis of why firms enter into inter-firm organisations in the first place, beyond situation-specific triggers[10].

Another important aspect of the framework should be mentioned. Its general use provides a holistic strategic view rather than a particularly economic one. Even though economic rationale is inbuilt in terms of the general objectives of the business firm, a longer-term view concerning how to deal with uncertainty is given. Since, in many cases, it is difficult to put a monetary value *ex ante* on certain inter-firm constellations, investigation before entering into inter-firm organisation needs to be a probabilistic assessment.

In sum, the delivery of a theoretical framework of inter-firm organisational formation through this study will provide a multidisciplinary inspired explanation of why firms enter into such organisational solutions. It is an attempt to bridge a very interesting and currently extensively researched gap, and to give an impulse to overcome the fragmentation that has prevented the rapid advancement of knowledge in this field (cf. Barringer and Harrison, 2000).

5.2.3 Managerial Implications

What contribution does this framework of inter-firm organisational formation make to managerial practice? The traditional strategy making of firms originates in the principles of microeconomics of Alfred Marshall[11]. His theories were designed at the end of the 19th century in order to explain how an agriculture- and industry-based economy functions[12]. Such a system could be described as a more or less closed physical economy. A firm operating in an economy with stable technologies and business systems, diminishing returns and a stable industry structure has a generally predictable future. If it has sufficient information on industry economics and consumer preferences,

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[9] Environmental concentration has been measured by the percentage of market share the top four companies of an industry possess in total, for instance. The challenge in producing a measure of adaptation is that proactive and reactive behaviour are rather ends of a continuum, and therefore the grey area in between needs creative solutions to allow for successful testing.

[10] E.g., a situation-specific trigger emitted from the market, as discussed in Achrol and Kotler's (1999) "*Networks designed to optimise customer opportunity*".

[11] Cf. Wagner (1891).

[12] Cf. Dunning (1998).

and if everyone interprets this information in the same way, it can conduct its business in a reasonably foreseeable fashion.

However, this is decreasingly the case. Many industries, including the automotive industry and consumer electronics, and many others even in traditional sectors such as agriculture[13], face a different reality. Firms operate in a reality that is characterised by constant innovation, shortened development time, product and consumer preference cycles, and increasingly global competition in which technological and business systems change, and consumer demand and regulatory changes decrease the certainty of accurate forecasting of the future. Such environments are characterised by uncertain information and are subject to interpretation. An indication that such thinking is entering managerial behaviour is the strategic view put forward by the consulting firm McKinsey[14]. They refer to the "*emergent self-organisation*" of "*open complex-adaptive systems*". Therefore business practitioners increasingly take into account a theoretical framework that is based on complexity theory, and on the notion that constituent parts form new systems that have no master plan. In my view, on the practical level, this is a justification of the avenue I have taken in this study.

The current framework allows managers to analyse their environments in order to reach conclusions about dependence relationships with important actors. Further, it provides solutions embodied in different interdependence forms, which could be used to define fundamental partner requirements and the type of interaction the firm attempts to utilise in the process of inter-firm organisational formation. On the firm level, managers can classify their firms in terms of the five dimensions and their elements. The framework supports the self-perception to find the right match between uncertainty-avoiding and opportunity-capturing behaviour that suits the nature of their individual firms. It could therefore be developed into a strategic tool for dealing with environmental issues, and for supporting goal setting that targets inter-firm organisational formation as a solution to environmental uncertainty.

The following chapter addresses the second research question of this study. The objective is to devise a framework for classifying inter-firm organisational forms. The formation of inter-firm organisations and the forms they take are closely related. My argument here is that the formation determines the form. In the course of the next chapter one distinction is given special attention. When two or more firms enter into an inter-firm organisational relationship,

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13 Cf. Leach, Mesquita and Downey (2001).

14 McKinsey's strategy framework is based on three conditions: (1) a dynamic rather than a static economic view, (2) complexity-based economics that are driven by evolutionary principles, and (3) a realistic model of how humans make decisions. Refer to: http://autoassembly.mckinsey.com/insights/strategy/concept01

different stages of this relationship appear to merit special consideration. It is crucial to keep in mind the emergence or self-organising nature of inter-firm organisational formation, since a relationship develops through the stages of (1) formation, (2) operation, and eventually (3) termination. Different rationales of inter-firm organisational participation develop along these stages, and initial considerations, about the use of power, for example, can be revised[15].

[15] In the course of the next chapter some remarks concerning such "self-organising developments" are made, where seen applicable.

6 A FRAMEWORK TAXONOMY OF INTER-FIRM ORGANISATIONAL FORMS

6.1 From Formation Rationales to Forms of Inter-firm Organisations

The previous chapters focused on inter-firm organisational formation with a view to creating a holistic picture of why firms engage in inter-firm organisational constructs. The point of departure, based on systems theory, was the environment in which firms operate. The central explanatory concept was that of environmental uncertainty and how it triggers inter-firm organisational formation. This concept was then extended to explanations that derive from the firm's internal nature. One important link between the environmental and the internal explanation was shown to be the mindset of the firm's actors, the role of which was elaborated to embrace the goal-making dimension in particular. Uncertainty, which originates in the environment, in combination with the corporate mindset, was analysed in order to expose an entirely different reasoning behind inter-firm organisational formation. Further, I have illustrated how other important company dimensions are influenced by environmental constellations leading to interactions with other important actors and aspects of the environment. Specificity of resources, specialisation in activities, the nature of the boundaries and the approach to adaptation were considered important determinants in the sense-making of inter-firm organisational formation. As a result, a systemic framework was presented that I claim furthers understanding of formation rationales and of the interaction of causes and effects within and outside the firm.

Formation is only one part of the underlying research question, however. It is not only a matter of why firms form inter-firm organisations, but also a question of the form they take. This "*how*" question concerns how the form of organisation can be classified rather than how it is managed - an interesting question in itself but beyond the scope of this study. This chapter deals with the classification of inter-firm organisations. I suggested above that classification is an outcome of taxonomic activity. The classificatory attempt that I pursue in this study takes its point of departure from essentialism. The rationale behind this choice is two-fold. First, I have taken the essentialist's approach to using *a priori weighting* of selected characteristics, and secondly,

the principle of *classificatory intent* is applied to produce a multitude of organisational possibilities[1].

The objective of producing this taxonomic framework is to create organisational systematics for explanations of inter-firm organisational behaviour. As discussed earlier, the theoretical level targeted is the mid-range level comprising more general than specific theories, which would apply to one specific situation in which two or more specific firms entered into a specific inter-firm organisational agreement to conduct specific economic activity, for instance. On the other hand, the theoretical level is lower than might be assumed for general theories. Even though a high degree of generalisation within the classes is attempted, I have to realise that the general level is out of reach for this type of theory[2]. There are two reasons for this. First, nobody can know what the future will bring and what new developments of a technological or social nature, for instance, will influence the development of new classes of inter-organisational forms. Second, it is very reasonable to assume that the *a priori* selection of classification characteristics chosen for this framework misses some important dimensions.

This misconception could take two forms. First, I might have completely overlooked a decisively important dimension that should have been used in such a classification attempt. Second, it may be that when social systems develop, dimensions that are not considered important at the time later become crucial distinguishing factors. These limitations are important ones and I believe they have to be stated before I embark upon my discussion about the selection of single dimensions and their interactions, which in the final analysis are meant to lead to a sound classification framework.

Creating a framework for inter-firm organisational forms is a question of selecting characteristics, or as I prefer to call them, dimensions. It is from dimensions and their diverse natures and sub-elements that it is feasible to find all theoretically possible types of inter-firm organisational forms grouped in classes that reflect the distinguishing natures of inter-firm organisations. This opens up two avenues for discussion.

The first avenue is that of possibility. What does it mean that an inter-firm organisational form is possible? I would like to make a fundamental distinction here[3]. Possible forms of inter-firm organisation derive from the

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[1] Appendix 2 presents a deeper analysis of taxonomic approaches in order to further justify this approach. Essentialism provides the strongest influence in the approach, which otherwise is a methodological mix that takes into account a multitude of complementary views.

[2] Pinder and Moore (1979) criticise holistic approaches for their theoretical parsimony and lack of explanation. Therefore great attention is paid to combining the holistic principle with principles of reduction and rationale (cf. Schwab, 1960).

[3] This distinction is influenced by futures research and futurists' views on how to forecast futures. I have taken their mental concepts of possible, probable and desirable futures and projected it onto my

interrelation of different elements and their natures. To make this point more clear I will elaborate on it. In the case of this study, I have chosen five apparently highly relevant and distinct dimensions. Each of them has a different nature, and some have crucial sub-elements with their own distinct nature. If these elements are interrelated in a plausible way, along a plausible distinction path, a high number of possible inter-firm organisational forms will be the unsatisfactory result. Therefore this way of creating possible classes of organisational forms could be called artificial since it only reveals a *mathematically derived* number of possibilities, which do not necessarily have relevance in reality. Therefore these artificial possibilities have to be separated in order to arrive at logically possible organisational classes. The gap from the artificially possible to the logically possible is bridged by an analysis of the nature of the dimensions. Many artificially possible interrelationships become logically extinct based on the fact that there is no logical match in combinations of dimensional natures[4].

This is the level at which this study aims, to present a framework that provides logically possible classes of inter-firm organisational forms. At the same time, this provides a vast number of hypotheses to test. As pointed out at the beginning of this study, the testing of these meta-frameworks is outside the focus of this research, which emphasises theory building and does not engage in theory testing. Theory testing would lead to the third class of possibility dealt with here - the probable. By testing the classification framework, the hypothesis about classes may be falsified and therefore eliminated from the classification table. The organisational classes remaining after extensive testing are probable forms of inter-firm organisations. They are still called probable, even though testing might *verify* them, but they are only in existence until some incident *falsifies* them[5].

The philosophical question here is whether organisational classes have been found to be true over a longer period of time but are then falsified at some point. Would this mean that the framework under which it was developed is falsified? From a historical perspective, they might have been true classes, but in a given situation they are falsified. This is an interesting question I do not intend to address here[6].

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subject of interest, which is very close in nature also in that here, too, a number of apparently important elements are investigated on the basis of their possible interactions. These elements need to be distinguished in order to select the possibilities that appear, to the best of current knowledge, as sound probabilities. The difference is, however, that my use of these concepts is not deterministic in its fundamental meaning. See Masini (1982).

4 The content of this gap bridging is also a reason why I do not accept Meredith's (1993) argument that taxonomies are purely descriptions, and do not explain relationships.

5 See Popper (1968).

6 Related to that is the question whether, if extensive testing falsifies one class, it can then come into existence once the social universe has changed.

The second avenue of approach in building a framework taxonomy of inter-firm organisations concerns the selection of the dimensions. What is the process by which important or useful dimensions are arrived at? A vast array of possibilities exists. For instance, Grandori and Soda (1995) used the following three dimensions in their classification framework: (1) formalisation, (2) centralisation and (3) a mix of coordination mechanisms. The core question at the beginning of such a quest is how to arrive at this choice. The researcher needs to build some sort of theory or theories upon which to base such selection. The philosophical question is how he or she actually identifies such theories. This is a very special process, which Popper (1968) terms the *psychology of knowledge*[7]: "*How it happens that a new idea occurs to a man – whether it is a musical theme, a dramatic conflict, or a scientific theory – may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge. This latter is concerned not with questions of fact*[8]*, but only with questions of justification or validity*[9]." This means that there is a distinction between the logical examination of a statement, or a set of statements, and its presentation. Therefore there is independence between the research problem per se and the analysis of a statement[10].

The interesting question of how to arrive at an idea for a concept or scientific theory has been addressed by many philosophers. Bergson (1932) describes the process of creating an idea as "*creative intuition*"[11]. Albert Einstein (1934) similarly interprets this process as a "*search of those highly universal laws…from which a picture of the world can be obtained by pure deduction. There is no logical path leading to these…laws. They can only be reached by intuition, based upon something like an intellectual love*[12] *of the objects of experience*". This process does not contain a logical method for arriving at new ideas, for in Popper's (1968) words, "*Every discovery contains an irrational element*". The ingredients of intuition are obtained from one's view of the world, and a picture of the world and of laws in the world are constructed in some sort of *black box*.

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7 The *psychology of knowledge* and the *logic of knowledge* (epistemology) are two separate things. The first one deals with how to arrive at an idea or a theory, while the latter is concerned only with logical relations. Both should be seen as two different processes, which are analysed and judged separately. In Popper's (1968) view, inductive logic is a "*confusion of psychological problems with epistemological ones*".

8 Emanuel Kant's *quid facti?* See Allison (2001)

9 Kant's *quid juris?*

10 It should be pointed out that there are scientific questions that have to be distinguished from non-scientific ones. See the problem of *demarcation* in Popper (1968).

11 "*Penser intuitivement cést penser en durée*." Bergson (p. 30, 1932).

12 *Intellectual love* is not a good translation into English. The original term used by Einstein was *Einfühlung*. Einstein (p. 168, 1934).

It seems to me that this point in the study is an appropriate place at which to discuss the process of arriving at a theoretical framework since the choice of dimensions according to which inter-firm organisational forms are classified needs some explanation. Acknowledging Popper's view, that this is a process with irrational elements, I would like to illustrate the influencing origins of my choices.

6.2 Dimensions of Inter-firm Organisational Classification

6.2.1 The Selection of Dimensions

For reasons of readability, I have chosen to present the dimensions before I discuss the reasons for their inclusion and analyse their content. The following five dimensions provide a framework for inter-firm organisational classification:

(1) Inter-firm Organisational Goals
(2) Interdependencies between Contributors
(3) Coordination within Inter-firm Organisations
(4) Power Distribution within Inter-firm Organisations
(5) Work Systems within Inter-firm Organisations

The treatment of inter-firm organisational goals in this framework is based on literature on strategic management (e.g., Hansén 1991, Mintzberg, 1994). Like any firm or organisation, inter-firm organisations are also formed because economic actors believe, for various reasons, that they are better off joining an organisation than not joining it[13]. Nevertheless, the success[14] of membership and of the organisation itself is based on common goals. Therefore this dimension and its nature serve as a fundamental building block for this framework.

Interdependencies between contributors to an inter-firm organisation constitute the tools for identifying the nature of relationships between different actors within it. Interdependencies as classified in Figure 3.1 possess the explanatory power that links environmental constellations to actor-relationship outcomes.

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13 Cf. *Inducement Contribution*, Homans (1950).
14 Success, by definition, is "*a favourable or desired outcome*".

Closely related to the structure and origin of relationships in the form of interdependencies is the set of applied coordination mechanisms that are the governance systems of inter-firm organisations.

The power system among contributors is the fourth key dimension as far as this framework is concerned. Based on the nature of power, it is closely related to the relationships among actors and is therefore an outcome of interdependencies. The power dimension is used to determine the influence and control distribution within inter-firm organisations.

The last dimension under consideration in this framework of inter-firm organisational classification is the work system. Actors join an organisation in order to meet their individual firms' goals through a common inter-firm organisational goal. Their relationships are determined by the dependencies they impose on each other. The common goal is coordinated by different governance mechanisms, which are connected to the power distribution within the inter-firm organisations. The determination of the work system within the inter-firm organisational classification is based on key variables that illustrate how organisational work is carried out by firms that have a common goal.

6.2.2 Inter-firm Organisational Goals

Members of inter-firm organisations express or have tacit agreements about their common goals. Their initial assessments tell them that an inter-firm organisation that has other contributors results in the attainment of individual goals with a higher degree of certainty. Consequently, the goals of inter-firm organisations cannot be considered static, and are under continuous evaluation in order to determine whether the initial assessment of the benefits holds true. While such assessment may result in the discontinuation of the organisation, it may also result in a change in form. Hansén's (1991) framework is used to analyse the different natures of inter-firm organisational goals. On the top of the hierarchy a common vision is outlined that supports the future goal achievement of each individual contributor. This vision is the abstract perception of possible future outcomes that are shared by contributors and that may refer to a long- or short-term time horizon. The vision per se is seen in this framework as a qualifying element in entering a specific inter-firm organisation. It determines the nature of the goals the organisation sets. Two alternative types of inter-firm goals are distinguished, operational and strategic.

The difference between operational goals and strategic goals is in how far the individual firm connects its work system to the other contributors' work systems. It determines the extent to which the firm ties its own goal

achievement to that of other firms, and what influence the other contributors have on their actions. All in all, the difference is a difference in consequences for the contributors.

The agreement to form strategic or operational inter-firm organisations has implications on three different levels: (1) the time orientation of the joint organisation (Mentzer, Min, Zacharia, 2000), (2) the organisation of work (Hodge and Anthony, 1988), and (3) the design of the firms' boundaries[15].

Strategic goals in inter-firm organisations are assumed to have longer time effects than operational goals. This means that firms contributing to common organisations project their goal achievement onto a longer time horizon than in operational inter-firm organisations. Members of a strategic inter-firm organisation recognise each other as an extension of their own firm (Lambert, Emmelhainz and Gardner, 1996). Johnson (1999) suggests that a firm's perceptions of its strategic partners include: (1) considering its partner a large part of the picture; (2) not thinking of its own long-term strategy when it makes plans with its partners; and (3) if its partner goes out of business, having to change its competitive strategy. While the strategic inter-firm organisation undisputedly resembles the view put forward in Lambert et al. (1996), I differ from Johnson in how I see the second characteristic. In my opinion, a firm entering inter-firm organisations with strategic intent means that the strategic goal of the latter is a synthesis and complement of the individual strategic goal of the former.

Perceiving the other contributors as an extension of the individual firm, as suggested by Lambert et al. (1996), implies that the work systems among members of strategic inter-firm organisations are to some extent integrated. In Thompson's (1967) terms, a strategic inter-firm organisation connects the technical cores of the contributing firms. Apart from this integration of technical cores, which are primary work systems (Hodge and Anthony, 1988), secondary work processes such as administrative tasks[16] are also strongly linked together. Upton and McAfee (1996) illustrate the difference between strategic and operational inter-firm organisation through integrated work systems with the example of electronic data interfaces.

The distinction between strategic and operational, goal-based inter-firm organisations is further related to the boundary of the firm, as discussed in Chapter four dealing the firm-based explanation of inter-firm organisational formation. The boundary shifts when the firm engages in strategic inter-firm organisation. This is related to opening and connecting the technical cores of the contributors. Boundary links are in place so that the strategic inter-firm

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15 Cf. the discussion on boundaries in Chapter four.

16 E.g., billing systems, stock information and process information.

organisational goals can be realised[17]. Operational involvement in inter-firm organisations, on the other hand, connects the work systems via boundary-spanning units. In that case, the technical core is protected and only selective information flows between contributors.

The operational contribution to inter-firm organisation involves shorter time spans (Lambert and Stock, 1993; Ganesan, 1994). Such inter-firm involvement consumes fewer organisational resources and is easier to implement and reverse than strategic contributions (Hitt, Ireland and Hoskisson, 1999). Therefore, operational inter-firm organisations are more likely to match operational actions than strategic actions (Grimm and Smith, 1997).

The goal orientation of inter-firm organisations is in line with the previously discussed position of their forms on the continuum between ideal market types and hierarchies. As Frazier et al. point out, "*Strategic and operational partnering is distinguished from transactional buyer-seller relationships by degree*[18]*"* (Frazier, Spekman and O'Neal, 1988).

Thus the inter-firm organisational goal dimension is of two distinct types, strategic and operational. It is related to (1) the firms' work systems, (2) the individual firms' goals, (3) the boundary systems of the contributors, and (4) the "*resource commitment*"[19] each contributor makes to the inter-firm organisation.

	Strategic	Operational
Work Systems	Connecting Technical Cores	Sealing off Technical Core
Individual Firms' Goal Contribution	Long-term; Major Goal Attainment Contribution	Short-Term; Minor Goal Attainment Contribution
Boundary Systems	Boundary Links	Boundary-spanning Units
Resource Commitment	Major Contribution; New Productive Opportunities	Minor Contribution Realising Existing Productive Opportunities

Figure 6.1 Types of Inter-firm Organisational Goals and their Characteristics

[17] See Figure 4.3.

[18] By degree means the extent to which the partner firm is seen as an extension of its own operations.

[19] Resource commitment in this study is defined as "*the relative degree of resource contribution a contributor is making to an inter-firm organisation*". The relative resource commitment determines the importance of the inter-firm organisation to the contributor.

Strategic goal orientation in inter-firm organisations has the following characteristics. The technical cores of the contributors are connected, which in turn indicates long-term goal adjustment. Its role in the firms' individual goal-attainment process becomes crucial. Boundaries shift and the contributors and their internal actors cannot determine the exact location of firms' boundaries since two or more firms are internally linked, on either the corporate or the business-unit level. The resource commitment to, or in other words the investment in, the inter-firm organisation is relatively high. A relatively high investment is understood in terms of committed resources in relation to "*resource size*". In exchange for this resource commitment, the contributors create new productive opportunities, which are derived from new combinations of complimentary resources. This leads to the question of inter-firm organisations joined by contributors of substantially different sizes. The case in which a small firm commits a substantial part of its resources has to be contrasted with that of a large firm that enters the same inter-firm organisation with an equal contribution. The relative resource commitment of the small firm is much higher than that of the large firm[20]. This reflects the nature of interdependencies and inter-firm organisational power constellations, which are discussed in this chapter.

The operational orientation in inter-firm organisation is expressed in a work system that protects the technical cores of its contributors. In practice, this would reflect typical transactional relationships to a higher degree than cooperative forms. Therefore the time orientation targets short-term benefits for the contributors, and an assumed lower-level contribution to the overall attainment of each contributor's individual goals is the result. Boundaries in such an orientation are clearly demarcated, which is indicated by the use of boundary-spanning units, the connection points being clearly defined organisational units of each of the contributors. The resource commitment in the operational orientation is minor and presumably specific to the transaction or exchange for which the inter-firm organisation was formed. Each contributor employs resources in order to realise its own productive opportunities rather than, in the case of strategic orientation, to find new productive opportunities.

The significance of the distinction of types of goal orientation in inter-firm organisations can be expressed in two ways. First, it appears that there are misconceptions and confusions in academia and practice with regard to mixing strategic and operational forms of inter-firm activity. The term strategic alliance and what it really is serves as an example of such a misunderstanding. Therefore the clear definition presented here helps to focus on the differences

[20] Blomqvist (1999) provides further insights by analysing such combinations.

between these two dimensional types. Second, clear distinction and the relationships between strategic and operational orientations and other dimensions are considered important in this study. Otherwise, the goal to create a system of "*logically possible*" forms from a pool of "*mathematically possible*" inter-firm organisational forms, which could then be tested, is not attainable.

6.2.3 Interdependencies between Contributors

As pointed out above, the dimension through which I seek to explain the relationship between contributors to inter-firm organisation is the concept of interdependence. Figure 3.1 illustrates a systematically built up classification of interdependencies. This classification served to support understanding of inter-firm organisational formation based on the structure of the environment and the interaction of actors within it (Chapter 3). In the present section, the interdependencies serve to explain the natures of the relationships within inter-firm organisations. As mentioned in Chapter three, only *positive interdependencies*[21] directly lead to inter-firm organisation. The opposite, competitive outcome interdependencies, lead only indirectly in that direction[22].

It is generally assumed that all positive interdependencies are to be found in inter-firm organisational forms. The transactional forms are closer to the market side of the continuum, while cooperative forms are closer to the hierarchy end[23].

Emerson (1962) introduces the concept of *total interdependence* (Lawler and Bacharach, 1987). This is the sum total of dependence within an inter-firm organisational context. Symmetric interdependence among contributors occurs when they are all equally dependent on each other. Symmetry and asymmetry in an inter-firm organisation represent two types of interdependence that are strongly related to the concept and dimension of power, which is discussed later in this chapter. Relative asymmetric interdependencies within inter-firm organisations lead to situations that are "*more dysfunctional, less stable, and less trusting than symmetric relationships*" (Stern and Reve, 1980; Anderson and Weitz, 1989). According to Mentzer, Min and Zacharia (2000), regardless of whether the firm is in a position of relative power or relative dependence,

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[21] Positive interdependencies are symbiotic-outcome interdependencies that are sequential and reciprocal, and pooled as well as intensive.

[22] Cf. the *theory of countervailing power* developed by Galbraith (1967).

[23] Transactional interdependencies include sequential and reciprocal interdependencies, and cooperative interdependencies include pooled and intensive interdependencies (see Figure 3.1)

increasing asymmetry in relative dependence and decreasing total interdependence generates greater conflict, lower trust, and lower commitment. Conversely, commonality of interests is strongest in symmetric relationships (Kumar, Scheer and Steenkamp, 1995). Buchanan's (1992) empirical findings further support the notion that increasing total interdependence in symmetric relationships enhances performance.

These discussions in the literature give rise to two types of interdependence relations (Figure 6.2). First, the symmetry of interdependencies among contributors in inter-firm organisations relates to the power and influence within them. It was suggested in Chapter three that this feature was related to the ability to deal with external uncertainties, and this has been acknowledged as a source of power within inter-firm organisations.

Second, the symmetry of interdependencies is related to the goal systems within inter-firm organisations. The presence of symmetric inter-firm organisational dependencies indicates the existence of a common longer-term goal and strategic orientation among the contributors.

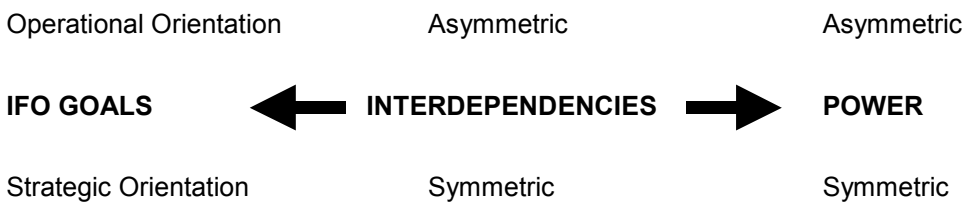

Figure 6.2 Symmetry of Interdependencies

I will now move away from the level of symmetry of interdependencies towards interdependence types. The four positive interdependencies are analysed in order to raise the explanatory level of inter-firm organisational forms.

Sequential interdependencies belong to the symbiotic-outcome class. This transactional type is closest to the market ideal on the market and hierarchy continuum. The symbiosis is derived from an output and input perspective that is based on an exchange of resources. The relative positioning on the continuum cannot be given since sequential interdependencies may be pure market transactions, and there may be no need for further coordination mechanisms or information exchange, taken on a case-by-case basis. On the other hand, sequential interdependencies may also be present in an

institutionalised form[24]. The institutionalisation appears through simple exchange relationships between buyer and seller, for instance. Through routinisation of this relationship the firms involved develop a memory that stores this knowledge[25]. The relationship is then sustained independently of the individuals within the contributing firms, and could be attributed to uncertainty reduction and efficiency. This kind of institutionalisation has been observed in recent years especially through the appearance of electronic exchanges. The interdependence between contributors is generally sequential, but takes a high-frequency institutionalised form. The reasoning behind such exchanges is based on efficiency gains instituted to minimise the costs of secondary work processes[26]. It does not involve common goal formation in general, but contributes more to individual firms' goal attainments. Such institutionalised sequential interdependencies serve as standardisation tools, and the contributors may or may not enjoy preferred access advantages to supply or demand.

The basic form of systematised sequential interdependencies would be closest to the market paradigm on the continuum, while institutionalised sequential interdependencies would move in the other direction. The fundamental difference between the two is the degree of connection in the work systems. The assumption is that, in the institutionalised form, some degree of adjustment is made in order to connect secondary work systems for the benefit of both parties in terms of efficiency[27]. This type of interdependence does not concern the technical core of firms, however.

The reciprocal type of interdependence is also classified as symbiotic outcome interdependence. As discussed in Chapter three, reciprocal interdependence is a form of transactional interdependence complicated by information complexity and specificity, rather than simply by bi-directionality of transfer. Inter-firm organisational forms based on reciprocal interdependencies are more intense in terms of interaction between the contributors, as the term information complexity and specificity indicates. Information complexity occurs when a simple coordination mechanism such as price is not sufficient to make an exchange happen. Some kind of multi-stage dialogue is necessary in order to complete the transaction. The design of an automotive component serves as an example: pure price/quantity signals

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[24] "Institutionalised" in this context refers to "a system that evolves over time and is accepted as an important part of the contributors involved".

[25] For a deeper understanding of routinisation, see Winter (1988) or Colombo (1998).

[26] Examples of secondary work processes include information gathering, ordering, accounting and billing.

[27] Gains in efficiency are assumed to result from reducing coordination efforts. The institutionalised sequential form uses a mixture of norm- and market-based coordination mechanisms. This is further discussed in section 6.2.4.

are not sufficient to make the exchange happen, and a number of individuals on various corporate levels need to interact. Similar reasoning applies to specificity. Other than for components or simple goods or services, exchange partners need to specify their input requirements for completing a transaction.

The implications of reciprocal interdependent relationships within inter-firm organisations are twofold. First, the work systems have to be connected to a large extent, and secondly, bi-directional actions precede the exchange. The connection of work systems is not limited to secondary work processes, but requires closeness of the technical cores and interactions between the constituent elements. The fact that the technical cores have to be opened up to some extent also implies that both types of goal orientation, strategic and operational, are possible. In practice, many complex industries rather follow a strategic orientation in this type of relationship. The automotive industry is such a case. Reciprocal interdependencies are a normal fact of business. Specificity and complexity are very high and a high level of interaction is necessary during the design phase, and also later during manufacturing and logistics operations[28]. This and the fact that automotive series are produced for many years with the same components make strategic orientation preferable. Another explanation is related to the learning curve of collaboration that provides benefits only over longer periods of time. All this puts the location of reciprocal interdependent relationships further away from the market end of the continuum than sequential interdependent relationships. The market does not possess the coordination mechanisms that are needed to successfully complete transactions within this type of interdependence[29].

In sum, several relationships between dimensions have to be considered in order to capture reciprocal interdependent relationships[30]. (1) The goal orientation is more likely to be strategic when information complexity and specificity occur on high levels. In such situations, the work systems are connected by boundary links, which in turn connect the technical cores of firms to some extent. (2) Operational goal orientation features in reciprocal interdependent relationships when the information complexity and specificity is on a lower level and boundary-spanning units can handle transactions without connecting technical cores, or when the transaction has a short-term definitive point of completion.

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[28] Cf. the automotive case study in Zettinig (1996).

[29] Automotive exchanges, such as Covisint (see: www.covisint.com), reveal the tendency to use information technology in order to create new coordination mechanisms that behave like market coordination on the one hand, and that facilitate the handling of information complexity and specificity on the other. Nevertheless, the degree of connection of work systems is on a higher level than what is achievable through the institutionalisation of sequential interdependent relationships.

[30] Coordination mechanisms are dealt with in the next section.

Figure 6.3 illustrates the different types of transactional or positive symbiotic-outcome interdependencies and the relationships they form with other important dimensions.

TRANSACTIONAL INTERDEPENDENCIES

	SEQUENTIAL		RECIPROCAL	
	Simple Form	*Institutionalised Form*	*High Complexity*	*Low Complexity*
Goal Orientation	Operational	Operational	Strategic	Operational
Boundaries	Boundary Spanning	Boundary Spanning	Boundary Links	Boundary Spanning
Work Systems	Separate	Simple Adjusted	Combining Tech Core	Separate
Rate of Interaction	One-off	Repeatedly, Systematised	Long-term	Project

Figure 6.3 Relationships between Transactional Interdependencies and Other Dimensions

The next set of interdependencies classified in Figure 3.1 is behavioural interdependence, with its two cooperative forms of pooled and intensive interdependencies. Pooled interdependencies occur when contributors share common resources in terms of *"cooperation in assets*", because the outcomes are dependent on the use of the resources of the other contributors within the inter-firm organisation. Two or more contributors create productive opportunities by bringing in resources in exchange for being able to draw from the combined pool. What is interesting is how such behaviour influences the goal system, the boundary and the work system in inter-firm organisations. The question of symmetry is also interesting, but this is covered in a separate discussion on the power dimension.

The goal orientation of inter-firm organisation that is based on pooled interdependencies may take one of two forms. Strategic orientation, as assumed here, is adopted when the created pool concerns the primary work system of the contributors. It is definitely required when the technical cores of the contributing firms are dependent on the common pool of resources in order to guarantee long-term strategic goal attainment for each individual contributor. The boundary system of the inter-firm organisation in that case is overlapping with the cores of the contributing firms. A recent example may help to clarify this case. The joint venture between Sony and Ericsson to

produce and market mobile phone products together is a form of strategic pooled interdependence. Prior to engaging in this inter-firm organisation, both contributors had their own necessary functions for developing, producing and marketing mobile phones. The concentrated environment and the industry power of the market leader countervailed power motives and triggered the transformation of competitive-outcome interdependence between Sony and Ericsson to pooled behavioural interdependence. The common pool consists of major components of the technical cores of both firms' mobile phone handset operations. The strategic orientation of this form of inter-firm organisation is obvious if we think of the difficulties in reversing it. Both firms' mobile-phone handset businesses are directly and absolutely dependent on the common resources.

Pooled interdependence may also be based on operational orientation. In that case, it is not the technical cores, but mainly the secondary work systems and auxiliary processes contributing to the primary work of the contributors that are directly dependent on the inter-firm organisation. The boundaries of the contributing firms are by and large separated, and only those that concern the common pool of resources are integrated through boundary links. Dissolving an inter-firm organisation based on pooled behavioural interdependencies might be technically challenging, but the assumption is that, in many cases, there is a market for such pools. Therefore the time orientation of this form of inter-firm organisation is possibly but not necessarily shorter.

Again, it is helpful to illustrate this through an example. The "*Efficient Consumer Response (ECR) Initiative*"[31] within the grocery industry is a case of pooled interdependencies. This initiative facilitates different forms of cooperation among the competitors in the value chain, as well as among retailers. One part of this initiative concerns the electronic data interface and efficient replenishment system that is cooperatively in use. The effect is in terms of increased efficiency and results in win-win situations. In Austria this initiative has a savings potential of approximately €73 m, which results in 0.67% lower consumer prices. The contributors create interdependencies by pooling resources that are necessary for secondary work processes in particular. Membership in this form of inter-firm organisation is on a free basis and is not forced by the regulator. Each contributor may leave the cooperation, which is an indication of an operational form. The boundaries of the contributors remain intact and concern only the parts directly accessible from or contributing to the pool of common assets.

[31] Kotzab and Teller (2002) illustrate the ECR Initiative in the case of the Austrian retail environment.

POOLED BEHAVIOURAL INTERDEPENDENCE		
GOAL ORIENTATION	Strategic	Operational
BOUNDARY SYSTEM	Common Boundaries; or Boundary Links	Boundary Spanning
WORK SYSTEM	Combining Technical Cores	Combining Secondary or Auxiliary Work Systems

Figure 6.4 Relationships between Pooled Behavioural Interdependencies and other Dimensions

Figure 6.4 illustrates the differences between operational and strategic pooled behavioural interdependence. The relative position on the market and hierarchy continuum is closer to the market paradigm for the former than for the latter, which is closer to the hierarchical type of organisation.

The second type of behavioural interdependency is the intensive type. While pooled behavioural interdependence reflects "*cooperation in assets*", I like to term this form "*cooperation in activity*". It is created because contributors bring in specialised resources[32] to render specialised services, which in conjunction with other services create new productive opportunities. The fundamental differences from the pooled form mainly concern specialised assets, which have to interact in real time. Therefore different coordination mechanisms between contributing firms have to be used than in forms that are based on pooled behavioural interdependence. The example of a team of doctors engaged in surgery has been used to illustrate this form of interdependence. The team can only reach its goal when all the contributors perform their specialised activity at a given time. A distinction is also made between strategic and operational orientation among the members who contribute to the inter-firm organisation.

The strategically oriented relationship based on intensive behavioural interdependence creates boundary links between the contributors. These links are becoming so specialised that detangling the inter-firm organisation is very difficult and therefore not desirable by the contributing parties. Boundary links directly connect the technical cores of the contributing firms. Their organisational goals become closely dependent on the goal of the inter-firm organisation so that long-term survival is only possible in union within it. The

[32] By way of contrast, pooled interdependencies require non-specialised resource inputs, such as capital.

connection that should be made here is to the specialisation of the firm and how it is fostered by engagement in inter-firm organisation. The firm becomes so specialised that it possesses sets of resources that render a specific specialised activity that is bound to behavioural interdependent relationships with other actors. The work system of each contributor is designed to fit in the work systems of other firms brought together in inter-firm organisations[33]. The relationships between automotive system suppliers and OEMs serve as examples of organisational forms that are based on strategic intensive behavioural interdependencies.

The restructuring of the industry during the 1990s resulted in a three-tier industry in which the OEMs are served on the first supplier tier by system-integrating suppliers. Their role is to deliver complete systems that make up the whole of a car[34]. Each player in the industry has become so specialised that intensive behavioural interdependencies are largely the result. Since coordination is very complex, long-term inter-firm organisational relations are the goal. One case that has created strong intensive behavioural interdependencies is Volkswagen's "*modular consortia approach"* in their facilities in Resende, Brazil[35]. Volkswagen has put up facilities in which specialised system suppliers install manufacturing facilities, which in turn are organised around another system supplier's assembly line. Each system supplier is an important stakeholder in that operation. Volkswagen has reduced its role and limits its involvement to design, the coordination of contributors and marketing the outputs. As this case shows, each contributor provides its specialised resources, which in cooperation with other specialised resources generate new productive opportunities in a strategic manner.

The operational form that generates intensive behavioural interdependencies differs from the strategic form in its extent and in its time horizon. Boundaries of the strategic type become completely interwoven and difficult to draw, while those of the operational type retain clear organisational distinctions among contributors. This is possible because the technical cores of the contributing firms are not directly connected, and boundary-spanning units facilitate the coordinative integration of specialised tasks through the value-creation process.

The Dell Corporation serves as an example of operational intensive interdependencies. With its consumer-need-driven strategy, Dell is following

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[33] This situation has been described in the literature as "*competition between networks of firms*" (Achrol and Kotler, 1999). It is based on the notion that networks are formal governance structures (Powell, 1990; Galaskiewicz, 1996).

[34] Examples of such systems include automotive platforms, interiors and transmission systems.

[35] This case is well illustrated by Collins, Bechler and Pires (1997), and Marx, Zilbovicius and Salerno (1997), for instance.

the principles of mass customisation that allow the tailoring of products to closely meet the customers' needs. Since the company serves a large number of narrowly defined segments, a "*vertically connected enterprise*" (Dell, 1994) distributes tailored products to customers by using "*global supply chain management*" techniques (Motwani, Larson and Ahuja, 1998) as a coordinating mechanism. The suppliers, which are organised in a network structure around Dell, conduct their specialised activities in order to meet specific demands identified by Dell. They are not integrated, but they are connected through boundary-spanning units. The time horizon of these interdependencies is as long as a certain combination of specialised resource-service vendors satisfies the needs of selected customer segments. The technical cores are not connected, but their outputs are rather managed by Dell, the "*spider in the network*" (Hansén and Zettinig, 1999).

	INTENSIVE BEHAVIOURAL INTERDEPENDENCIES	
GOAL ORIENTATION	Strategic	Operational
BOUNDARY SYSTEM	Integration of Activities through Boundary Links	Coordination through Boundary-Spanning Units
WORK SYSTEM	Connecting and Integrating Technical Cores	Separate Technical Cores; Synchronised Activities

Figure 6.5 Relationships between Intensive Behavioural Interdependencies and other Dimensions

Figure 6.5 is a summary of two distinct kinds of intensive behavioural interdependencies and the relationships with other important dimensions discussed in this classification framework. The position of the two forms on the market and hierarchy continuum is relatively closer to the hierarchy end for the strategic form, while the operational form is relatively closer to the market paradigm.

The discussion on interdependencies began in Chapter three, where it served as a determining factor of inter-firm organisational formation based on relationships between actors in the environment. A classification based on a literature review of the most influential contributions over half a century was generated. I used the classification of interdependencies in my framework of inter-firm classification because it clearly explains the relationships between members of inter-firm organisations. The discussion initially oscillated around the question of dependence distribution among contributors. This discussion is picked up and intensified in the section on power dimensions below.

Further, the original classification of interdependencies is analysed in more detail in order to distinguish between forms that are created as a result of emergent outcomes of complex interactions, and to move away from the goal-orientation starting point. Significant connections between the boundary-system and work-system dimensions have been made during the discussion on different types of interdependencies and their goal orientations. This facilitates the further development of a logical classification system within which natural types of inter-firm organisations can be positioned. Other significant connections between interdependencies and other relevant dimensions are not included in the above discussion, but will be studied intensively throughout the following sections. As mentioned above, coordination mechanisms and power distribution fall into this category of dimensions.

6.2.4 Coordination within Inter-firm Organisations

6.2.4.1 The Concept of Coordination

According to Coates, Duffy, Hills and Whitfield (2000), *"Coordination can be thought of as a concept of the appropriate activities being performed, in a certain order, by a set of capable agents, in a fitting location, at a suitable time, in order to complete a set of tasks.*" The dictionary defines the term as "*to make various different things work effectively as a whole*". For Grandori (2001), it implies evaluation of the effectiveness of desired results, and for Casson (1991), "*Coordination is a set of modes for Pareto-improving collective action*". Grandori (2001) argues that the concept of coordination implies an exercise of influence among interdependent actors, although this differs in terms of modality. Whatever the motive for which actors need to be coordinated, it implies processes of reciprocal modification of behaviour. In social sciences, processes of modification of behaviours among actors are normally indicated by the term "*influence, which does not mean that all influence is coordination*" (Grandori, 2001). Influence itself does not necessarily have a desired direction, and especially in interconnected systems, it may result in contingencies that are beyond desire and have negative consequences for goal achievement[36]. According to Dahl (1957), "*The capacity to exercise influence on the behaviour of others in a desired direction is power*"[37]. Nevertheless, not all power is coordination. The result of

[36] See Chapter 1 on the underlying systemic approach taken in this study, and Chapter 2 for a discussion on complexity theory.

[37] Power and influence are discussed at length in the next section.

coordination has to be looked at from the perspectives of all actors involved. For instance, consumers have power over producers in price-based coordination because they can influence the types of products offered. In authority systems, one or more parties agree to take actions influenced by other parties. In teams and negotiations, different actors exert influence reciprocally. Norm-based coordination sets rules that influence the behaviours of different actors to the benefit of the complete set of actors within the system.

This discussion on the nature of coordination reveals the following inherent components: (1) actors, (2) activity, (3) order, (4) influence, and (5) effectiveness and goals.

Actors in this context are economic actors. The relationships among them are defined through interdependencies, as discussed in the previous section[38]. Each of the actors has his or her own goals, which are dependent on the activities of other interdependent parties. Interdependencies of the positive kind require a certain order of conduct in order to achieve commonly defined goals. Reciprocal dependencies exert an influence on the contributors in the common goal-setting process, which effectively supports individual contributors' goals. The assumption here is that a logical pattern exists of the types of coordination that serve different types of interdependent relationships among contributors in inter-firm organisations.

In order to create a typology[39] of common coordination mechanisms we need to identify the elements that determine the nature of coordination. As a step in this direction, allow me to use a trivial case in which somebody wants to build a house. First, there is a mental picture in the mind of the house builder. This contains information and knowledge about the needs the house has to satisfy. Then the builder chooses contractors to construct the house according to his specifications. The house builder and the contractors need to communicate in order to match each other's needs, in the form of regulations, material choices and static requirements. Finally, when different alternatives have been put forward, a decision concerning the final plan of the house has to be made.

This simple case illustrates mechanisms that occur every day in more or less complex manners. The elements required to achieve coordinated actions are assumed to contain the following components: (1) knowledge, (2) communication and (3) decision making. All three may take multiple forms in the inter-firm organisational context. The same knowledge may be shared

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[38] This section also indicated the relative positions of interdependency types on the market–hierarchy continuum. Among others, Ouchi (1980) pointed out that markets and hierarchies (apart from clans) are forms of governance.

[39] In Grandori's (2001) terms, this would be a classification of modalities of coordination.

among all contributors, it may be concentrated in one, or it may be dispersed among them. Communication may be in one direction, but it can also be bi-directional or multidirectional. Decision-making may be unified within one contributor or it may be shared among them all.

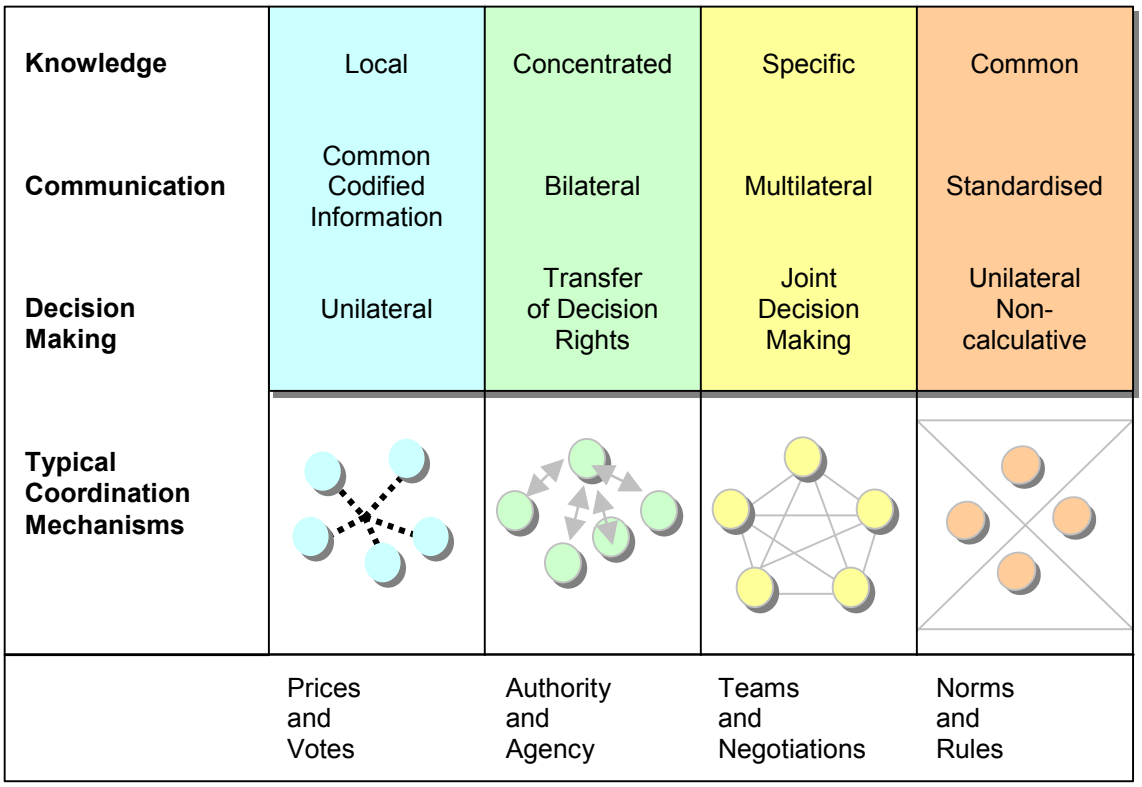

Figure 6.6 Elements of Coordination and Typical Coordination Mechanisms. Adapted from Grandori (2001)

These three elements have been discussed by different authors[40] and are therefore included in this model as decisive components of coordination mechanisms. Figure 6.6 classifies the three elements according to their different forms, and relates them to the most distinctive coordination mechanisms.

The classification contains four typical coordination mechanisms. Coordination through prices and votes is achieved when different actors possess local knowledge[41] about the production, selling and usage of goods

[40] E.g., Demsetz (1991), Izraeli (1991), Mayrhofer (1998) and Grandori (2001).

[41] In this context, information and knowledge have to be clarified. Information is seen as an integral part of knowledge. Combining and relating information creates knowledge, which is therefore information of a higher order.

and services[42]. Products may be transferred without supporting the costs of exchanging the local knowledge of different actors (Demsetz, 1991). Hayek (1945) describes this coordination mechanism as one that helps to solve complex problems without much analysis[43]. It is a type that uses communication expressed through commonly codified information[44]. The decision-making about the exchange is separated and each participating actor makes unilateral decisions that do not require the participation of other actors. Typical market transactions, as on commodity markets, serve as an example of this type of mechanism.

Situations in which knowledge is concentrated, communication is bilateral and decision-making as a right is transferred typically arise in bureaucracies. Agency and authority serve as coordination in such situations[45]. One actor knows better than any other how to best complete a task. In such a situation, production and sales are most effective if that actor decides for all. The decision-making right is transferred to the knowledge-possessing actor via bilateral communication. This coordination mechanism is used in international marketing in order to place standardised products on local markets. The knowledge about the local conditions is encapsulated in the agent, and thus the decision-making rights concerning the marketing of the products are transferred from the principal to the agent.

Teams and negotiations are coordination mechanisms that are effective when different actors have specific knowledge concerning a certain problem[46]. Selected specific knowledge of contributors is combined in multilateral communication. The decision-making is complex and achieved jointly by the participating actors. A useful example of the application of this coordination mechanism is the sale of industrial, non-standardised goods. In order to realise the transfer of engines for large ships, for instance, a set of different parties needs to be involved. The engines need to fit into the larger system, taking into account a number of systemic relationships. Different actors possess specific knowledge about the internal systems of the ships. Therefore their joint

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42 This means that actors can separately perform their activities of producing, selling and using.

43 The shortcomings of this mechanism have been widely discussed (e.g., Williamson, 1975; Grandori, 2001). One basic problem inherent in it is that a lot of information is sacrificed in judging by prices, and the legitimate question is whether the knowledge costs of this procedure outweigh the efficiency gains.

44 Such information includes prices, votes, stocks, queues and exit. For a deeper analysis, see Grandori (2001).

45 Very influential writers (Coase, 1937, Hayek, 1945, Williamson, 1975) have mentioned authority and agency systems as the most important alternatives to systems based on price and unilateral decision-making.

46 Small numbers, equally valuable resources and common goals are mentioned as conditions for the effective and efficient use of teams as coordination mechanisms (Grandori, 2001). Another phenomenon directly related to this type of coordination is *emergence* in the context of complexity. For further reading, see Letiche (2000).

problem solving is facilitated through multilateral communication and it leads to joint decision-making.

Norms and rules are effective coordination mechanisms when the knowledge is common, the communication is standardised and decisions are made unilaterally in a non-calculative manner. Non-calculative in this context means that, by adopting a rule, calculative judgement is suspended on a case-by-case basis. Therefore rules and norms, where applicable, are also highly efficient mechanisms. Daily life provides many examples that promote common understanding of this type of coordination. The general rule of driving a car on the right-hand side of the road is based on knowledge that every participant has. Communication about it is standardised and does not requiring further direct communication among them. Decision-making on this issue is avoided and unilateral, and everybody is better off[47].

These four coordination mechanisms need to be related to the other dimensions of inter-firm organisation that have been discussed above in order to create a logical path for the classification of inter-firm organisational forms. As pointed out above in the sections on goal systems and interdependencies, coordination plays a prominent role.

6.2.4.2 Coordination Mechanisms and Goal Orientation

The assumed goals of inter-firm organisations are related to the forms of coordination mechanisms used. Figure 6.1 distinguishes between two goal orientations within inter-firm organisational forms. The fit of coordination mechanisms with the two goal orientations, the strategic and the operational, are discussed in the following.

Strategic goal orientation in inter-firm organisations is acknowledged to connect the technical cores of the contributing firms. The time horizon is long-term, involving major, individual goal-attainment contributions. Boundaries are blurred and the contributors are connected through boundary links. Coordination through prices and votes indicates that knowledge is local and therefore there is no need for boundary linking of the technical cores. Information is codified and therefore minimal boundary spanning is sufficient

[47] In order to keep this study focused, certain sets of special types of coordination are not taken into account. One famous example, which I acknowledge as a coordination mechanism, is culture. Culture is cognitive behaviour, which in the classification presented in Figure 6.6 would share the characteristics of norms and rules. It is stored in the form of routines, habits and programmes. Schein (1985) states that such behaviour is the result of "*a series of past decisions and past experimentation*" within a certain context. Organisational culture, for instance, is considered a form of collective knowledge, which is hierarchically organised and provides social and collective mechanisms for generating aligned action and controlling behaviours.

to enable all parties involved to make their unilateral decisions. Mechanisms such as prices and votes are thus unsuitable for primary coordination in inter-firm organisations with strategic goal orientation.

Operational goal orientation provides a fit with prices and votes in cases in which the short-term goals of contributors can be achieved. Minimum exchange of information is required and unilateral decisions can be made because of common codified information structures. Work systems are connected merely by boundary-spanning activities for the time of the transactions. No further knowledge is transferred and the technical cores remain sealed off.

Inter-firm organisational forms with a strategic goal orientation may use authority and agency mechanisms if the common organisation is characterised by concentrated knowledge in one contributor who conducts bilateral communication with other actors, and these other actors transfer their decision-making. Boundary links are established and technical cores are connected in order to reach long-term common goals that benefit the individual goal achievements of the contributors. A typical example of this type of combination is a manufacturing network with a leader firm that subcontracts different parts to different contributors[48].

An operational orientation with authority or agency coordination is another feasible combination. Contributors continue to protect their technical cores. Common goals are limited to the short term and communication is via boundary-spanning units. Knowledge is concentrated to a high degree. A practical example of this form of inter-firm organisation is an agent-based distribution system in which a manufacturer of standardised goods uses a local agent to conduct business[49].

Further, there is a fit between strategically oriented inter-firm organisational forms and coordination mechanisms of teams and negotiations. Different parties bring in their specific resources and the services they can render. Each contributor possesses specific knowledge, and as a consequence, long-term common goals are achievable by multilateral communication that is conducted through boundary links. Because of this, and because the actions of the inter-firm organisation have substantial effects on the individual goal attainment of the contributors, decisions are made jointly. An example of the use of this coordination mechanism is joint product development by contributors in different industries[50].

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[48] Grandori and Soda (1995) describe a network hierarchy of subcontractors with a leading firm on top. A company that has been described as using this approach is Benetton (Ketelhöhn, 1995).

[49] E.g., Russell (1969) writes about export marketing through commissioning agents.

[50] For a descriptive case, see Subramanian (1991). A broad theoretical discussion can be found in Evans and Jukes (2000).

Other than that, there is no logical match between operational goal orientation in inter-firm organisations and team- or negotiation-based coordination. Because specific knowledge has to be combined, it is assumed that technical cores have to be opened up. Since this is avoided in operational forms, important factors that facilitate multilateral communication and joint decision-making are not given.

Coordination through mechanisms such as norms and rules is assumed to be valid for both goal orientations. Inter-firm organisational forms possessing both goal orientations utilise these mechanisms because they create common knowledge that reduces the need to communicate, and unilateral non-calculative decisions can be made ad hoc. Further, they do not have direct effects on the contributing firms' boundaries. The contributors set the degree to which this form of coordination affects the technical cores. This is most likely to happen in strategic forms in which *specific norms and rules* are imposed. Operational types rather use common and *general norms and rules* to support their coordination[51].

To conclude this section I would like to point out that inter-firm organisations vary in their degree of complexity. Therefore different inter-firm organisational forms may apply a mix of different coordination mechanisms to reach effective and efficient coordination among the contributing parties.

6.2.4.3 Coordination Mechanisms and Interdependencies

Two forms of sequential-outcome interdependent relationships have been distinguished among contributing firms in inter-firm organisations [52]: (1) the simple form with an operational goal orientation in which technical cores are minimally connected through boundary spanning units, and (2) the institutionalised form that is operational in nature, and its technical cores are connected to some degree through boundary-spanning units. Both types are operational and therefore the following coordination mechanisms apply: (a) prices and votes, (b) authority and agency, and (c) norms and rules.

Reciprocal-outcome interdependencies among contributors to inter-firm organisations have been distinguished as (1) high in complexity and (2) low in complexity[53].

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[51] Nevertheless, specific rules are not excluded from operational forms. Typical contracts include such specific norms and rules. These have the function of reducing legal uncertainties, especially when the regulator does not regulate certain aspects, or in international business where different legal systems do not provide a regulated framework.

[52] See Figure 6.3.

[53] See Figure 6.3.

The highly complex form requires strategic goal orientation on the part of the inter-firm organisation, and suitable coordination mechanisms include (a) authority and agency, (b) teams and negotiations, and (c) *specific* norms and rules.

Less complex operational forms have the following coordination mechanisms at their disposal: (a) prices and votes, (b) authority and agency, and (c) *general* norms and rules.

The forms of pooled-behaviour interdependent relationships in inter-firm organisations include the strategic and the operational (Figure 6.4). Strategic forms logically fit the following coordination mechanisms: (a) prices and votes, (b) authority and agency, (c) teams and negotiations, and (d) *specific* norms and rules.

Operational forms fit the following coordination mechanisms: (a) prices and votes[54] and (b) *specific* norms and rules. (c) Authority and agency may be used when the contributors create a regulatory body to which decision-making rights are transferred[55], in terms of who has the concentrated knowledge and is in bilateral communication with the contributors.

Figure 6.5 illustrates the distinction between (1) strategic and (2) operational forms of intensive behaviourally interdependent relationships. Strategic forms have the following coordination mechanisms available: (a) teams and negotiations and (b), for auxiliary coordination, *specific* norms and rules, while operational forms are coordinated through (a) teams and negotiations and (b) *specific* norms and rules.

Figure 6.7 provides an overview of matching coordination mechanisms, goal orientation and interdependencies among contributors in inter-firm organisations

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[54] Queues in particular have been mentioned in the literature. Grandori (2001) gives an example of a pool of trucks that is coordinated through a queuing system among the contributing parties. Another example of pooled interdependencies so coordinated concerns the facilities and services provided by incubator firms to their members.

[55] Which is in the case of a common pool of trucks a managing body that has the right to judge the situation and to allocate the common resources.

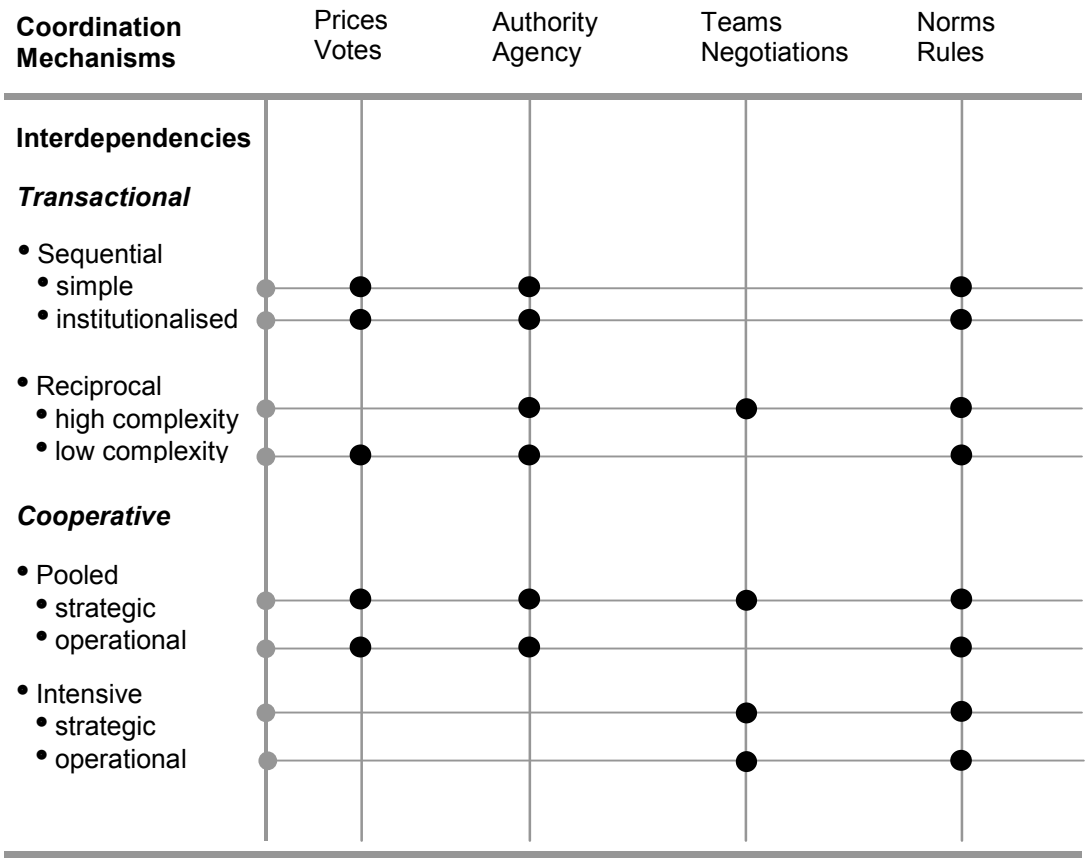

Figure 6.7 Coordination Mechanisms, Interdependencies and Goal Orientation Fit

The logical match between coordination mechanisms, interdependencies and goal orientations plays a crucial role in determining which "mathematically possible" inter-firm organisational forms are logically possible. It is also important to point out that every form has one dominant coordination mechanism within the mix of mechanisms, which I suggest would be a useful starting point for grouping inter-firm organisational forms. The two remaining dimensions that enter the classification framework, power and the work system, are discussed in the following sections.

6.2.5 Power Distribution within Inter-firm Organisations

6.2.5.1 The Concept of Power

Reitz (1977) defines power as "*the ability (potentially or actually) to impose one's will on others*". In the context of inter-firm organisations, the powerful contributor has the ability to alter the behaviour of other contributors. Power is generated by certain sources, including resources such as financial, human,

knowledge, and demand or access to demand[56]. On the other hand, it can originate from certain rights, such as delegated rights in authority systems. The distinction between power and authority is that power is not linked to a certain position within an organisational context, but it may exercise influence from outside the bounds of organisational relationships (Hodge and Anthony, 1988). It is therefore an abstract dimension, which becomes visible through the influence it generates. Power within inter-firm organisations may rest with one contributor, but it may not be exercised in terms of organisational control[57]. In sum, the logical construct of power comprises the following key elements: (1) the source of power, (2) the influence it generates, and (3) control as a result of that influence.

According to Bierstedt (1950), "Power supports the fundamental order of society and the social organisation within it, whenever there is order. Power stands behind every association and sustains its structure. Without power there is no order". Therefore, so my argument goes, power has to feature in any attempt to create a framework for classifying inter-firm organisational forms.

In this study, the power dimension is used to determine its distribution among contributing firms in the inter-firm organisational context. It is not a question of whether a firm possesses sources of power to exercise influence over its partners, but rather whether it seeks control over the other contributing firms[58]. Further the goal in this section is to discuss which forms of power distribution have a logical fit to various other dimensional forms of inter-firm organisation.

The connection between power distribution and the environmental explanation of inter-firm organisational formation is illustrated in the following statement by Hickson, Hinings, Lee, Schneck and Pennings (1971): "Power accrues to those in the organisation able to reduce uncertainties for the organisation, and the more central the uncertainty and the more irreplaceable the actor, the more influential he will be". According to that view, the powerful in the inter-firm context is the contributor who can render services that lower the environmental uncertainty, which is perceived the most pressing issue. Thus, power distribution is necessarily seen as a dynamic process rather than a static situation. It has to be accepted that the distribution of power can change over time depending on the nature of the environmental uncertainties and of the contributing firms and their resource services.

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[56] French and Raven (1959) and Adams and Romney (1962) classify sources of power as follows: (a) rational/legal, (b) reward-driven, (c) coercive, (d) referent, (e) charismatic, and (f) expert.

[57] Control is used to indicate that influence has a desired direction from the perspective of the contributing firm, which has power over other contributors.

[58] Perrow (1972) notes, "*The critical issue in organisations is not whether there will be a concentration of control but, rather, whose interests are being served by the organised, coordinated activities*".

Power distribution can take two forms[59]. Symmetric distribution occurs when all of the contributors have the same influence over the course of actions taken by the inter-firm organisation. Asymmetric distribution, on the other hand, indicates that one contributor is in control. I will therefore relate these two aspects of the dimension of power to the other dimensions and their relative natures in order to identify which emergent forms result in logical matches.

6.2.5.2 Power Distribution and Inter-firm Organisational Goals

Goal orientation within inter-firm organisations has been classified as strategic and operational (Figure 6.1). The question, which arises in connection with power distribution, is which combinations are logically possible.

Symmetric power distribution among contributors appears to have a fit with strategic goal orientation. Contributors connect their technical cores with a long-term intent. All contributors' individual goal attainments are linked to the goal achievement of the inter-firm organisation. Therefore symmetric power distribution among them is a feasible option. An example of this is the co-development of products. Firms form a common research team that includes major resource providers in order to develop a technology that serves all contributors.

Symmetric power distribution is possible in operational goal-oriented inter-firm constructs. Contributors align in order to facilitate a short-term common goal without any contributor exercising influence over the others. The repetitive buying-selling relationship is an example of this. Neither the buyer's nor the seller's individual goal attainment is dependent on the other's behaviour and therefore nobody can control the other contributor. The power distribution is symmetric while the goal orientation is operational.

Asymmetric power distribution in strategic goal-oriented inter-firm organisations is a possible option. Contributors connect their technical cores to long-term goal attainments through boundary-linking mechanisms. One contributor in this organisational form is dominant by having a superior source of power that creates influence and allows the exertion of control over the others. The asymmetry is explained in terms of unequal dependencies among the contributors. Different reasons support the sustainability of this inter-firm

[59] At this point I wish to emphasise that power within inter-firm organisations is a rather multidimensional construct. While *formal arrangements* stipulate symmetry, certain situations may arise that cause one of the contributors to exert its influence over the others. Given the complexity involved in identifying all possible situations and sources of power, this study is limited to formal arrangements.

organisation[60]. Relationships along value chains serve as an example. In the automotive industry, the OEM has power over systems suppliers because it has several options in terms of fulfilling their function. Nevertheless, strategic inter-firm organisations between the OEM and the system suppliers are created in order to attain the OEM's goals, which include being competitive in terms of cost. The specialisations of the systems suppliers provide efficient methods of generating these benefits. The OEM will nevertheless use its power, which I interpret as power created by access to demand, in order to control the contributors within the inter-firm organisations of which it is part.

Asymmetric power distribution in inter-firm organisations with an operational goal orientation is another feasible match. One contributor has control over the others because strong one-directional dependencies exist. This form of operational inter-firm organisation could be interpreted differently by different contributors. The powerful clearly perceive it as an operational construct and do not open up their technical core to the others, while the powerless perceive it as a strategically important relationship and are therefore willing to be open. Overall, such inter-firm organisation with asymmetric power distribution has to be classified as operational, even though certain contributors might argue that it is strategic[61]. For example, Blomqvist's (1999) description of asymmetric partnerships between large firms and small firms in the IT sector supports this argument. The small firm views its partnership with the big firm as a strategic organisation to which it commits major resources. At the same time, the partnership is considered important on the business-unit level in the big firm, but overall on the corporate level it is just seen as a project making only a limited contribution to the overall goal achievement.

In sum, symmetric and asymmetric power constellations can be found in strategically and operationally oriented inter-firm organisational forms. It is important in testing the classification framework to acknowledge the various perceptions of the nature of goal orientation and of power distribution among the contributors, because those might differ to a great extent.

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[60] An example here concerns efficiency gains, which may be derived through economies of scale, from learning effects or from decreased costs through process advantages, for instance.

[61] In business, this difference in perception can be observed in many instances. While the powerful contributor speaks of working relationships and operational involvement, the powerless identifies a strategic alliance. One way of accommodating such diverse opinions in order to identify strategic or operational overall orientation is to consider the dependencies among the contributors and the openness of the technical cores.

6.2.5.3 Power Distribution and Interdependencies

As pointed out above, the ability to reduce environmental uncertainties is an explanation for the generation of power within inter-firm organisations. This ability depends on one actor possessing some sort of resources that render services that make the future state of the contributing firms more foreseeable. The relationships between the contributing firms could therefore be defined as dependence relationships. The degree of involvement in inter-firm organisations in terms of opening up technical cores varies with the extent to which dependence is perceived because, in principle, firms seek to *seal off* their technical cores (see Thompson, 1967). This section considers the nature of relationships defined by interdependencies in relation to the distribution of power within inter-firm organisations. Figure 6.2 illustrates the assumed connection between asymmetric interdependencies and asymmetric power relationships. When one firm in the inter-firm context possesses strong dependence-creating features, the potential to exercise control is given. Whether it actually does so is another question that is highly situation-specific. It could be assumed that contributing firms possess crucial access to demand and that the other contributors, which could be substituted by the powerful contributor, still enjoy symmetric power distribution within the inter-firm organisation[62]. The aim of his section is to evaluate which interdependence types are likely to foster symmetric or asymmetric power distribution.

Transactional types of outcome interdependencies, the sequential and the reciprocal, are the starting point of the investigation. The sequential type is per definition an operational involvement in which dependencies are typically low. The simple form of sequential interdependence is a type in which boundary-spanning units create interaction between otherwise separate work systems. This type of relationship is symmetric in the distribution of power in cases in which the importance of the transactions for both contributors is minor and therefore dependencies are low. Asymmetry is given in cases in which the relationship is generally highly important for the goal attainment of one contributor, and therefore dependencies on that relationship are unidirectional.

The institutionalised form is one that, in simple terms, adjusts to the work systems of the contributors. This type represents symmetric power distribution when dependencies are low and the motivator for the institutionalisation is to do with efficiency. Asymmetry can be assumed in forms in which one contributor's goal attainment is strongly dependent on the other contributors' transactions.

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[62] As noted before, many reasons, such as efficiency gains, can be used to justify such an outcome.

Forms of reciprocal outcome interdependency have been distinguished in conditions of high and low complexity[63]. The highly complex form has been defined as a strategic form in which boundary links connect the technical cores of the contributors based on efficiency and effectiveness considerations. This relationship may feature both forms of power distribution, and it is feasible that the distribution of power changes over its lifetime. One contributor may possess dependence-creating resources at the formation stage, but once the work systems are connected, strong interdependencies support symmetric power distribution. An example of this is the purchasing process in the automotive industry[64]. One firm may have advantages over the other in the phase of negotiation between system supplier and OEM. For instance, the OEM may be sourcing a steering system and the system suppliers capable of producing it have excess capacity. The OEM in that phase has the power to control the negotiations. Once a supply contract has been made and the operations, which typically last for several years, start, dependencies become symmetric because both contributors have invested unrecoverable resources in a highly complex transaction. Any disturbance in this relationship can lead to problematic situations for both contributors, and therefore the power is distributed equally and it is in both parties' interests to maintain undisturbed relationships[65].

The low-complexity form of the reciprocal-outcome interdependent relationship, on the other hand, is operational because of its low complexity and a lower resource commitment. In this case, symmetry may be given based on efficiency reasons, but it is assumed to have a rather stable power distribution over the lifetime of the relationship. The reasoning here is based on Thompson's (1967) "*sealing off*" argument, according to which technical cores are kept separate and therefore the "*sunk costs*" of inter-firm organisational formation are lower. In the same example of the automotive industry, the OEM, for instance, maintains a dominant controlling position over the lifetime of the relationship because substitutes can be found without creating disturbances in the primary work system[66]. Nevertheless, it is

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63 N.B., complexity in the nature of the transaction (bi-directional, high in specificity).

64 I have worked in a first-tier supplier to automotive OEMs.

65 Power symmetry is given even if the OEM might have a clear advantage in terms of resources and factual power, but is not willing to exercise its power because of the overall impact on its own goal achievement in case disturbances occur.

66 Such supply relationships are typically guided by contracts that cannot be terminated immediately without high liability consequences. Therefore a typical contract-termination period is sufficient to enable suppliers to be substituted in low-complexity reciprocal transactions. In contrast, highly complex transactions of that kind may take many months and years before an actual agreement for design, maximum supply and minimum demand is made, and before the work systems are adjusted.

assumed that both power distribution occurrences are found in low-complexity reciprocal interdependent relationships.

Behavioural interdependence can be pooled or intensive. The former comprises a resource pool from which the contributors draw, and its strategic form involves boundary links and connects the technical cores of the contributing firms. The power distribution is symmetric because of problems associated with disturbances that could be caused by exercising power. The operational form of pooled interdependent relationships can occur in both forms of power distribution. The distribution of power in that case is assumed to be dependent on the size of the resource commitment. If each contributor possesses the same share of the common resource pool, power symmetry is given. In contrast, unequal ownership of the resource pool leads to asymmetric power distribution within that inter-firm organisation.

Intensive behavioural interdependent relationships of the strategic type achieve a common goal by aligning very specific resource services contributed by the member firms in the inter-firm organisation[67]. Technical cores are integrated through boundary links, and individual goal attainment is strongly connected to the goal attainment of the inter-firm organisation. Power in such a relationship is symmetric because the absence of one contributor makes goal attainment impossible. Therefore strong interdependencies are given among all contributors, and that leads to symmetry in power distribution.

The same argumentation is valid for the operational type of intensive behavioural interdependent relationships. Power is distributed symmetrically because of the requirement of all contributors needing to contribute their specific resource services. This symmetry may change over the lifetime of the relationship, however, and contributors can be substituted. This is feasible in the operational form because the technical cores are not integrated as they are in the strategic form.

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[67] One assumption is that each contributor in that form of relationship possesses some form of power. French and Raven (1959) and Adams and Romney (1962) use the term “expert power” to describe this source of power.

		SYMMETRY	ASYMMETRY
Sequential	Simple	■	■
	Institutionalised	■	■
Reciprocal	High Complexity	■	■
	Low Complexity	■	■
Pooled	Strategic	■	
	Operational	■	■
Intensive	Strategic	■	
	Operational	■	■

Figure 6.8 Power Distribution and Interdependence Relationships

Figure 6.8 is a summary of the discussion on how different types of interdependencies relate to the distribution of power within inter-firm organisations. In principle, all interdependence types can have symmetric or asymmetric power distribution among the contributors. As far as behavioural interdependence is concerned, it is assumed that when the goal orientation is strategic, then it makes little sense to imply an asymmetric power relationship. This explanation is based on the fact that all contributors need to contribute their specific resource services in order to achieve common goals, which are highly related to individual goal attainment. Another strong reason is that technical cores need to be connected, therefore intensive resource linking that is difficult to detangle is given[68].

6.2.5.4 Power Distribution and Coordination Mechanisms

Four typical coordination mechanisms were described above (see Figure 6.6). The classification of coordination mechanisms was generated from three elements: (a) knowledge distribution, (b) communication type and (c) decision

[68] Intensive resource linking in this context means that specific investments have to be made in order to engage in these relationship forms.

making, and their different natures. The correlation between power distribution and coordination types is based on the *decision-making* element [69].

Coordination mechanisms such as prices and votes are characterised by *unilateral* decision-making. In the context of the inter-firm organisation, each contributor makes his or her own decisions. This is an indication that no one possesses power to alter another's behaviour and therefore symmetry in power distribution is assumed[70].

Coordination mechanisms such as authority and agency are characterised by the transfer of rights to make decisions. The *formal theory of authority* (Hodge and Johnson, 1970) explains the approval society gives for decision-making. It states that the manager gets the right to make decisions and to issue orders, instructions and so on from property ownership and control. The process of passing this right from the owner to a management group and then from one manager to the next is called *delegation*. Inter-firm organisations that have authority mechanisms as a dominant coordination tool delegate the right to make decisions from the contributing firms to their management, or alternatively from one contributor to another. In the first case, in which the company's own management group decides on the inter-firm organisation, the power distribution may take both forms, symmetric and asymmetric, depending on the dependence distribution among the contributors. The second case, with one contributor delegating the decision-making to another, leads to asymmetric power distribution because the receiving contributor unifies all of the decision-making power available within the inter-firm organisation. The two cases are distinguished by the design of the work system of the inter-firm organisation.

Team-like coordination mechanisms feature joint decision-making among contributors to inter-firm organisations. Because all participants contribute specific resources, symmetric power distribution is given[71].

Norm-based coordination provides unilateral non-calculative decision-making. Once norms are in place, the power distribution concerning this coordination type is symmetric. The question of how norms are created between inter-firm organisational contributors is important. It could be assumed that both types of power distribution influence it. In any case, the norm-formation process is guided by other coordination mechanisms such as negotiations and delegation. The outcomes of these processes are irrelevant in

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[69] The justification for identifying power distributions based on the *decision-making* element is given because control is expressed through decision-making rights and methods. This finds support in Boyle and Dwyer (1995) and Cutting and Kouzmin (2000).

[70] The importance of one actor for another may alter this state. This is discussed in the section on interdependencies. Asymmetry is thus also a possibility.

[71] Cf. behavioural interdependencies in the previous section .

terms of identifying the power distribution in norm-coordinated situations. In effect, contributors follow the norms without making extra decision-making efforts, and therefore power distribution is always symmetric.

	Decision-making Characteristics			
Power Distribution	**Unilateral**	**Delegation**	**Joint**	**Unilateral non calculative**
Symmetric	×	×	×	×
Asymmetric	×	×	///	
Coordination Types	**Prices, Votes**	**Authority, Agency**	**Teams, Negotiations**	**Norms, Rules**

Figure 6.9 Power Distribution and Coordination Mechanisms

Figure 6.9 is an illustration and summary of the correlation between coordination mechanisms and the distribution of power among contributors to inter-firm organisations. The discussion has illustrated that symmetric power distribution supports all coordination mechanisms, and it has been shown to apply in certain cases to delegation-coordinated systems. In other cases of asymmetric power distribution, no clear correlations with coordination types are visible. The assumption is based on the above discussion about the relationships between interdependencies and power distribution. Even though asymmetry in power exists among contributors, control is not exercised as a trade-off for other benefits.

6.2.6 Work Systems within Inter-firm Organisations

6.2.6.1 The Concept of Work System

Inter-firm organisations, like any organisation, separate primary and secondary work (Davis, 1951). Figure 2.1 illustrates the primary work system as an input – transformation – output model. Secondary work[72] is conducted in order to provide support systems for primary work. The organisation of work goes

[72] Secondary work systems include human-resource management and accounting.

back to classic organisational theory and its three pillars of (a) the division of labour, (b) the structure and (c) the process (Wren, 1972). Theories of the division of labour go back to the predecessors of economic theory (e.g., Smith, 1776). The concept comprises two components, how to differentiate and separate, and how to integrate different work processes. Higher degrees of corporate specialisation[73] have increased differentiation so that integration work happens between firms in the form of inter-firm organisations. This whole study is concerned with the issue of why firms form inter-firm organisations and how they do it. In simple terms, increased specialisation and the consequent increased differentiation of work processes provide a general answer to the why question.

This chapter concerns the *how* question. In addressing this question, the integration of different work systems has to be considered an important explanatory factor. The nature of *organisational integration* needs to be investigated if we are to find out how inter-firm organisations carry out work among contributors. Organisational structure would appear to be a key element in defining the nature of integration. Mintzberg (1979) defines this as "*the sum total of the ways in which the organisation divides its labour into distinct tasks and then achieves coordination among them*". The insight from that definition is that coordination mechanisms play an important role in integrating the work systems of contributors into inter-firm organisations. The third pillar of the process is the way in which organisational work is actually carried out[74].

The work system has been identified as a key dimension in creating a classification framework of inter-firm organisational forms. Before we can understand the work systems in inter-firm organisation, we need to define the constituent elements.

Thompson (1967) suggests three characteristics of work-systems design, all of which reflect environmental characteristics[75]: (a) the degree of organisational complexity, (b) centralisation/decentralisation, and (c) coordination mechanisms.

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[73] See Chapter four.

[74] Examples of different processes include just-in-time management, modular systems and fractal production systems (e.g., Collins, Bechler and Pires (1997). In this treatment of organisational work I do not investigate different processes in depth. Processes are constituted by a number of dimensions and elements drawn in this study, and therefore are not investigated separately.

[75] Thompson (1967) illustrates in typological form the organisation of work systems as determined by the degree of homogeneity and the degree of environmental stability. See also Chapter three.

6.2.6.2 Organisational Complexity of Work Systems

Organisational complexity principally refers to the number and intensity of differentiated interacting work systems. Complexity is high in inter-firm organisations in situations in which different specialised subsystems of contributing firms need to reciprocally interact in order to perform economic activity. An example of a complex inter-firm organisation would be a joint R&D project. The complexity increases with the number of interacting differentiated work units, thus making the task of integrating or coordinating more complex. An example of low complexity is a simple buyer and seller interaction. Only a few units are interacting, knowledge transfer is uncomplicated, communication is simple and decision-making happens ad hoc.

In relation to other dimensions of inter-firm organisation outlined in this study, complexity appears to be strongly related to coordination mechanisms. The assumption is that the degree of complexity determines the usefulness of the different mechanisms. The way to treat the element of complexity of work systems in an inter-firm organisational context is to define a high-low-complexity continuum. For ease of discussion, these endpoints are investigated and related to coordination mechanisms.

Coordination mechanisms similar to prices may be related to work systems of lower complexity since knowledge is local, information is commonly codified and decision-making is unilateral. A highly complex work system would not be effectively coordinated by such mechanisms because highly differentiated systems, which possess different types of knowledge, require bi- or multilateral communication.

Coordination by delegation, as in authority systems, is likely to be used regardless of the complexity level of the work system. The reasoning is that when knowledge is concentrated, then coordination can be achieved by giving decision-making rights to the units that possess the appropriate knowledge. Highly-complex work systems would use this coordination to reduce the complexity related to integration, whereas systems of low complexity would use it to gain in efficiency.

Team-like forms of coordination are appropriate when knowledge is specific, communication is multilateral and decision-making happens jointly. Therefore this coordination mechanism is effective in highly-complex work systems. It could also be used in low-complexity systems, but in terms of efficiency, in most cases the costs would exceed the advantages.

Norm-based coordination is well suited to highly-complex work systems because common knowledge is created and its communication is standardised so that unilateral and non-calculative decisions can be made. This highly

effective coordination is a very efficient way of reducing organisational complexity and is therefore an important coordination mechanism in highly-complex inter-firm organisational work systems. Its application is also suitable for low-complexity systems. However, the additional investment in thought required in creating an individual normative system has to take cost and benefit considerations into account. In many situations, external norms, which do not need to be specifically created, are sufficient to provide auxiliary coordination for low-complexity work systems.

Figure 6.10 summarises the correlations between coordination mechanisms and the degree of complexity. In general, it has to be said that the application of such a mechanism needs to be considered in terms of effectiveness and efficiency. It is not only that it has to have the ability to attain the organisational goal, it also needs to be evaluated as a cost factor in terms of alternative mechanisms.

Coordination Mechanisms	**Prices, Votes**	**Authority, Agency**	**Teams, Negotiations**	**Norms, Rules**
Complexity **High**		×	×	×
Low	×	×		⫽

Figure 6.10 Inter-firm Organisational Complexity and Effective Coordination

6.2.6.3 Centralisation in Work Systems

The next element discussed by Thompson (1967) is centralisation. This can be defined as "*the extent to which property, decision, and/or control rights are allocated asymmetrically to a sub-set of the actors*[76] *comprised in a system*" (Grandori, 2001). Property is treated in this study as the ownership of resources. In cases in which these resources create dependence-generating properties, power is the result. This power can be exercised for making decisions and for controlling the inter-firm organisation. I therefore consider the element of centralisation a function of power. The assumption is that when power distribution is asymmetric, then centralisation is a result. Nevertheless, there has to be a logical limit to that assumption, which applies in cases in which the powerful do not exercise their power. As a trade-off for other

[76] The extreme case being that one actor unifies all rights.

benefits, such as efficiency, the powerful contributor could create inter-firm organisations with decentralised structures.

Figure 6.11 is an attempt to distinguish between different work systems in terms of the degree of centralisation. I distinguish three different forms of centralised work systems based on the dimension of power and the way it is executed. The first type of centralisation results when one contributor to the inter-firm organisation unifies all control over its activities. Such a situation arises, for instance, along the value chain in the automotive industry. The OEM possesses dependence-generating resources over a systems supplier and therefore assumes control over their inter-firm organisation. The result is a contributor-based centralised-work-system structure. The second form is a decentralised work system in which each actor controls his or her own resource services. An example of such a system is the co-development of new products. The third form outlined involves delegating power from the contributors to a newly formed organisational body, which conducts the inter-firm organisational operations in a decentralised manner. Joint Ventures provide an example. All actors contribute their more or less specialised resources to a new unit, and the delegation of decision-making power is embodied in the Joint Venture with this transfer.

Work System	**Centralised**	**Dispersed Decentralised**	**Transferred Decentralised**
Power	**Unified Control in one Actor**	**Control by Specialisation**	**Control by Delegation**

Figure 6.11 Types of Centralised Work Systems.

6.2.6.4 Systemic Coupling of Work Systems

Systemic tightness is the third element of inter-firm organisational work systems to come under scrutiny. Simon (1969) uses the term to indicate interconnectedness. It could be seen as a continuum between tightly and loosely connected systems. Primarily, it covers the cause-and-effect relationships within connected systems. Tightly connected systems appear to have effects throughout regardless of the cause, whereas loosely connected systems are less affected by such relationships. In this study I identify a relationship between systemic tightness and goal orientation in inter-firm organisations. Goal orientation is distinguished in operational and strategic forms. Operational forms build boundary-spanning units between contributors'

systems, while strategic forms create boundary links in order to connect technical cores[77].

System Coupling	Tight	Loose
Strategic	×	
Goal Orientation		
Operational		×

Figure 6.12 Systemic Tightness and Goal Orientation in Work Systems

Thus I conclude that strategic goal-oriented inter-firm organisational forms are tightly coupled systems, and forms with an operational orientation are loosely coupled (see Figure 6.12).

6.2.6.5 Value Direction in Work Systems

The fourth element in this dimension of inter-firm organisational work systems is what I term "*value direction*". This peculiar-sounding element defines in which direction economic value is created. By direction I mean the distinction between (A) vertically organised, (B) horizontally organised and (C) diagonally organised work systems in inter-firm organisations.

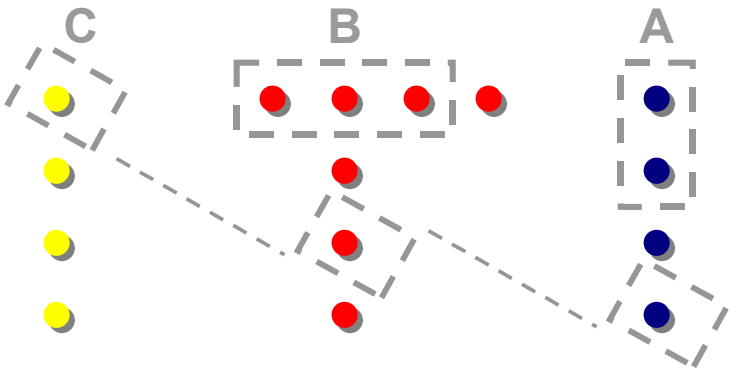

Figure 6.13 Value Directions in IFO Work Systems

[77] See the discussion on goal orientation above.

This element is included for two reasons. First, it is easy to identify as a characteristic of an inter-firm organisation. Secondly, it is closely related to the dimension of interdependence. Figure 6.13 illustrates the three elements in an attempt to better describe the differences between these work systems in inter-firm organisational forms[78].

A vertically organised work system is created between firms that are within the same industry along a value chain[79]. Specialised firms with specific resources render certain services that are dependent on other value-chain members' activities in order to finally produce a relevant economic value[80]. It is interesting to relate this to interdependencies. Vertically organised work systems are possible with both types of symbiotic outcome interdependencies, namely sequential and reciprocal. Pooled and intensive behavioural interdependencies also seem to be feasible in this value direction[81].

Horizontally organised work systems in inter-firm organisations conduct work through cooperation among competitors within a certain industry. The goal of such work systems is to generate a strategically or operationally important outcome that benefits competing players on a horizontal level. In relating this to interdependencies I would exclude transactional interdependencies because the output of one contributor does not directly serve as input for the others[82].

Behavioural interdependencies exist on the horizontal level, expressed in their work systems. Pooled interdependencies exist when each contributor invests resources in a common pool for a common or individual purpose. Strategic pooled interdependence on the horizontal work level has been created in the automotive industry in terms of electronic purchasing exchanges, which have been established by a number of competing OEMs[83]. The operational form of pooled behavioural interdependence in the

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78 The different shades of dots represent different industries. Dots on a vertical line stand for a value chain. The letter A stands for vertically organised work systems, B stands for horizontally organised work systems and C for diagonally organised work systems (which can be observed in converging industries).

79 For example, part of the automotive value chain includes suppliers, system suppliers, OEMs, distributors and retailers.

80 By relevant economic value I mean that it reaches a user who consumes the output of the industry.

81 Examples include sequential interdependencies in simple or institutionalised buyer-seller relationships, reciprocal interdependencies as in OEM system-supplier relationships of high and low complexity, and strategic and operationally pooled interdependencies as we find them in retail value chains. Intensive interdependencies of the strategic type are to be found in the co-development of new products within a value chain. Operational intensive interdependencies are illustrated by the example of documentation work for regulatory authorities.

82 In terms of positive interdependencies. As a matter of fact, they always have competitive outcome interdependencies.

83 Cf., for instance, www.covisint.com.

horizontally organised work systems of inter-firm organisations is another practical possibility that is found in different forms of trade association.

Intensive behavioural interdependencies are possible in horizontally organised work systems in both forms, strategic and operational. Airline alliances serve as an example of the strategic type. Each contributor in these alliances provides specificity of resources[84] that benefit all contributors strategically. The operational type is illustrated by common lobbying efforts and agreements on standards, as can be observed in the mobile-phone industry[85].

Diagonally organised work systems in inter-firm organisations refer to the contribution that actors from different industries make in order to attain a common goal. By doing that, such inter-firm organisations are responsible for the emergence of converging industries. According to that definition, the interdependencies that are created among contributors are very limited. The requirement is a behavioural one that excludes transactional interdependencies. A common goal excludes operational forms, and therefore pooled and intensive forms of the strategic type are left out of the picture. Both strategic types of cooperative interdependencies create common boundaries by connecting technical cores through boundary links, and therefore both appear as suitable possibilities.

Figure 6.14 summarises the interdependencies created along different value dimensions of work systems in inter-firm organisations[86]. Vertical work systems may create any form of interdependence distinguished. The horizontal type is assumed not to create transactional interdependencies among competitors. The diagonal type is assumed to have a strategic orientation and cooperation as conditions, and therefore the two strategic behavioural interdependencies are created in such inter-firm organisational forms.

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84 In the case of airline alliances, resource specificity includes geographic knowledge and access to demand.

85 Cf. www.gsmworld.com

86 The abbreviations in Figure 6.14 carry the following meanings: SIM = simple; INS = institutionalised; COM = highly complex; ST = strategic; OP = operational.

Interdependencies	Transactional				Cooperative			
	Sequential		**Reciprocal**		**Pooled**		**Intensive**	
	SIM	INS	COM	SIM	ST	OP	ST	OP
Vertical	×	×	×	×	×	×	×	×
Horizontal					×	×	×	×
Diagonal					×		×	

Figure 6.14 Value Directions of Work Systems and Interdependencies in IFOs

6.2.6.6 A Classification of Inter-firm Work Systems

Given the above discussion on elements of the dimension of inter-firm work systems, the following classification framework is proposed, which excludes types that are not possible or are undesirable. The elements covered include: (1) organisational complexity with its relation to effective coordination mechanisms, (2) types of centralisation with a logical connection to power distribution, (3) systemic tightness taking into account the goal orientation of inter-firm organisational forms, and (4) the value direction related to created interdependencies between contributors and inter-firm organisations. Figures 6.15 and 6.16[87] illustrate the different degrees of possible work systems I aim to distinguish in this study[88].

[87] The dotted lines in Figures 6.15 and 6.16 represent ramifications that are logically unfit. The letters under each branch help to distinguish the different forms in the following discussion. The full dots under each type indicate a logical form of inter-firm organisational work system.

[88] Work systems can be further classified into more elements, each with its own nature. The four chosen elements appear sufficient within the framework of this study. Other potential elements include the degree of formalisation, and proprietary and contractual forms (cf. Zettinig and Hansén, 2002). Formalisation is assumed to be closely related to coordination mechanisms (e.g., the implementation of specific norms and rules). Proprietary and contractual forms occur in forms with different degrees of centralisation.

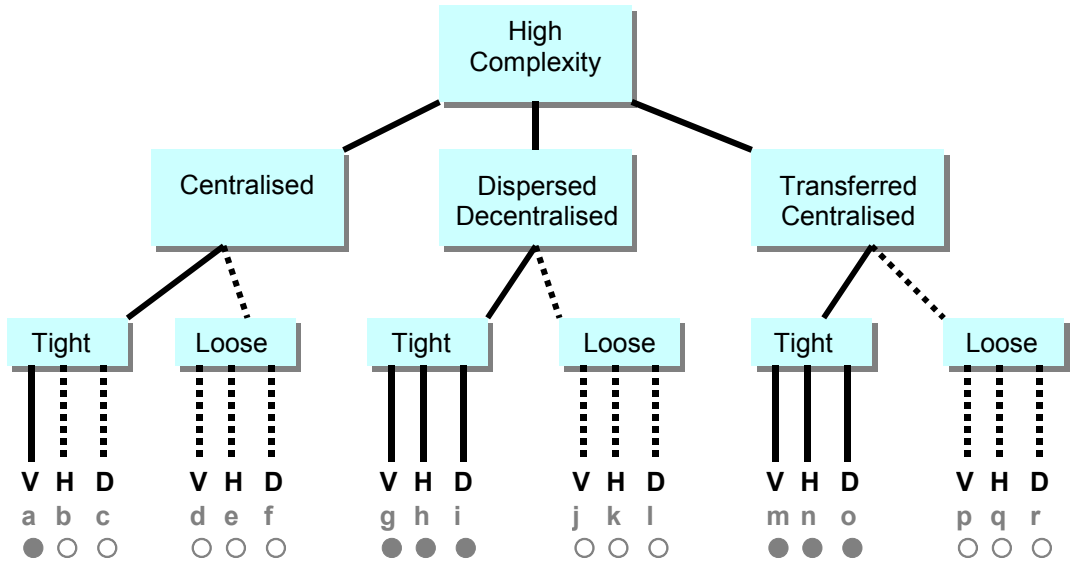

Figure 6.15 IFO Work Systems with High Complexity

The classification illustrated in Figure 6.15 starts from highly complex work systems, and contains all of the "mathematically possible" forms[89]. From this, the logic within all of the combinations is considered in order to derive the logically possible forms of inter-firm organisational work systems of high complexity[90]. These logical combinations arise from the above discussions on the natures of the elements of the dimension and their relationships to dimensions of goal orientation, interdependencies, coordination and power[91]. The major exclusions of non-logical work systems are forms of highly complex systems that are loosely coupled. This argumentation is based on the following logic. Loose systems, as I have pointed out, are based on a more operational goal orientation, and it is not to be expected that their technical cores will be connected by boundary links. This argumentation excludes dispersed decentralised systems (forms j-l). On a higher level, I defined highly complex work systems consisting of a high number of relationships and a high intensity of differentiated work systems. Loose coupling therefore appears to be unsuitable. Systems that are connected in high number through differentiated work units in an intensive manner arguably have strong cause-and-effect relationships if systemic shocks appear, for instance (cf. Simon

[89] All "mathematically possible" forms are distinguished in alphabetical order from a) to r) in Figure 6. 15.

[90] The logically possible branches are indicated by a combination of lines and full dots (Figure 6.15). Those without logical fit are indicated by dotted lines and circles.

[91] What I wish to state at this point is that I do not consider the work systems I mark unfit impossibilities, but rather that it is the logically fitting combinations that are assumed to be effective.

1969). Other loose work systems are therefore excluded (forms d-f and forms p-r).

Further, highly complex work systems that are centralised in a tightly coupled system on the horizontal and diagonal levels are not considered effective matches. The reason why the horizontal type (form b) is excluded is because it is a form that exists between competitors. One contributor is not assumed to be in a position to assume centralisation and therefore complete control over the other contributors[92].

On the diagonal level, as defined in this study, a logical match is not seen either. The reason for this is clear, because in this case interdependencies are of the cooperative and strategic types only. The likelihood of generating a centralised position for any contributor is seen as very low. The remaining forms are all logically possible.

The same investigation is repeated in Figure 6.16 with work systems of low organisational complexity within inter-firm organisational forms. The following line of argumentation explains the exclusion of the non-logical types from the suitable combinations .

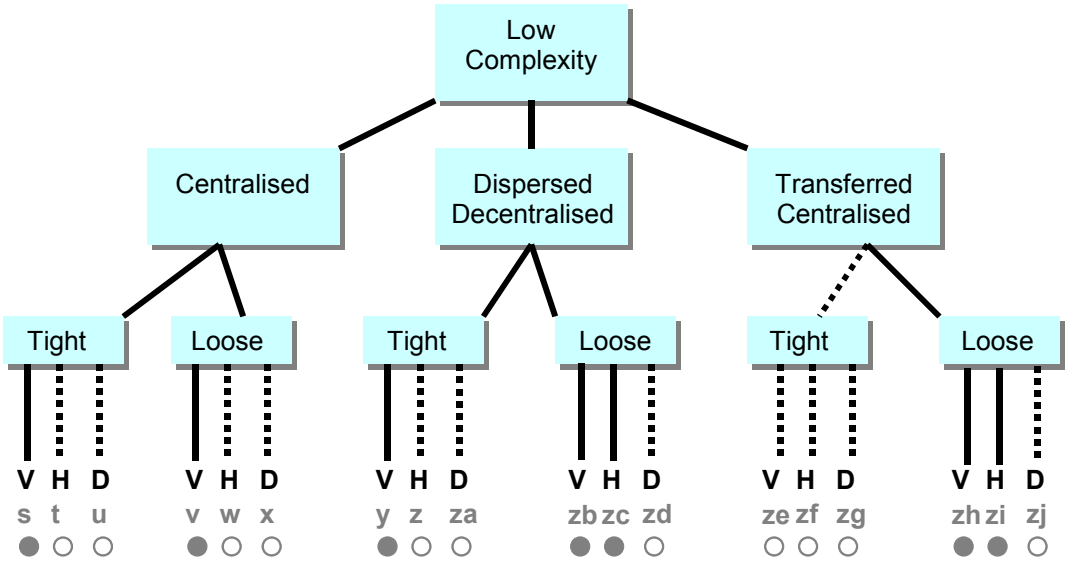

Figure 6.16 IFO Work Systems with Low Complexity

This classification illustrates possible forms of inter-firm organisational work systems that are based on low complexity. With two exceptions, tight system connectedness is excluded. The argumentation for this exclusion is

[92] This would result in a kind of monopoly situation, which is generally beyond the scope of this study.

based on the above discussion, which has shown that low-complexity work systems primarily use coordination mechanisms of lower complexity such as prices and norms, and therefore involve a lower number of organisational systems of contributors with less intensity.

The exceptions are vertically organised centralised work systems (form s) and dispersed decentralised systems (form y). The centrally-organised, tightly-connected form is possible along value chains in which sequential symbiotic outcome interdependencies exist. This is most likely in institutionalised forms with this interdependence structure. One contributor holds the control and, in the interest of efficiency gains, implements a simple low-complexity institutionalised work system with other contributors.

The same argumentation applies to dispersed decentralised systems in which the power distribution is symmetric and non-complex relationships are institutionalised. Transferred decentralised systems with tightly organised work systems result in higher complexity, because many contributors' work units are involved. Therefore these possibilities (forms ze, zf, zg) are excluded.

Centrally-controlled, loose work systems along value chains (form v) are logically possible with both forms of sequential interdependencies and the low-complexity form of reciprocal interdependent relationships. The other two forms along this branch (forms w and x) are excluded. Form w is excluded because, on the horizontal level, centralised control is not assumed. Form x requires behavioural interdependency, which contradicts centralised control.

The next relevant branch in Figure 6.16 illustrates low-complexity work systems of inter-firm organisational forms with dispersed decentralised control and loose systemic coupling (forms zb, zc, zd). Low systemic tightness indicates that the technical cores are not connected by boundary links and each contributor holds control over its own resource services. The vertical type (zb), which provides a logical fit, describes a simple buyer-and-seller relationship, for instance. The horizontal type (zc) that is classified as fitting is observable in common standard competitive settings. The diagonal type (zd) is excluded because, as discussed above, some form of boundary linking is required, which most likely uses team-like coordination, and therefore higher complexity is assumed.

The next ramification concerns types that are loosely coupled systems controlled by transferred decentralised structures (forms zh, zi, zj). Both types, the vertical and the horizontal, are illustrated as logically fitting. In the vertical forms, contributors along a value chain create inter-firm organisations that are loosely connected to their work systems and are not necessarily part of an overall strategic orientation. As far as horizontal forms are concerned, otherwise competing firms contribute resources to a transferred decentralised

organisation, which controls them. The inter-firm organisation is not highly connected and does not have a strategic orientation in the eyes of the contributors. The diagonal form, as with all low-complexity work systems, requires highly complex coordination mechanisms such as team-like mechanisms, and is excluded for that reason.

In sum, the above analysis of inter-firm organisational work systems included four elements and their natures, which I argued are crucial for inter-firm organisational effectiveness. Complexity of work systems was considered in terms of the division of labour, and showed strong relationships with mechanisms of coordination (Figure 6.10).

The centralisation structure of work systems was distinguished in three alternative types. A strong link between the form of centralisation and the dimension of power was drawn in Figure 6.11. The centralised form unifies control in one contributor. The dispersed decentralised form is one in which the source of power comes from specialisation and the necessary resource services render the necessary activities. Therefore control in that form is dispersed among the contributors. In the third type, which I termed transferred decentralisation, power is delegated to a separately formed body that produces economic activities on behalf of the contributing firms.

Thirdly, I defined a continuum of systemic tightness ranging from loosely coupled to tightly coupled systems. This element indicates what impact systemic effects have within inter-firm organisations. The argumentation is that tightly coupled systems require more of a strategic orientation, while operational goal orientation leads to looser forms of systemic coupling.

The last element under consideration was value direction. The distinction I made identified three different directions in which economic value could be produced. The vertical form indicates inter-firm organisational formation along an industry's value chain. Organisational formation among competitors is captured by a horizontal value direction. The third form is called diagonal value direction in this study. It provides a cluster of inter-firm organisational forms that belong to different value chains within different industries. The justification for including this distinction was the observation of industry convergence. Value direction has been argued to have strong correlations with types of interdependencies, which are outlined in Figure 6.14.

The discussions in this section lead to the classification scheme illustrated in Figures 6.15 and 6.16. The starting point was the degree of organisational complexity of inter-firm organisational work systems. A distinction was made that reduced the number of forms of work systems from the mathematically possible number of thirty-six to fourteen. The remaining types were argued to possess a logical fit within their combinations of elements and natures in relation to other dimensions.

One limitation that has been pointed out regards the number of elements under investigation. Limiting that limits the number of logical forms and certainly also the complexity of treatment. Formalisation[93] is one element that could be included. Given the argument that formalisation is represented in the form of coordination mechanisms, the complexity could be on a lower level. Another element that could be included is the distinction between proprietary and contractual forms[94]. Proprietary forms of work systems can be divided into (a) no new equity, (b) new equity and (c) dissolution of equity. Contractual forms could be distinguished in (a) traditional forms such as supply contracts or franchising[95] and (b) new forms such as virtual and hollow corporations[96]. This perspective on organisational forms has been adopted in a number of other studies, as discussed in Chapter three. The reason why I have not followed the same line of thought was because I wished to emphasise the constituent dimensions with their elements and natures, which in turn could be explained by the phenomenon of self-organisation and emergence (Letiche, 2000). To some degree, though, these dimensions are implicitly included through the discussion of different degrees of centralisation. This explains in more depth why firms merge, why they create new legal entities, and why they engage in different types of contractual relationships. In the end, it is not the ownership of resources that is important, but the control over them. This control can be exerted by means of equity or contractual involvement. The choice in this study was to refrain from such distinctions.

The next section is an attempt to unify the five dimensions discussed in order to provide a framework for classifying inter-firm organisational forms.

6.3 An Inter-firm Organisational Classification Framework

This chapter seeks to answer questions concerning how firms interact in order to perform economic activity. It is presented as the logical continuation of the question why they engage in inter-firm organisations. Previous chapters have provided an integrated view of firms and the dimensions embedded in their environments. The outcome of this chapter is a framework of organisational elements that facilitate the classification of inter-firm organisational forms. The idea is to promote understanding of the critical dimensions, each of which comprises a number of elements that may vary in nature. The result, as discussed throughout this study, is complexity. Complexity as such is often

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93 This element is discussed in Grandori and Soda (1995), for instance.
94 For an analysis of this element, see Zettinig and Hansén (2002).
95 See, for instance, Boyle (1999).
96 See, for instance, Werther (1999).

perceived as problematic because of the limits of the human mind. Therefore I have been trying to rigidly[97] create a systematic approach to describing dimensional elements and their forms. I then identified interrelationships between the dimensions in order to separate what is logically fitting from what is only "mathematically possible". This resulted in the sixteen tables that are scattered throughout this chapter. The objective in this section is to pull the threads of these discussions together and repeat what has already been done with regard to inter-firm organisational work systems.

In an attempt to deal with that complexity, the systematic approach makes an overall distinction between all possible strategic and operational goal-oriented forms as a starting point for the classification. Further, these forms are related to interdependencies as classified in this chapter. Since interdependence has a number of implications on the next level of discussion, the classification tree includes the distribution of power in its two forms, symmetric and asymmetric. Power distribution is a dependence-determined dimension and it illustrates variations in control over inter-firm organisations. Typical mechanisms of coordination are included on the next level of discussion, in order to show all possible combinations and to determine which of them are feasible. As a preliminary result, feasible forms are presented and also related to the different work systems outlined in Figures 15 and 16 in this chapter.

Figure 6.17 is the first part of the classification system[98]. It illustrates the feasible inter-firm organisational forms that have a strategic goal orientation and in which the contributors' interrelationships are transactionally interdependent in nature. The left-hand side of the classification tree describes sequential interdependencies among contributors. The symmetrically distributed power forms are all considered relevant except that there is no logical match with team-like coordination mechanisms.

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97 Of the many meanings of the term "rigid", I refer here to "*precise and accurate in procedure*".

98 In Figures 6.17 ff., INTDP is an abbreviation for interdependence. Symmetric and asymmetric refer to the distribution of power among inter-firm organisational contributors. (P) stands for price-, (A) for authority-, (T) for team-, and (N) for norm-like coordination mechanisms. Each of these are themselves representative of similar other coordination mechanisms, which share the same nature in terms of knowledge distribution, communication and decision-making.

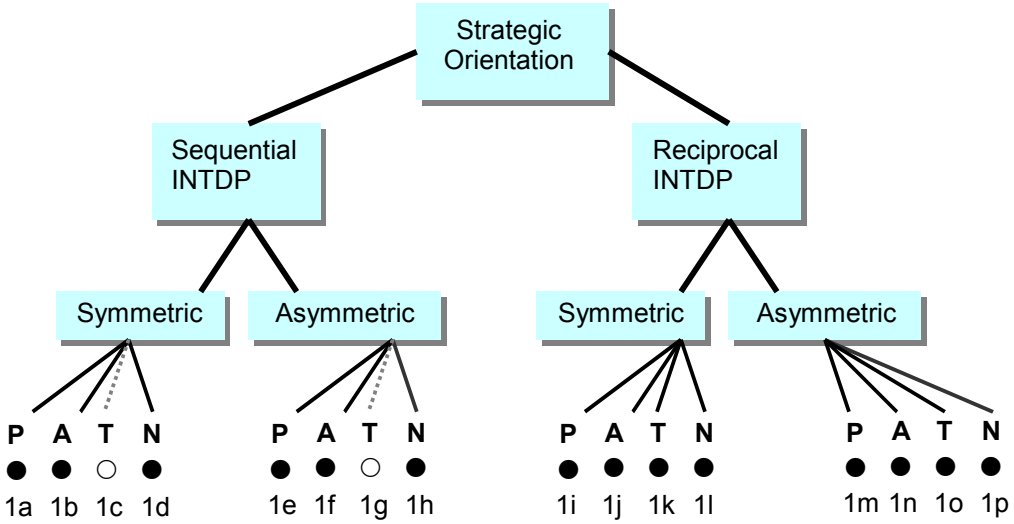

Figure 6.17 Strategic Forms of Transactionally Interdependent Inter-firm Organisations

The same exclusion criterion is applied for sequential interdependencies of the asymmetric type. The reasoning is the same for both forms. The nature of team-like coordination mechanisms is that each contributor has specific knowledge that is based on specialisation and a set of resource services. Through multilateral communication, joint decisions are made for generating economic activity. In the case of asymmetric relationships, multilateral communication is not assumed and each contributor makes decisions independently. In the symmetric form, local knowledge leads to the same outcome that decisions are made separately. The four forms along this classification tree are all assumed to be rather institutionalised, sequential, interdependent relationships because of their nature, which implies a common goal benefiting each contributor's individual goal achievement. Nevertheless, the limitations pointed out in Figure 6.3, that the extent is lower than for other forms of interdependent relationships, should be borne in mind. In practice, this means that technical cores are connected through boundary-spanning units rather than by boundary links.

Eight distinct reciprocal interdependent forms of strategic orientation with both types of power distribution are identified, all of which appear possible. Some limitations can be assumed. Price is a possible coordination mechanism in highly complex reciprocal interdependent relationships, but as indicated in Figure 6.7, it is unlikely to be used as a primary coordinative mechanism. In this case, team-like coordination is more likely given the level of specialisation and the resulting specific knowledge that is located with the contributors. At the same, time low-complexity reciprocal interdependent

relationships have been shown to be rather unlikely objects of team-like coordination. Here, the assumption is that one contributor who has concentrated knowledge about the larger system delegates, in authority-like coordination, the task to another contributor who assumes responsibility for carrying it out. In all cases, norms are feasible coordination mechanisms for increasing efficiency[99].

Figure 6.18 illustrates the logical fit of strategically oriented inter-firm organisational forms of cooperative interdependence types. It is assumed that the degree of dependence on the common resource pool as well as on the common activity contribution is symmetric, and therefore the power distribution ought to be symmetric in order to result in logical forms[100]. Only symmetrically distributed power is assumed in strategic types of inter-firm organisational forms.

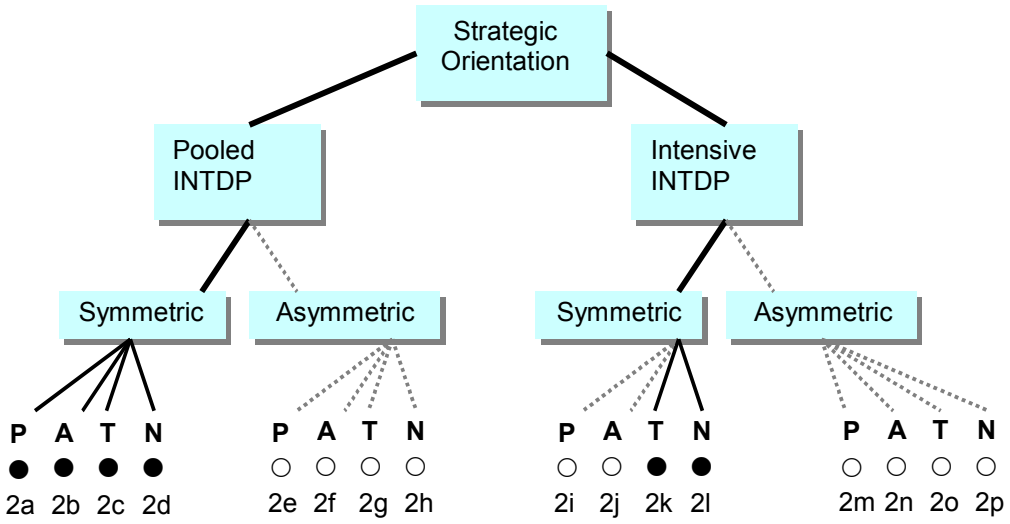

Figure 6.18 Strategic Forms of Cooperative Interdependent Inter-firm Organisations

Forms with pooled interdependent relationships provide a logical fit with all types of coordination mechanisms (cf. Figure 6.7). Strategically oriented forms of intensive interdependent contributors with symmetric power distribution have been shown to use team-like and norm-like coordination mechanisms . Price-like coordination is ruled out because commonly codified

[99] In this case, norms are the outcome of a negotiation process. Once in place, they are equally valid for all contributors. The negotiation process itself is a different issue. Here, symmetry and asymmetry of power distribution play an important role in influencing agreement on different norms.

[100] Cf. Figure 6.8.

information is not available in this combination. Authority-like mechanisms are unfit because no concentration of knowledge is given and therefore no decision-making rights are transferred.

Next I turn to the fit between different elements of dimensions concerning operational types of inter-firm organisational forms. Figure 6.19 illustrates operationally oriented types of transactional interdependent forms.

With the exception of team-like coordinated forms in sequential interdependent relationships, all combinations are possible. The match between the goal orientation, transactional interdependencies and coordination types is discussed above, and is illustrated in Figure 6.7. The fit between interdependencies and power distribution is illustrated in Figure 6.8. The use of price-like coordination is possible in reciprocal interdependent relationships if the complexity level remains low.

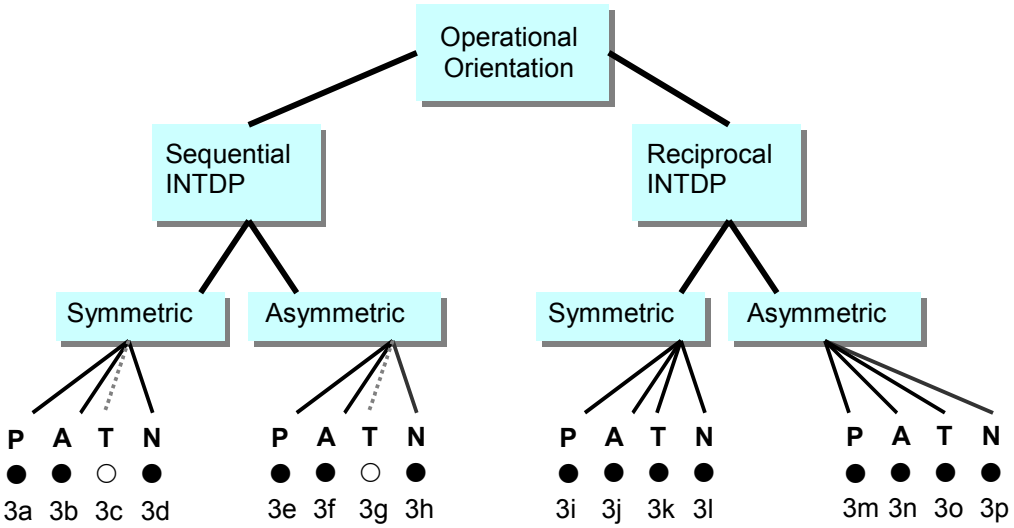

Figure 6.19 Operational Forms of Transactionally Interdependent Inter-firm Organisations

Figure 6.20 is an illustration of operationally oriented inter-firm organisational forms of the cooperative type. The pooled interdependent forms rule out team-like coordination mechanisms because specific knowledge is required from inter-firm organisational contributors. Since this is not a necessary requirement for pooling resources and creating interdependencies that are based on a common pool, this form of coordination has been ruled out.

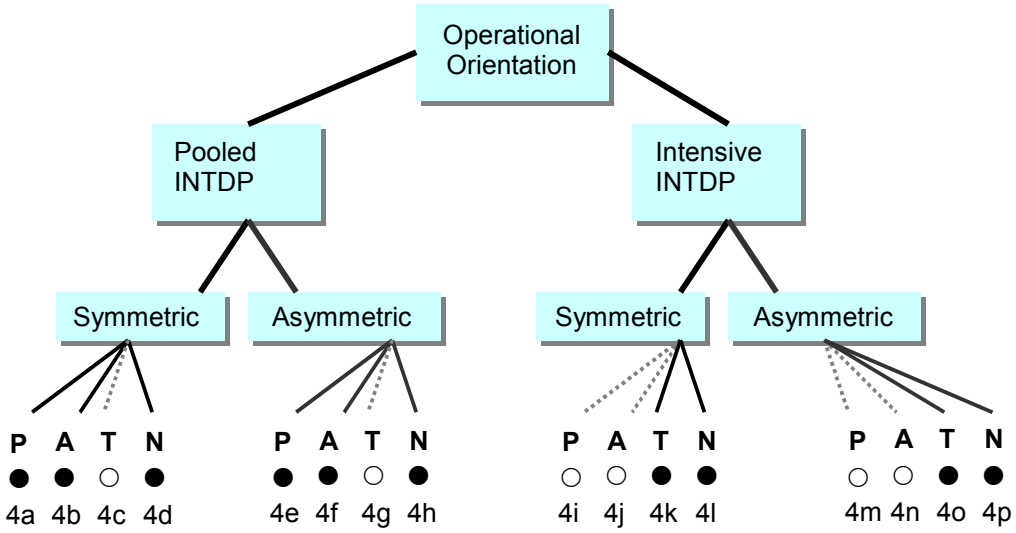

Figure 6.20 Operational Forms of Cooperative Interdependent Inter-firm Organisations

Price-like coordination mechanisms are excluded in intensive interdependent forms (cf. Figure 6.7). This type of coordination is based on local knowledge and is not compatible with the specific knowledge requirement that is found in intensive interdependent relationships. Given the nature of coordination mechanisms, authority-like mechanisms are also excluded because no concentrated knowledge has been found that would support the transfer of decision-making rights. A special case is intensive interdependence with power asymmetry and team-like coordination (form 4o). This is illustrated in Figure 6.9 as one that requires symmetry among participants, and especially in its strategic form. In operational terms, it appears possible for one contributor, even though it is dependent on the behaviour of the other contributors, to exercise control over them. This occurs when the powerful actor is in a position to be able to substitute other contributors, and they are not able to generate the same choice.

This section has focused on inter-firm organisational forms based on the four dimensions of (1) goal orientation, (2) interdependencies, (3) power distribution and (4) coordination mechanisms. As a result, 44 inter-firm organisational forms have been found to possess logical matches. What remains to be done in this chapter is to relate these forms to the types of work systems discussed and illustrated in Figures 6.15 and 6.16.

6.4 Fitting Work Systems to Inter-firm Organisational Forms

Figures 6.17 to 6.20 provide an overview of inter-firm organisational forms. In this section, the fit between these forms are discussed with respect to the work systems identified in Figures 6.15 and 6.16.

Complexity as a concept comprises the number of differentiated work systems of different inter-firm organisational contributors, and the intensity of their integration. Because integration is strongly related to questions of coordination, it serves to create a logical fit between those elements. As shown in Figure 6.10, highly complex work systems are effectively coordinated by (a) authority-like, (b) team-like, and (c) norm-like coordination mechanisms. On the other hand, low-complexity work systems are effectively coordinated by (a) price-like and (b) authority-like coordination. Norms, as pointed out, are also effective coordination mechanisms for low-complexity systems, but they have their limitations in terms of efficiency. Inter-firm organisational forms of low complexity are assumed to largely use *external norms*[101] and not to form specific norms for reasons of efficiency.

The element of centralisation has been distinguished in three different forms. In order to fit work systems to inter-firm organisational forms, the match has to be with the distribution of power. Centralised work systems, as summarised in Figure 6.11, are forms in which one contributor unifies control over the overall work system of the inter-firm organisations. Therefore the relationship to the dimension of power by its very nature produces asymmetric power distribution among the contributors. The dispersed decentralised form is determined by the control of specialised contributors and the specific resource services they can render. Therefore symmetry in power distribution is given for such forms.

The third element discussed is the systemic coupling of work systems, which have two distinct natures that are related to the goal orientations of inter-firm organisational forms. Tightly-coupled systems have strong cause-and-effect relationships among connected work systems. Therefore disturbances as well as positive causes are easily transmitted throughout the whole inter-firm organisational system. Because the tightly-coupled work systems of contributors connect technical cores through boundary links, such causes have effects within inter-firm organisations and within the contributing firms. Therefore a strong relationship between tightly-coupled inter-firm organisational forms and strategic goal orientation is given (see Figure 6.12).

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[101] I define external norms in this context as norms that are generally common knowledge (e.g., regulations) and use standardised communication, as opposed to specifically negotiated norms that are created for a specific context.

On the other hand, operational goal-oriented inter-firm organisational forms do not provide tight coupling and are therefore rather connected through the boundary-spanning units of loosely-coupled systems.

The fourth element of inter-firm organisational work systems has been defined as *value direction*. Distinctions between the vertical, horizontal and diagonal value directions are shown in Figure 6.13 and could be summarised as the direction of the work processes in which value is created. The relationships of the different value directions to interdependencies are important because interdependence types limit the development of inter-firm organisations in certain directions. Along the vertical direction the argument has been that all of the distinguished interdependence types are logically feasible. Horizontally directed value-creating work systems do not create positive outcome interdependencies and therefore they have been excluded as possibilities. Horizontal work systems can create cooperative interdependencies of the pooled and intensive types. To relate this further to the goal orientation of inter-firm organisational forms, it is argued that both strategic and operational orientations are supported. The diagonal form of work system is limited to strategic types of pooled and intensive interdependencies. The argumentation is that diagonally organised work systems of inter-firm organisational forms need to connect their technical cores through boundary links, and therefore strategic intent is assumed. Figure 6.14 provides an overview of these relationships.

6.5 A Framework for Inter-firm Organisational Forms

This chapter has described five dimensions along which inter-firm organisational forms can be classified. The method I used was to arrive at useful dimensions in an act of "*creative intuition*", as described by Bergson (1932). A priori weighting of the dimensions was philosophically justified[102]. The ones discussed were broken down into their constituent elements, which were discussed and an attempt was made to classify their different natures. In consequence, these elements with their distinct natures were related to the elements and natures of other dimensions. This highly complex system provides guidelines for possible and logical forms of inter-firm organisations. The classification as such should be viewed as a framework that is open for discussion and development. It is constructed as a system of statements that is logically conclusive. The next chapter offers a holistic view of inter-firm organisational forms and their emergence in terms of their formation

[102] See Appendix two for the discussion on methodological choice.

rationales. The external environment and the internal structure of the contributing firms are used along selected dimensions in order to arrive at a multitude of rationales why firms engage in inter-firm organisations. The current chapter has sought answers in terms of how this could be achieved. The following chapter relates the three frameworks, and an attempt is made to integrate them more clearly in order to enable conclusions to be drawn about their relevance in theory and practice.

7 AN INTEGRATED VIEW OF INTER-FIRM ORGANISATIONAL FORMATION AND FORM

7.1 Propositions and Conclusions

This holistic study is an investigation into the interaction between the firm and its organisational environment. The firm is a strategic actor with the goal to survive and to grow in value over time. Its organisational environment imposes external constraints on it. These constraints result in unpredictability about future states and therefore create perceptions of threats and opportunities. Threats as well as opportunities are expressed through uncertainties. Uncertainties per se are not positive or negative perceptions, but are understood as ingredients in the decision-making process.

This study takes different environmental factors, which are perceived to be important to the future state of the firm, into account. These factors are divided into structural characteristics of important aspects of the environment and the consequences of their combinations, the relationships between the firm and key external actors.

Environmental concentration, munificence and interconnectedness are structural characteristics that are complicated by levels of heterogeneity, and dynamically pose challenges to company decision makers. The structural characteristics of the environment have positive or negative relationships[1] with "*relationships between social actors*". Figure 3.9 summarises these arguments, and represents a development of the original causal proposition devised by Pfeffer and Salancik (1978)[2]. The current proposition differs from the original in four ways: (1) the level of sameness has been taken into consideration in order to distinguish different levels of complexity expressed through the perceived homogeneity found in the task environment; (2) dynamism has been included in order to illustrate structural change that influences change in

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[1] By way of clarification, by "*positive or negative relationships*" I mean causal relationships. E.g., a high level of environmental concentration on the horizontal level is positively related to conflict and to competitive outcome interdependencies. Relationships between social actors, on the other hand, are defined through the classification of interdependencies (Figure 3.1).

[2] Cf. Pfeffer and Salancik (p. 68, 1978), Figure 4.1 Relationships Among Dimensions of Organisational Environments.

relationships between actors; (3) interdependence has been classified[3] in its multiplicity because a variety of cause-and-effect relationships are logical consequences when types of positive and negative interdependencies are distinguished[4]; and (4) a distinction has been made in the relationships among social actors on the horizontal and vertical levels because structural characteristics are differently interpreted by the firm depending on the relationship direction of[5].

Further, the environment in this study is the product of the sense-making process of the actors within a firm. This approach is strongly influenced by Weick (1979). Meaningful environments are outputs of organising and not inputs to it. This means that the decision makers within the firm create their environment, and their actions are based on that perception.

The perception of uncertainty by the firm gives reasons for organising relationships with environmental actors[6] and thus provides rationales for the formation of inter-firm organisations.

The strong argument originally put forward by Pfeffer and Salancik (1978) is therefore reinforced. Their external environment controls firms. This control is strongly influenced by the perceptions of the decision makers in the firm. The sense making about environmental constellations is more of a basis for action than the factual environmental constellations. The result of the sense making is expressed in uncertainties, and uncertainties are the bridge to the internal nature of the firm.

As pointed out above, it is the view in this study that uncertainties are not by nature negative perceptions, but are rather expressions about not knowing what the future holds for the firm. This is a natural Western approach, which goes hand-in-hand with the belief that the future is not predetermined. Therefore the attitude within the firm and of the decision makers appears to be crucial input to the subsequent reactions to uncertainty. The structural characteristics of the environment are some of the input factors based on which the firm emerges over time and strives to advance to a higher organisational level. The other input factors in this emergence process are internal to the firm.

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3 See Figure 3.1.

4 Positive interdependencies being a) symbiotic outcome interdependencies and b) behavioural interdependencies, and negative interdependence being competitive outcome interdependence.

5 For example: high concentration among competitors can lead to higher predictability and therefore supports ease of management. In contrast, a high level of concentration among suppliers reduces opportunities and increases dependence (see Figure 3.4).

6 Figures 3.4 to 3.8 are propositions concerning the causes of structural characteristics and their effects on inter-firm organisational formation, which is based on the firm's perception of its environment.

The attitude of the firm or its decision makers towards uncertainty influences emergent processes and provides additional rationales for forming inter-firm organisations with outside actors. Attitudes that interpret uncertainty influence the goal-making process. Uncertainty, based on the different causes illustrated and discussed, is the raw material for decision-making. Figure 4.1 distinguishes between two fundamentally different attitudes of the firm towards not knowing the future. I have used the terms revolutionary and incremental in order to illustrate such differences in attitude.

The revolutionary approach interprets undetermined future states as opportunities - opportunities to influence the outside environment and to create future states that are favourable for the firm[7]. The rationale behind inter-firm organisational formation in that case is opportunity seeking. In order to realise its opportunities, the revolutionary-minded firm engages in organisations with outside actors. The emergent component of such processes include perceptions about the firm's own resource specificity, its specialisation, the nature of its boundaries and its approach to adaptation.

The revolutionary firm analyses the gap between its own resource basis and the different service combinations through which it can generate productive opportunities and the resource services it wants to render in order to capture the envisioned opportunities. In that case, the formation of inter-firm organisations is based on a resource-service motive, which can be satisfied by joining an organisation with other firms. The role of specialisation is important because it helps the firm to position itself in terms of what it wants to be and what it wants to do. I have used the main distinction of access and technology in order to differentiate elements based on which the emergence of specialisation can be understood. In order to extricate the role of the firm's boundaries, two types of boundary system were defined, boundary-spanning units and boundary links. This distinction is important in the light of the goal-making and the goal-achievement processes because it concerns operational and strategic orientations and the role that entering into inter-firm organisations plays. Boundary links are constructs that have the function of connecting to inter-firm organisational contributors' technical cores, and therefore create strategic links to contributors in order to realise opportunities. Boundary-spanning units have operational importance, contributing through inter-firm organisational participation to interim goal achievements that mark the path to the attainment of long-term strategic goals. The circle of this concept of firms with a revolutionary approach closes with adaptation. I consider the revolutionary-minded firm to be a proactive actor. It views the

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[7] Such attitudes are illustrated in "value innovations", for instance. See the article by Chan and Mauborgne (1997).

future as the consequence of its own actions. The goal is to create a favourable future state by planning resource-service development and by combining its resources with those of outside actors in order to create necessary productive opportunities.

The incrementally oriented firm has a goal-setting approach that is directed towards avoiding negative uncertainties. The point of departure for this type of firm is the status quo. The firm attempts to preserve its resource specificity, and the formation of inter-firm organisations with outside actors protects its resource access in terms of both input and output[8]. Specialisation imposes limitations. It defines what the firm does and how it conducts its business. Inter-firm organisational formation is used to keep this understanding of its specialisation extant. Hence firms with an incremental orientation are more likely to prefer boundary-spanning units in order to attain incremental goals and to secure a stable future state. Boundary links are used when participation in an inter-firm organisation provides long-term certainty about its goal achievement, and when it provides a higher degree of predictability about its future states. In such cases, the trade-off between the protection of the technical core and uncertainty avoidance leads to strategic forms of inter-firm organisations. The adaptation behaviour of incrementally minded firms is reactive rather than proactive. The goal is to survive and to build up the firm along incremental lines. If uncertainty is perceived, the firm prefers an experimental approach to avoiding it. Resources that are needed in the adaptation process are secured through inter-firm organisational participation.

In this study I have emphasised two opposing natures of firms, which could be understood as "*extreme types"* as defined by Hempel (1965)[9]. The purpose of refining the propositions put forward by Pfeffer and Salancik (1978) about the resource dependence of firms, and of integrating these propositions with a strongly dominated view of the resource basis and attitudinal factors, is primarily to promote better understanding of the process of inter-firm organisational formation. The basic underlying assumption is that, in order to understand the formation rationale better, it is valuable to investigate basic concepts and their possible relationships. Letiche's (2000) treatment of the ideas of emergence and self-organisation was a strong influencing factor. The credo is that things emerge through combinations of related elements and their

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[8] As mentioned previously, I understand resources not only as the inputs to the firm's transformation process, but also as resources that are based on demand on the output side. Such output-related resources include customer needs, wants and the actual demand for the firm's products.

[9] Hempel (1965) defines *extreme* or *pure types* in the following way: Extreme/pure types of concrete instances are rarely if ever found, but which may serve as conceptual points of reference or "poles", between which all actual occurrences can be ordered in a serial array. Many occurrences that fall between will not be qualified as either extreme occurrence but as exhibiting each of the two traits to a certain extent.

different natures. Therefore they constantly generate new social realities in the perception of the firm. Thus this study could be understood as an analytical tool for identifying the environmental aspects that control the firm. These aspects and their relationships in the perception of the firm could then be used to develop different sets of possible future states, and to separate the desirable ones from the unfavourable ones in order to direct the strategy of the firm. This study supports the search for patterns that create uncertainty perceptions, and it stimulates the search for desirable futures through the formation of and participation in inter-firm organisations.

This directly bridges the second part of the study, which deals with the research objective of furthering understanding of inter-firm organisational forms. In my view, the processes of inter-firm organisational formation and form are very closely related. The rationale for this logic is that formation that is based on perceptions of the task environment and the internal nature of the firm largely determines the form of inter-firm organisation between contributors. Therefore it makes sense to deal with such broad questions at the outset.

The relationships between actors in a given environment are defined in the first part of the study through interdependencies. They provide strong reasons for engaging in inter-firm organisation and they provide solutions for dealing with uncertainty. At the same time, they also determine the logical frame of what type of inter-firm organisational form lays claim to reasonable choices. The goal orientation of the inter-firm organisation, which means the commonly achieved understanding of what the purpose is and what goals need to be achieved together, is determined by interdependencies. The goals need to be in harmony with the individual contributors' goals, at least to some extent. Strategic and operational goal orientations were used in order to express opposing positions on goal harmony. In pursuance of that, the relationships between such choices were related to the firms' internal dimensions because goal formation with other contributors to inter-firm organisations influences and is influenced by the contributors' natures. The consequences of inter-firm organisational goal formation discussed in this study were illustrated through relationships to the boundary system of the firm, to consequences concerning the firm's resource base, and to the time horizon of the inter-firm organisational contribution. Goal orientation, at the same time, is an ingredient of the other dimensions of the inter-firm organisational form. Together with its relationships to different forms of interdependence types, it illustrates the array of possible logical constructs. In holistic terms, these constructs reflect the rationales behind inter-firm organisational formation based on environmental conditions and the corporate nature. Therefore the expressed view on interdependencies among inter-firm organisational contributors and

their common goal orientation is related to other dimensions that have been identified as important and chosen for investigation in drawing up a framework for inter-firm organisational classification.

The coordination mechanisms are analysed based on the constituent elements of coordination. Different types of knowledge distribution, communication directions and forms and the means of arriving at decisions are the three elements that support the creation of the four typical coordination mechanisms that are distinguished in this study, and which are used to identify the dominant forms of coordination among contributors to inter-firm organisations. The means by which such conclusions have been drawn included the logical analysis of fitting combinations[10] between coordination mechanisms, interdependence types and goal orientation. The purpose of doing that was to single out the logical from the full range of possible combinations that do not logically provide feasible solutions.

The following integration of the dimension of power distribution among contributors to inter-firm organisations with the dimensions of goal orientation, interdependencies and coordination mechanisms provides a framework for fitting combinations among dimensions. It rules out combinations such as asymmetry of power among the contributors and coordination that is based on joint or unilateral non-calculative decision-making. Further it suggests that strategically oriented cooperative interdependency-based relationships require symmetric power distribution.

The work-system dimension of inter-firm organisation comprises elements of complexity, centralisation, systemic coupling and value direction that produce a multiplicity of distinctive work systems.

The element of complexity is strongly related to coordination mechanisms. Highly complex work systems are suggested to be unfeasible for mechanisms that are based on local knowledge, commonly codified information and unilateral decision-making[11]. Low-complexity systems apparently rule out coordination mechanisms that are based on specific knowledge, multilateral communication and joint decision-making because such contributions by different actors per se create complexity. The rationale for excluding “specific norms” as a suitable mechanism for low-complexity work systems is considered relative in terms of costs and benefits.

The element of centralisation in work systems is categorised as centralised, dispersed-decentralised and transferred-decentralised, all of which reflect the dimension of power in inter-firm organisations. Centralised work systems are reasonable in cases in which one actor possesses unified control. Dispersed,

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10 Cf. Figure 6.7

11 Prices have been used as an example of such a coordination mechanism.

decentralised systems suit symmetric power constellations that are based on specialisation, while transferred, decentralised systems operate in those that delegate decision-making.

Systemic coupling is suggested to be tight in strategic goal-oriented inter-firm organisations as opposed to the loose coupling of operationally oriented work systems.

The dimension of *value direction* is introduced to distinguish between work systems that include value-creating processes along the vertical value chain, among competitors or across industries. This dimension is suggested to have strong links with the interdependence structure among inter-firm organisational contributors. All interdependencies logically occur along the vertical axis, while in the horizontal direction, all cooperative interdependencies are feasible. On the diagonal axes, strategic forms of cooperative interdependencies are relevant for inter-firm organisational work systems.

The discussion about types of work systems in inter-firm organisations resulted in fourteen different types (Figures 6.15 and 6.16) being distinguished that provide feasible options.

Chapter 6.2 brings together the foregoing discussions on inter-firm organisational dimensions to create a classification framework that illustrates logically fitting inter-firm organisational forms. Goal orientations of inter-firm organisations are distinguished in the strategic and operational forms, which are directly linked to the internal nature of the firm's goal orientation. Further division of the classification framework into types of interdependent relationships and power distribution resulted in a relational map of coordination mechanisms. Forty-four distinct classes of inter-firm behaviour were identified as a result.

The identification of dimensional relationships in work systems [12] with the remaining dimensions[13] of inter-firm organisation enabled direct conclusions to be drawn concerning the fit of work systems with inter-firm organisational forms.

7.2 Contributions and Limitations

This study is an investigation into the phenomenon of inter-firm organisation. The research objectives were related to two distinct problems, both widely discussed in the literature. The first was to arrive at a better understanding of

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[12] These include complexity, centralisation, systemic coupling and value direction.

[13] The goal system, interdependence, power distribution and coordination mechanisms.

why firms engage in inter-firm organisations. The respective research question was, "*Why do firms enter inter-firm organisations?*" The second related objective concerned the forms in which inter-firm organisations are organised. The guiding research question was, "*Which organisational forms are used between firms in order to facilitate economic activity?*" Both research objectives are dealt with together because formation and form are not only linguistically related concepts. The formation process determines the form. This is one result that has been established throughout this study.

The rationale behind why firms enter into inter-firm organisation and the modalities that are used to establish a particular organisational form are intertwined. Firms and individuals within them engage in processes to select, organise and interpret the inputs from their senses concerning the environment in order to give meaning and order to the world around them. This study is an attempt to use a number of different theoretical explanations that make a useful contribution to the research objective. These theories weave a net that facilitates the identification of rationales behind inter-firm organisational formation that can be observed and those that are beyond observation. The propositions developed by Pfeffer and Salancik (1978) in their "resource dependence view" established the basis on which I built an environmental explanation of inter-firm organisational formation. My propositions were constructed in order to identify different environmental characteristics and the relationships between the actors in an environment. This, in turn, facilitated the identification of given constellations, or provided the means to manipulate constellations in order to alter the level of uncertainty about future states. Uncertainty derived from structural and relational characteristics among actors are the ingredients on which the firm bases its proactive or reactive choice of possible futures.

One outcome of this study is that the firm indeed has a choice. Given the fact that the environment provides limitations, it also produces opportunities that the firm can realise once it understands the linkages between structural characteristics and the relationships among actors in the environment. This was an understanding that was furthered in this study. By seeking to explain such relationships, the firm can use its knowledge in choosing different means of adapting to the environment and achieving its goal of developing a secure future through incremental adaptation. Alternatively, it could realise perceived opportunities through the alteration and manipulation of relationships with important actors in the environment.

Formation determines inter-firm organisational form. The nature of the firm and the perception of the individuals within it about the environment determine the rationales and the means of their formation. Goal-setting mechanisms are considered the logical link between the internal nature of the

firm, the perception of its environment, and the goal orientation of its organisation. Chapter four considers the firm as a decision-making unit that sets goals based on attitudinal factors. The ends of a continuum of decision-making attitudes were labelled *revolutionary-oriented* and *incrementally-oriented*. These attitudes influence the perception of the environment, and in fact create it[14]. As a result, its structural characteristics and the relationships among the actors concerned give inputs to the interpretation of uncertainty. Uncertainty is the basis for the formation of inter-firm organisations. If there is no uncertainty about the future, then there will be little incentive to alter the status quo. When uncertainty is perceived, the firm reacts in order to avoid problematic futures or to capture opportunities. In both cases, the formation of inter-firm organisations can help in attaining desirable futures. The formation process determines the common goal orientation of the inter-firm organisational contributors. Two types of goal orientation were distinguished: (1) strategic goal orientation and (2) operational goal orientation. The difference between the two was clearly defined.

Strategic goal orientation requires the connection of the technical cores of the contributors. This problematic issue has been widely discussed in the theory[15]. It directly affects the boundary systems of contributors, and has long-term consequences for the firms' individual goal achievement.

Operational goal orientation exists among contributors who seal off their technical cores. The boundaries are not directly affected, but are connected through boundary-spanning units in order to realise existing productive opportunities.

Inter-firm organisational goal orientation is therefore the link between the individual contributors' sense making of their environments that results in individual inter-firm goal orientation. This linkage connects the research questions concerning the rationale behind inter-firm organisation and the resulting organisational form.

7.2.1 Theoretical Contributions

Barringer and Harrison (2000) discuss six different theoretical contributions[16] to the field of inter-organisational relationships. They suggest that all approaches form explanations of inter-organisational formation from a number of disciplines, and call for a multidisciplinary approach in order to overcome

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14 Cf. Weick (1979)

15 E.g., Colombo (1998). The spill-over effect is one problematic issue in this context.

16 Transaction-cost economics, resource dependency, strategic choice, stakeholder theory, organisational learning and institutional theory.

fragmentation and to provide a basis for theoretical advancement. According to them, one paradigm alone is insufficient to capture the complexities involved.

This study is an attempt to provide linkages between different theoretical approaches that provide support in understanding why firms engage in inter-firm organisations, and what form they take. The core concepts used are (1) environmental dependence, (2) uncertainty, (3) sense making and (4) goal orientation.

Dependence as a concept enhances understanding of the needs of the firm in respect of the factors found in its environment. The creation of reciprocal dependence, namely interdependence, is seen as a way of overcoming or utilising uncertainties. The perception of uncertainties represents an attitude of the firm and its decision makers. It reflects the way goals are set in the corporate and inter-firm organisational context, which in turn determines inter-firm organisational forms and has consequences in terms of short- and long-term goal achievement.

I have used complexity theory in this study as a guiding philosophical approach to understanding the phenomena in question. This is a rare approach in inter-organisational studies. The reason I adopted it was largely based on dissatisfaction with many theories in strategic management, marketing and organisational studies. Organisations and firms are social constructs. They are the sum of a large number of interrelated and interacting elements through which they emerge. The formulation of theories that could explain why firms or organisations behave in the way they do is difficult, and generalisation is assumed to be hardly possible. If one condition of a general theory is that it has to possess the power to predict future behaviour or developments, then it is easy to say that such a theoretical level is difficult if not impossible to achieve in inter-organisational studies. The number of elements that are interrelated and that interact in organisations provides too many possibilities, or as economists say, too many equilibria, so that prediction of future developments is hard to achieve. Even assuming that all actors behave rationally[17], the sheer complexity of development outcomes is too large to process. Moreover, the problem with creating general theories in this field is that when social constructs develop over time, then the laws that have been developed do not apply since the nature of the construct has changed.

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[17] Rational behaviour is an interesting concept. Generally it is assumed that people do not behave rationally at all times. In saying this I mean that people do not always behave in a direct, simple economically-rational way. On the contrary, I believe that human beings have a strong need to behave rationally. The difficulty is that rationales are personal and subjective. This does not necessarily prevent them from being rational, but merely indicates a multiplicity of rationales.

Therefore I have used an approach that identifies important elements of (1) the environment, (2) the firm and (3) the inter-firm organisation. These elements have been extensively discussed and compared with existing literature. My aim was to create relationships between the elements and the different natures such elements are assumed to possess. These relationships reveal a large number of possibilities, which help us to understand how elements are related to each other and what the possible effects are in certain constellations. The theoretical value of this study is not in creating a theory in the classical sense by providing universal laws. It is more of a tool for understanding how important elements interact and what the ranges of possible outcomes are. From these possible outcomes I have separated what I have called "mathematical possibilities" from those that are logically possible. Such an approach creates a "*simplified"* system of cause-and-effect relationships that answer the questions of "*why firms enter inter-firm organisations*" and "*which organisational forms they use in order to facilitate economic activity"*.

The study is based on the idea that firms and organisations are polymorphic social constructs. This means that they may assume different forms based on their constituent elements. This notion has been supported throughout this study by showing that different elements possess different natures. In combinations with other elements and their natures, a range of forms is possible.

It has been shown that firms and organisations have reconfiguration possibilities in that they have choices about how the various elements are arranged. The above discussion on revolutionary and incremental goal orientations supports this. Moreover, my proposed framework for classifying inter-firm organisational forms incorporates a repertoire of organisational possibilities the firm may choose or is forced to use.

I have stressed the idea of multiplicity by defining elements and their natures and by showing logical relationships among them in order to draw conclusions about inter-firm organisational formation and about the organisational form between contributors.

The study provides tools to promote better understanding of inter-firm organisational formation and form. It departs from the idea of observing firms' behaviour and of listing reasons[18] why they engage in inter-firm organisations. It also departs from the idea that certain forms of inter-firm organisation have to be compressed into a pre-defined framework such as a strategic alliance or a joint venture. I have emphasised the constituent elements in relationships

[18] Examples of such reasons include overcoming national barriers in international marketing, risk sharing, and competence sharing (see Contractor 1986 and Contractor and Lorange 1988).

between firms, such as the nature of interdependencies between contributors and the coordination mechanisms applied. Thus I have avoided certain complications, including the question of what makes a strategic alliance a strategic alliance, and of what is the borderline between a joint venture and a syndicated resource investment. My approach was to create a label-free framework for analysing inter-firm organisations and identifying different roads for departure in different organisational directions. In fact, it provides a framework for discussing inter-firm organisational forms that cannot be observed or that have not yet been invented. Focusing on the constituent elements and their possible combinations, which leads to multiplicity, is a radical approach, which goes beyond observed forms.

I have thus taken a path along which it is not markets, hierarchies or networks that are discussed as governing systems, but which distinguishes between typical coordination mechanisms. These coordination mechanisms are themselves constructs that derive from its elements, a) the distribution of knowledge, b) the directions of communication and c) the decision-making characteristics. Therefore more room is given to the investigation of why inter-firm organisational forms are efficient or effective than to discussion on the advantages or failures in markets, bureaucracies and networks.

I have adopted an explanatory approach to expressing relationships between firms. I have defined the constituent elements of relationship types themselves as consequences of dependence relationships, which is closely related to the distribution of power. The classification of interdependencies, which was developed from theoretical contributions published during the last 50 years, is a useful roadmap for finding ways of characterising relationships between two or more firms. It is not the "*degree of commitment*" or the "*trust*" between actors that defines a relationship, but rather the "*need for the relationship*" and its characteristics.

The definition of boundaries in this study distinguishes between their different natures. It is based on their purpose at the firm and organisational level. Thompson (1967) defines the purpose of boundaries as to seal off the technical core. According to this view, the technical core is the sum of the constituent elements that provide competitiveness for the firm. Boundary-spanning units have been used in traditional literature on organisations to describe the connection a firm or organisation establishes with the outside environment. This traditional view does not allow for the distinction of the nature of these connections. In my study, boundary links between firms incorporate the opening up of their technical cores to other firms as a trade-off between protecting competitive advantage and capturing new productive opportunities, thereby creating new competitive advantages. This reflects the goal orientation of the firm and influences the goal orientation of the joint

inter-firm organisation, which in that case is seen as a long-term strategic organisation with major resource contributions and a risk-taking element in terms of spill-over effects.

I have taken into account the resource-based view, which emphasises the services that resources can render and the multiplicity they provide in terms of productive opportunities, rather than the resources themselves. Transferring the individual firm's resource services onto the larger picture of inter-firm organisation emphasises the potential for cooperation in terms of productive opportunities. This has certain implications for firms deciding on their future goals, regardless of whether their goal orientation is revolutionary or incremental.

The work system of inter-firm organisational constructs emphasises the systemic embedded nature of work systems in inter-firm organisations, rather than structure and process, in the quest for differentiation and integration. Issues such as centralisation reflect dimensions of power. Systemic coupling relates to the goal orientation of the inter-firm organisation. Complexity indicates choices between coordination mechanisms, and the value direction of work systems emphasises the interdependent nature of relationships. The work system of the inter-firm organisation relates to the firm's specialisation. It constitutes a major contribution to the technical core of the firm with its resource services that provide a multiplicity of productive opportunities. The firm's contribution to the inter-firm organisation is its specialised arrangement of resource services as a value addition to the work system.

The adaptive behaviour of the firm is behaviour that reflects the dynamic nature of the environment and how the firm approaches it. It is strongly related to its goal-setting attitude. The way changes in the environment are perceived, together with the goal-setting attitude, releases behaviour that produces proactive or reactive adaptation. Uncertainty perception is interpreted in terms of conclusions about future states. The opportunity-seeking firm with a revolutionary goal orientation defines its future state as an outcome of its own actions. Therefore proactive firms are likely to initiate alterations in relationships with aspects of its environment. The uncertainty-avoiding firm with incremental goal orientation interprets perceived uncertainties as the threat of unknown futures. Its behaviour is therefore reactive in targeting actions that help to secure and incrementally develop the status quo.

In sum, the overall biggest theoretical contribution of this study is to provide different new perspectives on why and how firms engage in inter-firm organisations. Each of the interconnected statements throughout this study could be understood as a proposition. The propositional construct creates a framework for the researcher to consider when he or she analyses aspects of inter-firm organisations. I have tried to use concepts that are well defined and,

in some sense, basic. Therefore the degree of misunderstanding of statements and their relationships should be low. The difficulty in the assessment and use of this framework is its complexity. As in most systemic studies, a number of cause-and-effect relationships are intertwined and the resulting complexity is challenging.

7.2.2 Theoretical Limitations and Suggestions for Further Research

Because all research has its limitations, I will point out only the most critical ones in this study. One is best described by Albert Einstein's dictum[19] that "*everything should be made as simple as possible, but not simpler*". This framework can be criticised for its lack of simplicity. The problem with complex concepts is that they are not easy to use and they may be unstable - meaning that they are prone to error. I wish to point out that my work has this clear weakness. Being aware of opening myself up to criticism, I have nevertheless engaged in the quest charted in this study. My reasoning lies in the fundamentals of systems theory and complexity theory. The world in which firms operate is no simple world. Social actors are interconnected. Causes in one social system can have effects in interconnected other social systems. The mechanisms of single cause-and-effect relationships could be assumed to be simple in a rational world. The world in which firms operate is not completely rational in the usual meaning of the word, however, and even if it were, there are too many possible effects in interconnected systems that are too difficult for human minds to process. Therefore there has to be a selection process, and some dimensions and elements are investigated on the understanding that they are incomplete or not the most significant.

Further, the framework presented is a construct of relationships[20]. A number of dimensions, elements and their natures have been taken into account. The method of deriving these could best be described by Popper's (1968) term the *psychology of knowledge*. Bergson (1932) calls the process of arriving at ideas "*creative intuition*". The selection of dimensions and elements could be viewed as an idea-generation process. This process of arriving at a picture of the world is therefore a deductive process (Einstein, 1934). This kind of approach always implies the danger of incompleteness and error. Constructive criticism concerning the choice of dimensions and

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[19] Albert Einstein's dictum is quoted in numerous publications. I have been unsuccessful in tracing the original source.

[20] As such, "a construct is an abstract form of concept which cannot be observed directly or indirectly but can be inferred by observable events" (Meredith, 1993).

elements and their interrelationships can therefore only improve this framework. One suggestion for further research arises from this criticism. Each statement in the framework concerning dimensions and elements and their relationship forms is open for improvement. Further effort needs to be invested in making operational certain aspects of this framework in order to make better use of it and eventually to test it. This would contribute to placing this approach on a higher theoretical level through a process of scientific iteration.

7.2.3 Contributions to Managerial Practice

This section discusses potential contributions my work may make to managerial practice in companies dealing with inter-firm organisations. My study concerns three different levels from the point of view of managers: (1) the internal nature of the firm, (2) the perception of the task environment, and (3) relationships between the firm and other firms. Further, it indicates how these different levels are interconnected.

As a starting point in this discussion I would like to point out the target group for which this study is potentially interesting. First, it is aimed at decision makers on corporate and business-unit levels together with the management of small and medium-sized firms. The most important management function is the setting of goals and the decision-making. Managers who define these as their roles could use this study to find their own position on the continuum of revolutionary and incremental goal setters. From that starting point, they could conduct an investigation into the uncertainty level of their own task environment, including the means of defining the origin of uncertainties. This framework provides decision makers with an analytical account of interrelationships between their firm's dependence on important aspects and actors in the environment. Further, it provides a map of possible solutions concerning how to exploit opportunities and avoid undesirable future states. Important aspects are treated in detail, which may help the decision maker to identify strategically important inter-firm organisational engagements and their systemic consequences for the firm.

The next targeted group of practitioners are designers of inter-firm organisations. Their role in the firm is to match its internal nature with the requirements of inter-firm organisations. For these managers, the dimensions of resource specificity, specialisation, the nature of boundaries and adaptive behaviour provide insights into identifying the profile of their firm. It is on the basis of this profile that conclusions about suitable partnerships on strategic and operational levels can be drawn. On offer are the analytical tools to

identify common goals, with all their consequences for the inter-firm organisation and for their own firm's future developments and limitations. The classification framework of interdependency types allows this group of managers to better understand the quality of their own and other contributors' needs in inter-firm organisations. This, in turn, supports common goal setting and a more informed choice of contributors to inter-firm organisations. The position of a firm on the map of interdependence could help it to identify a suitable mix of coordination mechanisms that offer effectiveness and efficiency. Such a choice is easily weighed up by taking into account a) the distribution of information or knowledge, b) the necessary modes of communication and c) the decision-making mechanisms required in order to achieve effective and efficient coordination in the inter-firm organisation. Moreover, managers dealing with the design of inter-firm organisations have a tool with which to analyse their firm's work system, and thus are able to set requirements for the design of common work systems. This framework is both a tool for analysing existing inter-firm relationships in order to make them into more effective and efficient organisations, and a tool for designing completely new forms of organisation between firms. As such, it can help to facilitate organisational innovations. The various suitable combinations of dimensions and elements are suitable starting points.

The framework is also of value to analysts investigating inter-firm relationships from an outside perspective. It allows the making of assumptions about formation rationales and provides the means of identifying the organisational forms used. One of the biggest advantages to this group is in the distinction it makes between strategic and operational forms of inter-firm organisation, and it provides a number of means to facilitate such investigations.

Another potentially interested managerial group comprises contract lawyers who could benefit from this study when designing contracts. Because contracts are constructs that capture the goal of inter-firm organisations, and are based on the relationship natures between firms, the implications of interdependency should be of great interest. Further, this group of managers themselves use a wide variety of different mechanisms of coordination in the contract-negotiation and -building processes. They will recognise the value in the constitutional elements of the coordination mechanisms, and in their implications in that context and for facilitating a contractual basis for efficient and effective coordination among firms.

The practical implications of my study apply to certain groups belonging to the regulator's administration. Competition authorities and anti-trust regulators could also benefit from this framework and the different view taken when they reconsider competition-related laws. The dependence structure of industries

and the possible solutions could be of benefit in the construction of competition law.

The international business manager could view this framework as a "*culture-free*" analytical tool when planning new international relations with other firms. Because it applies very basic concepts that are universal in terms of its constituent elements, it allows a higher degree of rationality in the design of inter-firm organisations in international environments. For instance, the definition of relationships between international firms based on dependence allows the identification of certain requirements, such as coordination mechanisms. From that point of departure, the international business manager can identify possible power-distribution questions and identify possibilities for the design of effective and efficient work organisations.

The marketing manager concerned with matching output with demand will find different aspects interesting. The systematic discussions of the ramifications of possible and suitable choices concerning interdependence types and strategic and operational implications could support the design of distribution channels. Demand and access to demand are viewed as resources per se in this study. For the marketing manager, this implies that certain services can be rendered based on these resources. It allows customers and even consumers to be considered more like potential partners in the creation of productive opportunities because they enter potential inter-firm organisations with an important necessary resource. This, in turn, has implications for marketing practice. The other side of the same coin is the purchasing manager, who can use the tools and views represented in this framework to develop new approaches to purchasing.

Overall, this study makes a contribution in enabling managers to better understand the interrelationships between the nature of their firm, the environment in which it is embedded, and the solutions and practices of inter-firm organisations, all of which are open to organisational innovation. It provides a dynamic and complexity-based perspective on the outside dependence of the firm and on the attitudes that create these perceptions. The framework is a cookery book with a number of recipes, but should be understood as a basis of choice, possibilities and directions for organisational and managerial solutions and developments.

There are signs in managerial practice that an approach such as the one taken here is gaining in popularity. The global consulting firm McKinsey (2002) has aspirations to develop frameworks that give their consulting clients insights into industries and markets that go beyond traditional tools such as "*structure, conduct and performance*" and "*Porter's Five Forces*". Their "*Strategy Theory Initiative*" explicitly addresses uncertainty and dynamism as central concepts in strategic management. McKinsey calls for a complexity-

based microeconomic model that ought to differ from traditional models in three critical ways: (1) in its dynamism, (2) in following evolutionary principles, and (3) by providing a basis for a realistic model of how humans make decisions. Judging by McKinsey's criteria for a good strategy model, the approach taken here is a good point of departure. This study includes dynamic open systems, which are composed of many individual pieces that constitute what is known as "*emergent self-organisations*". The effect of arriving at concepts for "complex-adaptive systems" is evident throughout.

7.2.4 Limitations for Managerial Practice

Nevertheless, even with the support of a very academic type of global consulting firm, there are limitations in the applications of the current stage of this conceptual framework for managers. The aim of this study is an academic one. Therefore the style and the way it is worded reflect academic criteria more than the needs or requirements of acceptable business literature. The focus is on a holistic framework that fails to address the specific target audiences of business literature. The complexity with which it confronts the reader is a limitation for managers with time and capacity constraints. As mentioned above, more simple approaches are easier to directly implement and are less prone to error. Managers would probably therefore avoid the direct application of such a framework in this form.

Another difficulty for managers related to complexity and time constraints is that this work needs intensive consideration of the conceptual interrelationships, otherwise the potential solutions are inaccessible. Managers would rather live with a problem they understand than with a solution they do not understand.

To conform to standards of business literature this study should be rewritten and a more problem-solution-based approach should be taken. That would require the kind of provision of recipes I, as an academic, have tried to avoid.

SUMMARY

This study was conducted against the background of increasingly globally interconnected economies with ever more sophisticated technological means of interaction and connectivity between firms. In this complex setting, firms attempt to survive and grow by means of effective and efficient connections in diverse forms of inter-firm organisations.

Existing theories and frameworks in diverse organisational and business disciplines provide different approaches to understanding and explaining why and how firms facilitate economic activity between each other. The diversification of research activities has lead to a high degree of fragmentation among schools of thought in recent decades. This study is an attempt to follow calls by different researchers to contribute to the re-integration of concepts that concern organisational and business science. In accordance with this approach, strong emphasis is placed on creating frameworks that focus on the multiplicity of rationales in the field of inter-organisational studies. It is through the use of conceptual deductive methods that logical frameworks of statements are provided in an attempt to satisfy departure in a new direction of inter-organisational research. These frameworks have been constructed to go beyond observation to create space for organisational solutions that cannot be observed directly, or that have not yet been invented in practice. To make the task of the reader easier, some empirical examples are introduced in order to illustrate different constellations with a lower level of abstraction. The guiding philosophical ideas stem to a great extent from complexity theory. This choice was made in order to create a systemic view that facilitates the answering of the research questions that provided the focus for this research.

The research questions deal with a multiplicity of inter-firm organisational formation rationales, and with the diversity of inter-firm organisational forms that result. These are questions that interest researchers who are hungry for holistic explanations of why firms join organisations with other firms, and of the possible organisational solutions that facilitate economic activity between firms. The subject matter is also of interest to managers who are searching for explanations and solutions that support their striving for effectiveness and efficiency in inter-firm organisational activity. Hence, the research objective is to provide a systemic view that integrates inter-firm organisational formation rationales with possible organisational solutions.

This quest is organised in this study by making three divisions designed to make such an analysis operational. The three different blocks and their interrelationships are organised according to the following levels of investigation:

(1) The organisational environment
(2) The firm's internal nature
(3) The nature of the inter-firm organisation.

The environment of the firm is investigated by analysing structural characteristics and the nature of the relationships among the actors in a given task environment. The core concept of this investigation is uncertainty. Uncertainty is created on different levels by certain constellations of structural and relationship-based realities, which are discussed in Chapter three.

The sense making of this uncertainty leads to the second organisational block of the study. Chapter 4 considers the firm's internal nature in terms of five dimensions. The sense making of uncertainties is seen as being directly connected to the goal-setting function. Together with the remaining dimensions of its nature, a multitude of rationales behind the inter-firm organisational formation of the embedded firm is discussed in Chapter five.

The rationale behind inter-firm organisation determines its form and formation. This is the postulate discussed in Chapter six. By organising five selected dimensions of inter-firm organisation a taxonomic framework was established that facilitates the understanding and ordering of different forms of economic activity.

Systematically creating linkages between the different dimensions and their elements satisfies the complexity view taken in this study. This systematic organisation of dimensions and elements provides its main contribution. The overall framework could be seen as a conceptual map of formation rationales for inter-firm organisation and of the resulting organisational solutions. It offers the researcher the chance to position his or her own work in an overall interconnected and re-integrated systemic framework that takes into account the embedded firm's actions. It could further be used to engage in the empirical testing and development of a classification of inter-firm organisations.

Decision makers in firms and designers of inter-firm organisations could also use this framework to better understand the origins and consequences of organisational choices. Further, it provides support for organisational development. The theoretical and the managerial contributions of the study are discussed in Chapter seven.

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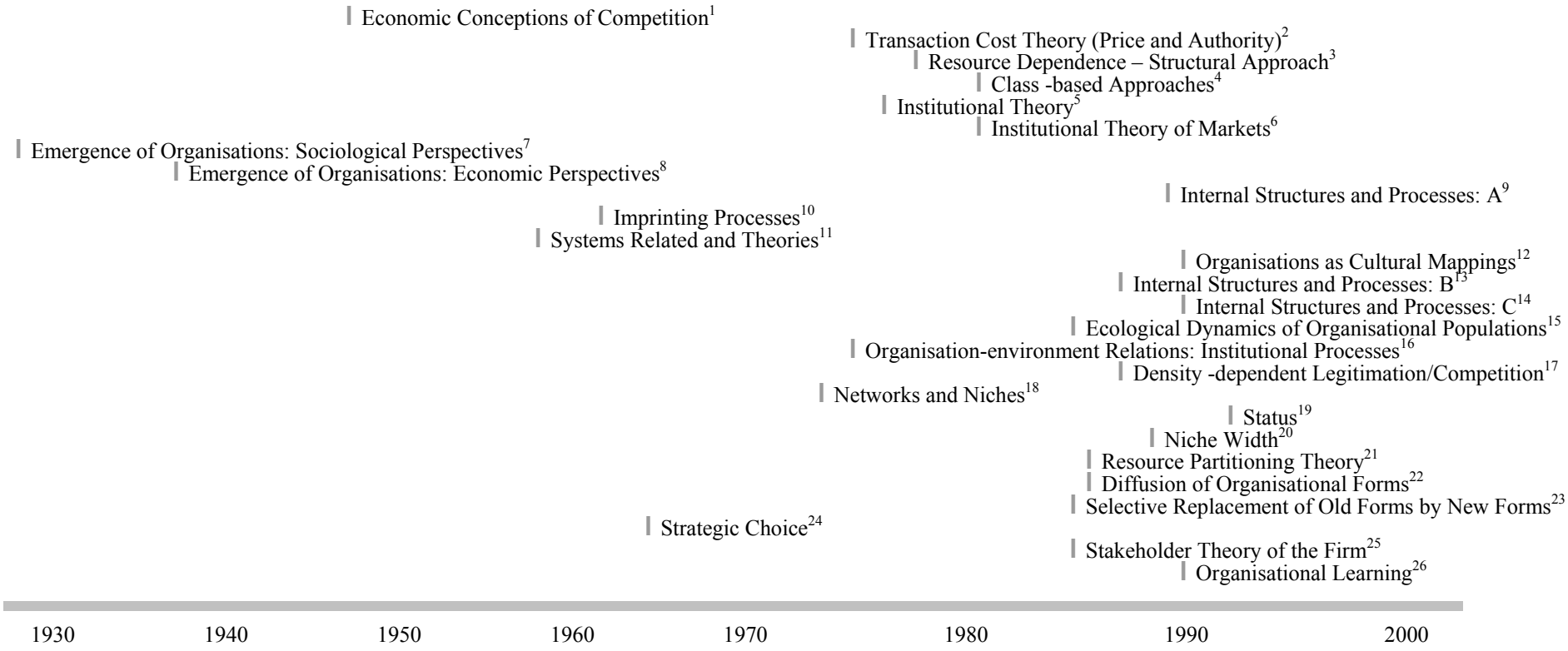
APPENDIX 1: AN OVERVIEW OF CONTRIBUTIONS IN THEORIES OF INTER-FIRM ORGANISATION



[1] E.g., Hayek (1949), Chandler (1962).
[2] E.g., Williamson (1975), Hennart (1988), Pisano (1990), Kreps (1990), Madhok and Tallman (1998).
[3] E.g., Pfeffer and Salancik (1978), Backer (1990), Sinha and Cusumano (1991), Deeds and Hill (1996), Bartholomew (1997), Das and Teng (1998), Das, Sen and Sengupta (1998).
[4] E.g., Glassberg (1981), Palmer (1983), Pfeffer (1987).
[5] E.g., Meyer and Rowan (1977), Camerer (1988), Baum and Oliver (1991), Powell and DiMaggio (1991), Haunschild (1993).
[6] E.g., White (1981), Leifer and White (1987).
[7] E.g., Weber (1922), Stinchcombe (1965).
[8] E.g., Coase (1937), Williamson (1981), Hart (1989).
[9] Internal Structures and Processes: Rational Choice Formulations: e.g., Coleman (1990).
[10] E.g., Stinchcombe (1965), Hannan, Burton and Baron (1996).
[11] E.g., Rosenbluth and Wiener (1943), Simon (1961), Thompson (1967), Bechtold 1997).
[12] E.g., Sutton and Dobbin (1996).
[13] Internal Structures and Processes: Network Formulations: e.g., Barley (1990).
[14] Internal Structures and Processes: Network Formulations: e.g., Barley (1990).
[15] E.g., Carroll (1985).
[16] E.g., Meyer and Rowan (1977), DiMaggio and Powell (1983), Hannan and Freeman (1989).
[17] E.g., Hannan and Freeman (1989).
[18] E.g., Hannan and Freeman (1989).
[19] E.g., Hannan and Freeman (1989).
[20] E.g., Hannan and Freeman (1989).
[21] E.g., Carroll (1986), Pfeffer (1997), Swaminathan (1995).
[22] E.g., Baron, Dobbin and Jennings (1986), Meyer (1992), Haunschild (1993).
[23] E.g., Hannan and Freeman (1984), Barnett and Carroll (1995).
[24] E.g., Backman (1965), Galbraith (1967), Berg and Friedman (1977), Harrigan (1988), Powell (1990).
[25] E.g., Freeman (1984), Jarillo (1988), Lorenzoni and Ornati (1988), Harrison and St. John (1996).
[2626] E.g., Hamel (1991), Doz (1996), Lane and Lubatkin (1998).

APPENDIX 2: TAXONOMIC CHOICES

Chapter six describes the methodological choice behind the taxonomic method derived from essentialism. This appendix examines taxonomic choices in more depth in order to generate an explanation and to embed it into the larger field of classification and organisational systematics. This is considered important because taxonomy in the field of business research is little discussed even though it is widely applied, especially in the form of typologies.

Schwab's (1960) elaboration on the *principles of enquiry* distinguishes between five main principles. (1) The *reductive principle* is the scientist's search for an explanation of the behaviour of an object by studying the nature of its constituent elements. (2) The *holistic principle* rejects the idea that phenomena can be explained solely by the analysis of its constituent elements. This principle emphasises interdependencies between elements in a system, which provide reciprocal causal flows. The focus is on the relationships among the elements themselves and between the parts and the whole. The systems view as applied by Buckley (1967) is an example of the use of this approach. (3) The *rational principle* suggests that the researcher should seek to explain the behaviour of an object by looking outward to the larger system or environment in which it is embedded. (4) The *anti-principle* is based on the rationale that the scientist avoids accepting and being guided by any theories or hypotheses, and tries to "let the facts decide". Hume's[1] claim, initially discussed in Chapter one, that "*every observation is theory-laden*", offers a strong critique of this method of enquiry. (5) The *primitive principle* is to some extent an opportunistic approach, which is guided by the problems and norms of the scientific community in guiding scientific inquiry. It could be seen as opportunistic because the research subject could at times be based on the rationale of what is being funded.

Nevertheless, a mixture of principles of enquiry can be found in most studies McKelvey (1982). My current approach is a mixture of the first three. First, I attempt to understand each of the *a priori* selected elements ascribed to the reductive principle. Second, I analyse the interrelationships of these elements in a system that is supported by the holistic principle. Third, the rational principle applies in my efforts to find explanations of how interrelated elements within one system affect and are affected by the larger system in which it is embedded.

A closer look at the variety of taxonomic methods may explain my choices. Taxonomy as the "science of classification" (Hempel, 1965) has long been

[1] See Popper (1968).

used, especially in different natural sciences. The goal of taxonomic systems is to compose a general classification. According to Jeffrey (1968), "A *general classification attempts to group objects together on the basis of all their attributes*", although some attributes may be weighted more heavily than others (McKelvey, 1982). Such general classifications are found in chemistry in the *table of elements,* for instance. Nevertheless, there appears to be disagreement among different contributors in methodological comparisons about the predictability of classifications. While McKelvey (1982) sees them as being broadly predictive and as such high in explanatory power, Meredith (1993) ascribes a mostly descriptive character to them. I agree with McKelvey's view, which is justified in the mixture of principles of enquiry mentioned above.

Mayr (1969) identifies five distinct taxonomic theories through a review of the history of zoology[2]: (1) essentialism; (2) nominalism; (3) empiricism; (4) evolutionism; and (5) cladism.

Essentialism, which is also termed the classical approach, brings out well-known classifications in the form of typologies (Hull, 1965). Hull (1974) describes Aristotle's view that "*three things can be known about any entity – its essence, its definition and its name*". Essentialists adhere to a conjunctive form of definition wherein species are "*explicitly defined if and only if a set of properties can be given such that each property is severally necessary and the entire set of necessary properties is jointly sufficient*" (Hull, 1965). Thus, objects are treated as analysable entities, which also indicates that essentialists deal with natural objects as opposed to artificial ones, which are also included in the nominalist theory of taxonomy. Therefore objects can be traced back to some essence – its definition. Another important feature of the essentialist theory of taxonomy is the concentration on the *a priori weighting* of relatively few characteristics. The results of essentialist classifications are *monothetic* groups. Rigid and successive logical divisions form these groups so that the possession of a unique set of features is both sufficient and necessary for membership in the group thus defined (Sneath and Sokal, 1973). Therefore all members of a group must possess all of the attributes used to define it. Scientists engaged in organisational theory and business research generally use essentialist or typological methods[3]. The greatest criticism of the essentialist approach is that it can be applied to unanalysable entities, those that cannot be

[2] Other sciences such as chemistry agreed early on to adopt one taxonomy, while the biological sciences have not reached agreement in two centuries on which theory to apply as a standard for classification.

[3] Examples include Katz and Kahn 1966, Thompson 1967, Meyer 1977, Etzioni 1975, Mintzberg 1979.

predicted from an essential definition or from the pattern of a few characteristics (McKelvey, 1982).

The second theory of classification is *Nominalism*. The basic argument is that only individual objects exist; there is no difference between classifying living and inanimate objects, and all groupings of objects are artefacts of the human mind. This approach does not attempt to explain why certain forms developed in nature, in fact they do not even recognise that such groupings exist (McKelvey, 1982). Classifications are merely instruments for scientists because classes are an activity of reason, which serve a purpose[4].

The third group of theories is based on *empiricism*, also referred to as (numerical) phenetics or numerical taxonomy[5]. The most important difference between empiricism and nominalism is the fact that only natural occurrences are classified. Therefore only observable forms can be considered. I also see this to some extent as a limitation in organisational and business research because it is not entirely clear how far organisations are natural occurrences and not constructs of the human mind.

The other limitation a purely empiricist approach arguably implies is that only observable organisational forms can form classes. Such a belief completely extinguishes the possibility of generating organisational innovations because they require managers or entrepreneurs to imagine new ways of organising rather than to imitate the characteristics of other classes. Therefore a strictly empiricist approach has limitations in providing guidelines for the practitioner to develop organisational innovations.

A major difference between empiricism and essentialism is the absence of the a priori weighting used in essentialism. The principle in empiricism is to take all characters into account with equal weighting. A related question concerns the extent to which the researcher can know all the characteristics. This has also been one prominent problem in biology prior to the discovery of deoxyribonucleotide-acid (DNA). What is the smallest distinguishable characteristic in the organisational context? Even if we break organisations down into such parts, we run into another problem. How can we deal with such computational complexity? If that challenge requires sophisticated computers, what is the value of such classifications? Another related issue is that of dynamism in organisations. If we create a general taxonomic theory of organisations, how can this be applied to real organisations? Organisations are dynamic and can change in a very short time to belong to an entirely different class. These are also challenges that the empiricist approach shares with the

[4] Cf. the discussion in Chapter one about *ideal types,* and see Hempel's (1965) discussion about taxonomic methods.

[5] These terms are not synonymous. They refer to slightly different approaches, all based on empiricist principles.

next one, the evolutionary approach. If one important goal of business and organisational research is to develop concepts that provide insights, understanding and tools for practitioners, then the question arises as to how far a classification can help in achieving such a goal. I consider the empiricist taxonomy somewhat weaker than essentialist taxonomies in that respect because it might create too much confusion for practitioners. By way of contrast, an essentialist approach underlines characteristics that are perceived to be important. Similarly, I single out five dimensions of inter-firm organisation, which a priori I define as crucial distinguishing factors that can help to promote understanding of the nature of different inter-firm organisational forms.

The fourth taxonomic approach leans on the principles of *evolution* theory (Darwin, 1859), also known as the *phyletic* or *cladism* approach among taxonomists[6]. The target is a classification scheme that A) classifies objects according to readily delimitable groups of species and B) explains why objects came into existence and why in a certain form (McKelvey, 1982). Character similarity alone is not sufficient. The phyletic approach is in accordance with essentialism and phenetics in that only natural groupings exist. It is the only approach that attempts to explain the origin of groupings as well as to classify forms. The Darwin-Wallace theory, which is well known, states one of the principal laws of this approach. "*Only those organisms well adapted to their particular habitat will survive in the long run. Organismic diversity reflects environmental diversity*" (Darwin-Wallace, 1858). The difference between the phenetic and the phyletic approaches in their groupings is based on a difference in affinity. While phenetics bases group membership on empirical similarity, phyletic grouping uses as its main principles "belonging to a group based on (1) a number of characteristics (*patristic affinity*) to a common ancestor or (2) the recency of descent without taking into account the number of common characteristics (*cladistic affinity*)"[7]. One of the main criticisms of these taxonomic practices is the high degree of subjectivity and absence of sufficient data. This, in turn, leads to heterogeneous classes.

One criticism I see with evolutionism is that an organisation shares many commonalities with biological systems, but unlike living objects, organisations are constructs of human activity. Therefore the philosophical question arises whether organisations per se are natural or artificial. I do not intend to go into this discussion, and will rely more on a perception approach. Thus I assume that organisations must be artificial to some extent, and that leads to a conflict

[6] These terms are not synonymous but are different approaches within the same mindset and follow the same basic scientific laws.
[7] McKelvey (1982) discusses these differences in great depth.

with evolutionism, which admits only natural occurrences. A logical example that is in conflict with evolutionism is the assumption that organisations can change from one form to another without following an evolutionary route. If such an evolutionary route existed, then there would be little space for disruptive organisational change. While phyletic approaches encompassing patristic affinity do not consider this at all, there is some space for implementation in the cladistic approach. The rationale for that is that cladism allows grouping based on belonging to a recent ancestor.

Allow me to return to the discussion on the principles of enquiry, and to connect these to different taxonomic theories. McKelvey (1982) provides a table of relationships between these approaches. According to him, essentialism requires a reductive principle, evolutionism follows the rational principle, empiricism is in compliance with the anti-principle, and Nominalism largely follows the primitive principle (Schwab, 1960). The only one left is the holistic principle, which cannot be clearly related to any theory of classification. As a matter of fact, it has been criticised as a classification principle, for instance by Pinder and Moore (1979), on the grounds of theoretic parsimony.

I applied a mixture of principles in order to combine the best of many approaches. The reductive principle, which is widely applied by essentialist scientists, provides valuable explanations of the constituent elements. In order to bring these into the larger systemic picture of interdependencies between these elements, a great deal of effort was devoted to building relationships among the constituent elements. This, in turn, follows the principles of holism. The rational principle was applied in drawing the ties of the system in question to the larger environment in which it is embedded. This principle is followed by evolutionism in taxonomic theories. The result is a combined methodological approach to the classification of inter-firm organisations. This combined approach has the following features.

A priori weighting is used to reduce complexity on the one hand and to concentrate on issues that are considered most important in practice on the other. This approach could be criticised on the grounds of subjectivity, but so could any scientific proposition, hypothesis or theory[8]. The main emphasis is on the use of characteristics that provide a high level of explanatory power, and on disregarding others that might be important, but not to the same extent[9]. This issue also refers to *classification intent*, which gives a great deal

[8] Cf. Bergson (1932), Einstein (1934); Popper (1968) concerning the psychology of knowledge.

[9] For instance, in this study I pay little attention to organisational culture, an important issue recognised by many authors, e.g., Edgar Schein (1985), but considered here as a function of coordination.

of attention to explanatory factors in order to provide tools for analysis and development for managers[10].

The rationale principle as a driver is reflected in this classificatory attempt by creating linkages of class origins. A number of possible combinations of groups are disregarded based on logical misfit. The same practice is observed in cladism, which searches for common ancestors in order to explain group membership along an evolutionary path. My hesitation in completely subscribing to cladism lies in the exclusion of objects that are not found by observation. Organisational solutions that are not in existence yet, but which exist as a "strategic plan" in the entrepreneur's or manager's mind, cannot be captured by such methods because of the exclusion of artificial objects. Therefore this approach owes something to Nominalism, in that it acknowledges that organisational constructs are also products of the human mind, especially before they are implemented – which does not prevent them from creating real effects.

In sum, the taxonomic method used in this study is a combination of the beneficial components of essentialism, holism, cladism and, to some extent, Nominalism. Nevertheless I use the expression essentialist taxonomy because the most critical characteristic is arguably the *a priori weighting* of characteristics of inter-firm organisational forms.

[10] The reasoning in this paragraph subscribes to the essentialist approach.