NIELS VAN DER WEERDT

Organizational Flexibility for Hypercompetitive Markets

Empirical Evidence of the Composition and Context Specificity of Dynamic Capabilities and Organization Design Parameters

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De Flexibiliteit van Organisaties in Hypercompetitieve Markten

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to
Rosalie Engeline
infinite promise of joy

Preface

Since I joined the Department of Strategy and Business Environment in August 2002 I've been teaching about strategy to very ambitious students and studying intellectual questions with extremely intelligent colleagues. Besides highly enjoyable on a day to day basis, I find this to be a very fulfilling profession and I'm grateful for the commitment of all these people.

From the start it has been a personal ambition to demonstrate my academic craftsmanship with a dissertation and 'get my PhD from the Rotterdam School of Management at Erasmus University'. The recognition expressed by this title makes me pride and completes a phase in my professional life. I'm so grateful to the people that made this possible, indirectly as intimate supporters or directly working side by side with me on this project.

Although the opportunity to express my gratitude by dedicating this dissertation to one of them is tempting, I keep myself to saying thank you! from the bottom of my heart. To my parents and brothers, my beloved friends in Oostzaan and Rotterdam, and my two partners in this endeavour at the Department.

Niels van der Weerdt

Rotterdam, May 2009

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1 Introduction

In a world that becomes ever more competitive (Wiggins and Ruefli 2005), the importance of developing a firm level capacity to act, react and evolve with markets becomes paramount. Such a capacity is often labelled 'organizational flexibility' (Volberda 1996) and the body of literature on flexibility reflects the importance attributed to this concept by scholars and practitioners. Measurement and analysis of organizational flexibility, however, has been cumbersome, limiting the development and testing of theory in several ways (Suarez et al 2003, Johnson et al. 2003; Dreyer and Grønhaug 2004).

1.1 Organizational Flexibility

For several decades a variety of scholars have described or documented increasing levels of competition in the business context (e.g. Lawrence and Lorsch 1969, D'Aveni 1994, Bettis and Hitt 1995, Kraatz and Zajac 2001, McNamara et al. 2003, Wiggins and Ruefli 2005) and particularly, D'Aveni's notion of hypercompetition has become quite popular in scholarly and managerial literature. Hypercompetitive environments show discontinuous change, with competitors acting boldly and aggressively to disrupt the status quo and severe penalties for firms failing to respond appropriately. Such conditions have been found in a variety of industries and geographical regions: from the UK banking sector (Scott and Walsham 1998) to remote regions in Scandinavia (Hanssen-Bauer and Snow 1996) and from the Canadian cola market (Nath and Newell 1998) to the Japanese beer market (Craig 1996) and the European mobile phone industry (Vilkamo and Teil 2003).

To survive in such turbulent environments - where competitive advantages can be nullified rapidly - firms need to develop and deploy various kinds of dynamic capabilities. Capabilities that result in first-order changes to the

organization and processes to deal with demand volatility, but particularly higher-order capabilities that enable fast reconfiguration of the resource base (Helfat et al. 2007, Eisenhardt and Martin 2000, Teece et al. 1997), changing the nature of activities (Aaker and Mascarenhas 1984), or dismantling of current strategies (Harrigan 1985). These requirements also pose rather strong demands on the organizational foundations in which such dynamic capabilities have to be developed and deployed (Volberda 1996, 1998, Teece 2007). The concept of organizational flexibility integrates the external dimension of a dynamic business context with the internal dimensions of adaptive managerial capabilities and the organization design parameters enabling effective implementation and deployment of capabilities (cf. Volberda 1998).

Management literature stresses the complex nature and multifaceted structure of organizational flexibility (e.g. Ansoff and Brandenburg 1971, Carlsson 1989, Volberda 1996, Teece et al. 1997, De Toni and Tonchia 2005), yet few empirical studies account for such complexity (Dreyer and Grønhaug 2004).

Furthermore, in spite of the assumed context specificity of flexible and dynamic capabilities (Volberda 1996, Eisenhardt and Martin 2000, Newbert 2007, Brouthers et al. 2008) and repeated calls for more research on the performance consequences of organizational flexibility (e.g. Bettis and Hitt 1995, Hitt 1998, Johnson et al. 2003), literature is still awaiting straightforward testing of models explicating relationships between flexible capabilities, environmental turbulence and firm performance (Suárez et al. 2003).

Other questions related to organizational flexibility remain unresolved. How does firm size affect organizational flexibility? Although many agree that firm size is a critical variable moderating the relationship between strategy and performance (Hofer 1975, Smith et al. 1989, Chen and Hambrick 1995, Donaldson 2001, Dobrev and Carroll 2003), literature is inconclusive on the theoretical quandary of whether firm size is a source of inertia or a source of resources for

strategic flexibility (Rajagopalan and Spreitzer 1997, Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007) and empirical evidence is scant or applying partial perspectives on the complex concept of organizational flexibility (Dean et al. 1998).

And, what criteria do successful firms use regarding appropriate flexibility strategies and organizational design? Do they strive to continuously adjust specific organization variables to specific elements in the task environment, as contingency theory holds (cf. Drazin and Van de Ven 1985, Venkatraman 1989, Donaldson 2001)? Or are firms conforming to the institutional pressures of the business environment and is firm performance a consequence of legitimacy and institutional fit (cf. DiMaggio and Powell 1983, Zucker 1987, Kondra and Hinings 1998, Scott 2001)?

1.2 Research Aim and Questions

The present research project aims to contribute to the academic knowledge base and move theorizing in strategic management literature with respect to organizational flexibility towards maturity.

Researchers have addressed the multidimensional character of organizational flexibility in a number of conceptual works and a limited number of large-scale, cross-sectional empirical studies (see Table 1.1). Some of these studies identify variables and specify the relationships between most of them, yet comprehensive modelling of a multidimensional set of variables and consequent testing of such a model remains a challenge. This is partly due to the absence of an empirically validated set of observables that allows objective observation and analysis of these relationships. Other research challenges concern the inclusion of mediating and moderating variables and the specification of strategic alignment (fit).

Table 1.1 Research findings and challenges regarding organizational flexibility

Topic	Prior research	Research challenges
Dimensions of organizational flexibility and structural relationships	– Eppink (1978): change can be operational, competitive, or strategic and there are distinct types of flexibility for each type of change *which minimize the vulnerability of organizations and their ability to respond*. – Volberda (1991, 1996): flexibility is derived from the repertoire of managerial capabilities and the responsiveness of the organization. – Sanchez (1995, 2004): organizational adaptation requires coordination flexibility and resource flexibility; five modes of competences reflect hierarchy of flexible capabilities. – Dreyer and Grønhaug (2004): different types of flexibility, e.g. supply, production, and product assortment, and different balanced forms of flexibility *required to cope in uncertain turbulent environments*. – Anand and Ward (2004): mobility and range flexibility are part of different types of manufacturing flexibility and flexibility is *a stronger predictor of performance in more dynamic environments*. – Verdú-Jover et al. (2005): different levels of flexibility and fit between real flexibility and that *required by the environment* have a positive impact on innovative capacity. – Hatum and Pettigrew (2006): centralization and formalization, institutional embeddedness, environmental scanning, and organizational identity determine organizational flexibility.	Comprehensive modelling of structural relations between variables. . Large scale empirical test of model and core propositions.
Context specificity of flexible capabilities	– Eppink (1978): see above in italics. – Evans (1991): proposes strategic flexibility as an expedient capability for managing capricious settings. – Volberda (1991, 1998): the sufficiency of the flexibility mix and the adequacy of organization design must be continuously matched with the degree of environmental turbulence. – Worren et al. (2002): empirical linkages between strategic flexibility in product competition and the market context. – Dreyer and Grønhaug (2004): see above in italics. – Anand and Ward (2004): see above in italics. – Verdú-Jover et al. (2005): see above in italics. – Nadkarni and Narayanan (2007): positive empirical relationship between strategic flexibility and performance in fast-clock speed industries.	Accounting for context specificity at firm level and multidimension ality in environmental turbulence in large scale tests.
Interaction of firm size with organizational flexibility	– Fiegenbaum and Karnani (1991): small firms trade cost inefficiency with volume flexibility, which is more viable in volatile industries. – Haveman (1993): large organizations are more capable of taking advantage of the opportunities to enter new and promising markets.	Inconclusive findings on nature of relationship.

Topic	Prior research	Research challenges
	– Rajagapolan and Spreitzer (1997): whether firm size is a source of inertia or a source of resources for strategic flexibility remains unanswered. – Majumdar (2000): in a dynamic setting large size does not necessarily influence negative performance. – Kraatz and Zajac (2001): research should acknowledge organizations differ substantially in their resource endowments, and attempt to measure and examine the effects of these important differences. – Ebben and Johnson (2005): small firms should not mix efficiency and flexibility strategies. – Bercovitz and Mitchell (2007): literature lacks a conceptual understanding of the underlying benefits of business size for long-term survival	Recognizing variance in strategy implementation in large scale tests. Incorporating performance consequences of strategic flexibility in large scale tests.

A first aim of the present study is to establish the validity of some core propositions regarding the composition of organizational flexibility, context specificity and performance consequences. These propositions have been developed in literature to some extent, but lack empirical support. Establishing the validity of a theory's core propositions may move the theorizing in a literature toward maturity and is important for further theory building in general. This applies to management in particular because some of the most intuitive theories introduced in the literature wind up being unsupported by empirical research (Miner 1984, Colquitt and Zapata-Phelan 2007).

Context specificity of organizational flexibility has been studied by various authors and some have indeed applied large scale quantitative analysis to test hypotheses (e.g. Nadkarni and Narayanan 2007: n = 225, Verdu Jover et al. 2005: n = 417, and Anand and Ward 2004: n = 101). Notwithstanding the individual merits of these studies, large scale empirical tests of models taking into account context specificity and multidimensionality in environmental turbulence are absent in literature.

A second aim of the present study is to refine and expand academic knowledge by exploring and testing moderating factors and investigating strategic fit and the performance consequences of organizational flexibility. Existing literature foregoes the complex nature of flexibility when touching on the interaction between firm size and organizational flexibility. Partial or oversimplified perspectives of flexibility may cause findings to be misinterpreted and explain the existence of contradicting positions in literature. That points to a gap in the literature with respect to the true relationship between firm size and organizational flexibility, a gap this study intends to fill. Further, the existence of multiple, perhaps mutually exclusive approaches to congruency or strategic fit lead to different and often conflicting predictions of firm performance. Attempting to integrate these perspectives may prove fruitful because neither perspective can

explain the success of organizational behaviour in its own right.

To conclude: *the central aim of the present study is to enhance the validity and comprehensiveness of organizational flexibility theory by structurally measuring and analyzing the components of a comprehensive framework within a large sample of firms*.

1.3 Research Strategy

To achieve this aim we conduct a series of hypothetic-deductive studies. Hypothetic deductive studies are appropriate to investigate the topic of organizational flexibility as a substantive body of literature exists. Hypotheses can therefore be grounded with existing theories, models and conceptual arguments and formally tested. Applying multiple perspectives on the central concept under investigation in different studies by varying the focus on different dependent variables increases our understanding of complex phenomena. However, pluralism for the sake of pluralism might lead to different insights without linking findings to one another. The studies therefore all share common concepts, as Figure 1.1 illustrates.

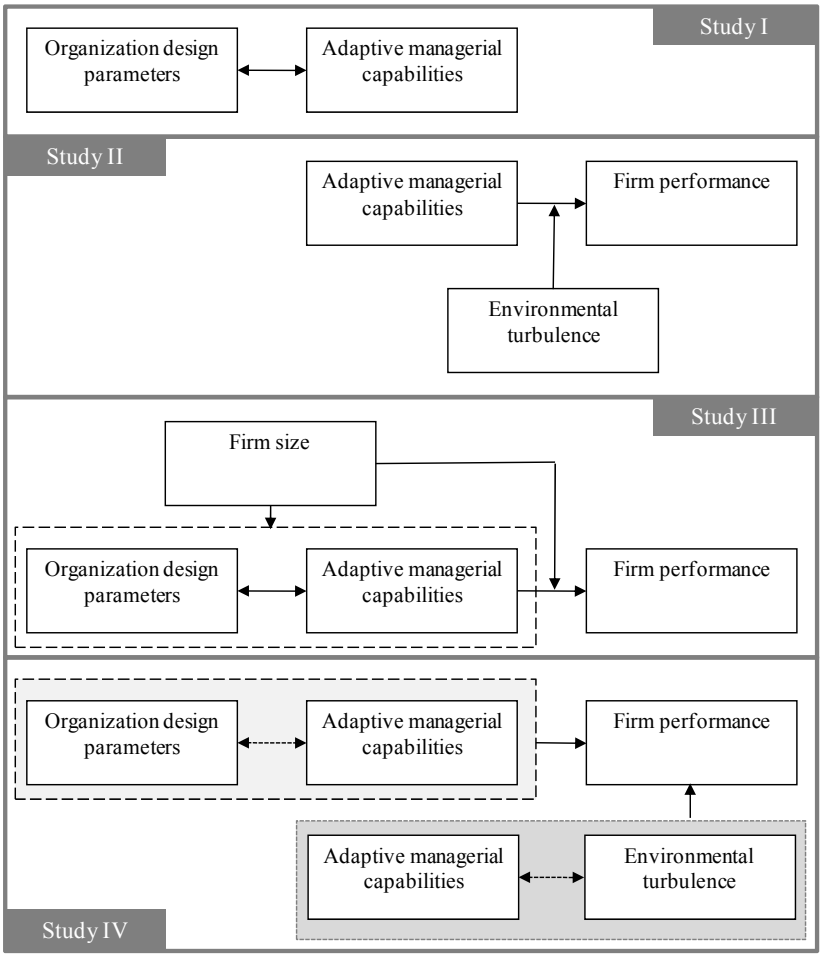

Figure 1.1 Four different perspectives on organizational flexibility and their commonalities in the variables under investigation

A first step is to clarify the meaning and validity of the concept of interest, organizational flexibility, in a nomological network (cf. Cronbach and Meehl 1955). This requires a model that represents the dimensions of organizational flexibility, the observable manifestations of these dimensions, and the interrelationships among and between them. Having established such a model, a

second step involves the introduction of a performance criterion and factors that moderate performance effects. Effects of organizational flexibility manifest themselves at firm level, so firm performance acts as the dependent variable in the extended model. Further, the second step involves the introduction of multiple moderating variables to account for context specificity and the complex nature of environmental turbulence (cf. Khandwalla 1977, Babürogly 1988, Volberda et al. 1997). Figure 1.1 shows the preliminary conceptual models of these first two steps, which will be approached in two separate studies.

These first two steps should provide a comprehensive and validated model that enables introducing additional mediating factors. As argued before, an important factor assumed to affect organizational flexibility is firm size. In a third study, therefore, firm size is introduced as an independent variable affecting dimensions of organizational flexibility and moderating on the performance consequences of organizational flexibility.

Further, once both internal and external dimensions of organizational flexibility have been established and modelled, different approaches to strategic alignment or 'fit' can be operationalized and the predictive power of resulting models with respect to the dependent 'firm performance' can be compared. The fourth study compares a contingency fit-based model, including environmental turbulence as a contingency factor, with an institutional fit-based model focusing on internal fit.

The hypotheses of these studies will be tested empirically on a large cross-sectional database. Primary data will be collected from a representative sample of firms and non-profit organizations using a self-administered survey. Collecting data, in some instances, from multiple respondents within a firm will allow us to test the interrater reliability and interrater agreement scores. The survey instrument will measure variables using perceptive measures, which will be complemented with archival measures when possible to prevent common method bias.

Survey items are drawn from existing literature as much as possible and validated qualitatively and quantitatively. Hypotheses will be analyzed using factor analysis, regression analysis and structural equation modelling as appropriate.

To summarize:

- Study I develops and validates a nomological net of organizational flexibility, linking variables to each other and a set of observables;
- Study II defines and empirically tests external factors that moderate the performance consequences of organizational flexibility;
- Study III introduces a new perspective on the mediating factors that relate firm size to organizational flexibility and on the performance consequences for small and large firms;
- Study IV demonstrates the predictive capacity of existing notions of strategic fit and their interaction.

As such, Study I should provide a validated and sufficiently refined model to investigate the consequences of organizational flexibility under different environmental conditions in Study II. Studies I and II should provide the factors required to examine the relationship between firm size and organizational flexibility and the competitive context in which small and large firms' flexibility prevail (Study III). Having established the internal and external dimensions of organizational flexibility also allows examining different notions of fit in Study IV. Figure 1.2 visualizes the interdependencies between these separate studies in yet another way. Next, each study is introduced in more detail.

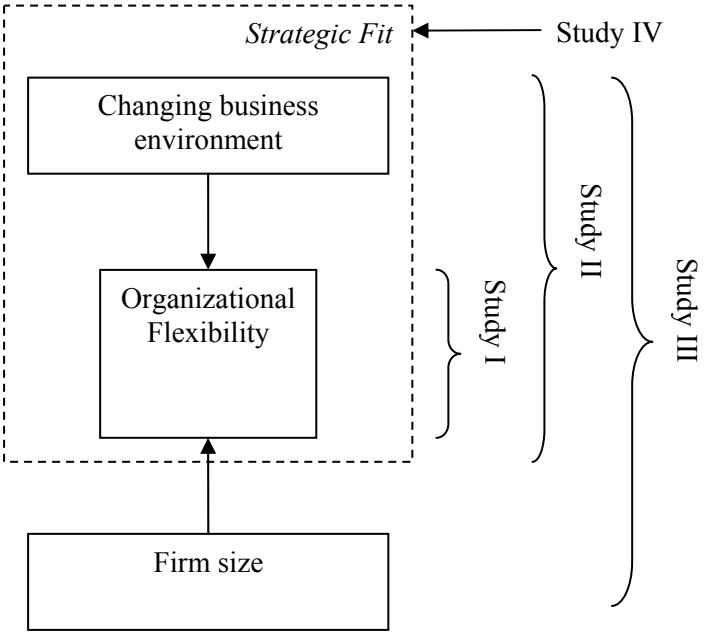

Figure 1.2 Interdependencies between the four studies

1.4 Study I: Empirical Validation of the Organizational Flexibility Nomological Net

The first study focuses on the internal dimensions of organizational flexibility and addresses the validity of the nomological net of this theoretical construct. Organizational flexibility is defined as *the outcome of an interaction between (1) the managerial dynamic capabilities and (2) the responsiveness of the organizational resources* (Volberda 1996). One can conceive of a hierarchy of dynamic capabilities (Suarez, Cusumano and Fine 1995, Grant 1996) on one side and corresponding organization design parameters on the other side (Zelenovic 1982, Grant 1996). Within this hierarchy, lower-order change capabilities are

formative to higher-order dynamic capabilities (Volberda 1996, Winter 2003, Sanchez 2004).

Although conceptually rather refined, the theory goes untested at large. Empirical research tends to focus on a limited set of dimensions of organizational flexibility, thereby surpassing the multi-dimensional nature of the concept, or rely on case-based evidence. The core propositions of the theory of organizational flexibility have not been tested empirically, which limits application and further theory building. We address this gap in literature by investigating the validity of various dimensions of organizational flexibility and by empirical examination of the relationships between these constructs. The first central research question is repeated below, and broken into 3 separate questions that guide this study.

Research question 1. *How are components of organizational flexibility related to one another?*

- *Which components of organizations promote organizational flexibility?*
- *How can these components be operationalized and validated?*
- *How are these components related?*

Theoretical deduction will lead to a number of hypotheses with respect to these questions. Using a self-administered survey these hypotheses will be empirically investigated.

With this study we'll examine effects that have been the subject of prior theorizing and ground predictions with existing models, which comes very close to testing actual theory (Weick 1995). The theoretical contribution can be classified as high according to Colquitt and Zapata-Phelan (2007) and falls within the category of "Testers" in their taxonomy of (high) theoretical contributions.

Having established the validity of the core propositions of a theory of organizational flexibility, in subsequent tests one can start exploring the mediators

that explain those core relationships or the moderators that reflect the theory's boundary conditions. Study II proceeds with the introduction of moderating factors that affect the effectiveness of organizational flexibility.

1.5 Study II: The Performance Consequences of Organizational Flexibility

The second study focuses on organizational effectiveness resulting from organizational flexibility. The contingency paradigm states that organizational effectiveness results from fitting characteristics of the organization, in the present case the managerial capabilities and organization design parameters, to contingencies that reflect the situation of the organization (Hambrick 1983, Donaldson 2001). Nearly all definitions of organizational flexibility incorporate the business environment as the criterion to which organizational flexibility should be fitted (e.g. Ansoff 1965, Scott 1965, Eppink 1978, Krijnen 1979, Aaker and Mascarenhas 1984, Volberda 1996, 1998). Particularly, definitions of strategic flexibility tend to incorporate a specific characteristic of the business environment, namely the degree to which change is predictable (Boynton and Victor 1991, Sanchez 1995, D'Aveni 1994, Volberda 1998).

Despite repeated calls for more research on strategic flexibility and performance consequences (e.g. Bettis and Hitt 1995, Hitt 1998, Johnson et al. 2003), the hypothesis that strategic flexibility is positively related to firm performance in dynamic or hypercompetitive markets has hardly been tested straightforwardly (Suárez et al. 2003). Such core propositions about the effectiveness criterion of organizational flexibility need empirical validation to allow further theory building and deduct managerial implications. Study II aims to provide the empirical evidence by focusing on two questions derived from the second central research question.

Research question 2. *How does organizational flexibility affect firm performance*

in turbulent markets?

- *How is performance affected by the dimensions of organizational flexibility?*
- *Which factors in the business environment moderate the performance consequences of dimensions of organizational flexibility?*

As in study I, following theoretical deduction a number of hypotheses will be empirically tested with our dataset. Similarly, as our predictions are grounded with existing models, the theoretical contribution of the second study can be classified as "Tester" in Colquitt and Zapata-Phelan's taxonomy (2007) as well. Once the core propositions about the relationship between organizational flexibility and effectiveness have been validated, managerial implications and further research avenues can be explored.

1.6 Study III: Firm Size and Competitive Advantage through Strategic Flexibility

The third study focuses on a second factor which is assumed often to impact on organizational flexibility, namely firm size. Many researchers identified firm size as a critical variable moderating the relationship between strategy and performance (Hofer 1975, Smith et al. 1989, Donaldson 2001, Dobrev and Carroll 2003) and empirical studies demonstrated basic differences in the behaviours and characteristics of small firms compared with large firms (Chen and Hambrick 1995, Dean et al. 1998). The extant literature, however, is not conclusive about the relationship between firm size and strategic flexibility (Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007). The present study will therefore address two questions derived from the third central research question.

Research question 3. *How does firm size affect organizational flexibility and performance?*

– *Which components of organizational flexibility are affected by firm size, and how?*

– *What are performance consequences of differences in organizational flexibility due to firm size?*

Following the theoretical deduction of hypotheses, predictions will be tested using our dataset and archival measures of firm size. Building on the results of studies I and II, the third study introduces a new conceptualization of the way firm size affects organizational flexibility. As predictions are grounded with existing models, this study can be classified more as a "Qualifier" (cf. Colquitt and Zapata-Phelan 2007) with a different kind of theoretical contribution. With the inclusion of firm size as a second factor, next to the business environment, our model of organizational flexibility now reaches a level of comprehensiveness and validity currently lacking the literature.

1.7 Study IV: Alternative Notions of Strategic Fit and their Explanatory Power

Finally, the fourth study delves into the notion of strategic fit or alignment. We specifically address the question "how do firms achieve effective strategic fit?" The concept of fit has been explored widely in organization and strategy literature and covers much of the descriptive and prescriptive research in this arena. Fit is a polyvalent concept, rooted in contingency theory and population ecology (Van de Ven 1979) and developed in the fields of organization theory (Van de Ven and Drazin 1985; Drazin and Van de Ven 1985) and strategic management (Venkatraman 1989). Fit is defined as co-alignment of variables (internal/external) that can explain the effects on a third variable such as performance (criterion specific) (cf. Venkatraman 1989). Different applications of the notion of fit compete in the literature. The underlying mechanisms of these different fit approaches have only been studied in isolation of each other, leaving

open the question how these fit approaches measure up against each other and whether and how they interact.

Research question 4. *How do forces for specific adaptation and institutional forces interact in the formation of firm performance?*

- *How do different notions of fit explain firm performance?*
- *How do individual notions of fit compare with respect to predictive capacity?*
- *How do notions of fit interact with each other?*

In this study, the different notions of fit will be linked to two major organizational theories, resulting in various propositions on the structure of contingency- and institutional fit concepts, and their interaction. We try to explain the interaction between different notions of fit by examining different learning perspectives on which institutional and contingency theory depend (see DiMaggio 1991). Institutional and contingency approaches refer to different types of learning. The fundamental difference between institutional and contingency approaches is how managers learn from their environments as well as how they conceive the constructs that represent the environment (Glynn et al 1994). The propositions will be operationalized using the organizational flexibility framework developed in the previous studies and tested against our dataset.

Interaction between different notions of fit has not been explored in literature previously. As our predictions about their interaction will be grounded with existing learning theories, the theoretical contribution is considerable, according to the Colquitt and Zapata-Phelan (2007) taxonomy, and can be labelled a “Qualifier” at the least. Defining and explaining the interaction between different notions of fit allows practitioners to apply these notions to improve learning processes and organizational performance in general.

1.8 Theoretical Contribution

Table 2.1summarizes the theoretical contribution of each individual study. Figure 1.3 depicts Colquitt and Zapata-Phelan's (2007) taxonomy and positions the contribution of the four studies in the framework. Taken together, these four studies have high theoretical contribution, as either known effects are empirically validated or previously unexplored relationships examined (in casu firm size and strategic fit notions).

Table 1.2 Individual theoretical contributions of four empirical studies

	Building new theory	**Testing existing theory**	**Theoretical contribution**
Study I	Examines effects of organization design parameters on types of flexibility previously defined in literature	Grounds predictions with existing conceptual arguments and models (Volberda, 1996, 1998)	Towards 'Tester'
Study II	Examines effects of change in the business environment on effectiveness of different types of flexibility which has been subject of prior theorizing	Grounds predictions with existing theory on dynamic capabilities and organizational flexibility theory	'Tester'
Study III	Introduces a new conceptualization of relationship between firm size and flexibility	Grounds predictions with existing conceptual arguments and existing theory (contingency theory)	'Qualifier'
Study IV	Examines a previously unexplored relationship (interaction) between different notions of fit	Grounds predictions with existing learning theory	Between 'Qualifier' and 'Expander'

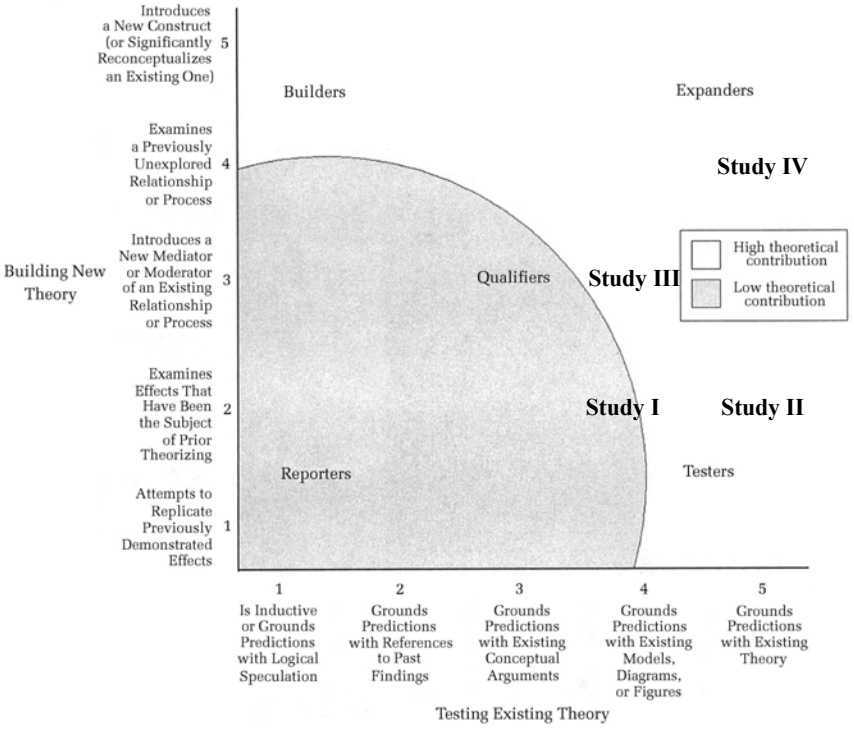

Figure 1.3 Theoretical contribution of individual papers in Colquitt and Zapata-Phelan taxonomy

1.9 Outline of the Dissertation

Having introduced the basic concepts and research questions of this thesis in chapter one, chapters two to five will present the four distinct studies that make up the main body of this thesis, in the order described above. Each chapter encompasses a complete scholarly article, with theory development and methods specific for that study, as well as the results and a discussion thereof. Some overlap with the contents of chapters two and three may occur as a result. Finally, overall conclusions and implications will be discussed in chapter six, where I will return to the questions and aims presented in chapter one.

2 Organizing for Flexibility: Addressing Dynamic Capabilities and Organization Design[1]

Abstract

Research on organizational flexibility has revealed relevant insights across multiple dimensions of organizational flexibility. However, the literature lacks a comprehensive empirical study addressing the relationships among the various aspects of organizational flexibility. Partial conceptions of organizational flexibility may lead to incorrect theoretical predictions and ineffective management practices. The present paper develops a nomological network of organizational flexibility, including a comprehensive theoretical framework, an empirical framework, and a specification of the linkages among and between the elements of these frameworks. Organizational flexibility is defined as a multidimensional concept consisting of managerial capabilities and organizational design parameters. Based on the literature, we develop five basic propositions from which we derive ten nomologicals. The resulting theoretical model is linked to observables which are developed from a dataset of 3,259 respondents from 1,904 companies of various sizes across 15 industries. With one exception, the relationships that we found between the constructs support the specified network of nomologicals, thereby supporting the conception of organizational flexibility as a multidimensional, hierarchical structure of constructs.

[1] This chapter is based work with Ernst Verwaal and Henk Volberda.

2.1 Introduction

The concept of organizational flexibility has received wide attention in the management literature in recent decades. Broadly defined, organizational flexibility reflects the capacity of an organization to respond to various kinds of external change. With increasing levels of turbulence documented in the business environment (McNamara et al. 2003, Wiggins and Ruefli 2005) and the speed with which competitive advantages are nullified in some markets (D'Aveni 1994), the need for flexibility is increasingly apparent. However, most empirical studies of organizational flexibility have focused on single dimensions of flexibility in isolation. Unfortunately, such partial approaches often lead to theoretical inconclusiveness and invalid predictions.

Management literature stresses the complex nature and multifaceted structure of organizational flexibility (e.g. Ansoff and Brandenburg 1971, Carlsson 1989, Volberda 1996, Teece et al. 1997, De Toni and Tonchia 2005), yet few empirical studies account for such complexity (Dreyer and Grønhaug 2004).

Table 2.1 presents an overview of recent empirical studies that take a multidimensional approach to complexity. Notwithstanding the merits in identifying relevant dimensions of organizational flexibility, many of these studies neglect to address the interrelated dimensions of *both* managerial capabilities and organization design variables (Volberda 1996, 1998). Thus, despite the attention paid to organizational flexibility in the literature, there remains a need to specify and empirically validate a complete set of relations between the different dimensions of organizational flexibility, to mitigate the risks of drawing partial or even false conclusions from underspecified single-dimension models.

Table 2.1 Empirical studies applying multidimensional conceptualizations of organizational flexibility

Authors	Dimensions	Sample	Outcomes
Eppink (1978)	operational-, competitive-, and strategic flexibility	3 firms (exploratory interviews)	Suggests multi-dimensionality and hierarchical nature
Volberda (1996/1998)	steady-state-, operational-, structural-, and strategic flexibility responsiveness of technology, structure, and culture	3 large Dutch firms (case studies)	Confirms hierarchical nature and multi-dimensionality of construct
Dreyer and Grønhaug (2004)	volume flexibility product flexibility labor flexibility financial flexibility	35 failures & 35 successful firms	Confirms existence of different types of flexible capabilities
Anand and Ward (2004)	mobility flexibility (alter production) range flexibility (product/process diversity)	101 manufacturing firms	Confirms multi-dimensionality at first-order level
Verdú-Jover et al. (2005)	operational flexibility structural flexibility strategic flexibility	417 European firms	Confirms existence of different types of flexible capabilities
Hatum and Pettigrew (2006)	centralization and formalization institutional embeddedness environmental scanning organizational identity	2 highly flexible & 2 less-flexible firms	Confirms multi-dimensionality of organization design construct
Fiegenbaum and Karnani (1991)	operational flexibility:	> 3000 companies	Variation of output over time in response to changing market conditions

Authors	Dimensions	Sample	Outcomes
Sanchez (1995)	coordination flexibility and resource flexibility	Anecdotal	Suggests high level multi-dimensionality (managerial and organizational flexibility)
Sanchez (2004)	five modes of competences reflecting specific forms of flexibility	Conceptual	Suggests hierarchical nature of flexible capabilities
Nadkarni and Narayanan (2007)	strategic flexibility	225 firms	Validates four measures of strategic flexibility

These risks are not just hypothetical. For example, management literature is inconclusive on the effects of firm size on organizational flexibility (Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007). Such inconclusiveness may be due to differences in the way organizational flexibility is conceptualized: different perspectives may reveal different kinds of relationships between firm size and various constructs. Whereas firm size may have negative effects on some aspects of flexibility, e.g. increasing inertia, large size also increases financial slack and the variety of routines and external ties. Failing to incorporate these different perspectives may result in underspecified models and false rejection of null-hypotheses (Type I errors), or inconclusive results at best. Furthermore, Type II errors may occur when variety between organizations stems from factors omitted from an underspecified model. Omitting relevant variables in an organizational fit analysis, for example, may cause false conclusions with respect to similarities between organizations which in fact differ in essential but overlooked aspects.

A nomological network is a representation consisting of concepts of interest, their observable manifestations, and the interrelationships among and between them. Its scientific objective is to clarify the meaning and validity of a measure by specifying laws (nomologicals) that link theoretical constructs to each other and to observables (Cronbach and Meehl 1955). Defining a comprehensive nomological net of organizational flexibility will deepen our understanding of the interrelationships across different dimensions of this construct and its links with observable manifestations. A nomological net of organizational flexibility may help managers to effectively develop flexibility in their organizations and facilitate researchers to further develop and test theories on this increasingly important management construct.

In the present paper we develop and assess the empirical validity of a nomological net that defines the multidimensional, hierarchical structure of

organizational flexibility. First, we define the central constructs and analyze their structure. Next, we specify a number of core propositions that reflect and extend common thinking about the relationships between aspects of organizational flexibility. We then describe how empirical measures of organizational flexibility were developed and tested against a large sample of 3,259 firms of various size classes across 15 industries. The results section confronts the theoretical framework with observable manifestations of organizational flexibility and demonstrates overall support for the nomologicals specified in our model. Having established the validity of the conceptual relationships, we discuss how researchers can proceed in subsequent tests to advance theory and explore the boundary conditions of organizational flexibility.

2.2 Theory Development

The concept of organizational flexibility has been studied in management literature for several decades (see reviews by Carlsson 1989, Volberda 1998 and Johnson et al. 2003). Broadly defined, organizational flexibility reflects the capacity of an organization to respond to various kinds of external change. This capacity depends on the presence of dynamic capabilities to effectuate change and the responsiveness of the organization to facilitate change.

A hierarchy of dynamic capabilities

Scholars have empirically documented increasing levels of competition in the business environment (Lawrence and Lorsch 1967, D'Aveni 1994, Bettis and Hitt 1995, McNamara et al. 2003, Wiggins and Ruefli 2005). To deal with increasing levels of turbulence and the increasing speed with which competitive advantages are nullified, firms need to develop and deploy various kinds of dynamic capabilities (D'Aveni 1994, Eisenhardt and Martin 2000).

A dynamic capability is the capacity of an organization to purposefully create, extend or modify its resource base (Helfat et al. 2007). Some dynamic

capabilities create first-order change to deal with volatility in demand and result in adaptations in the volume and mix of activities. Higher-order capabilities are aimed at more fundamental changes in the resource base (Teece et al. 1997, Eisenhardt and Martin 2000, Hellfat et al 2007), changing the nature of activities (Aaker and Mascarenhas 1984) or dismantling current strategies (Harrigan 1985). Such managerial dynamic capabilities endow the firm with *actual flexibility*, as they represent response routines that effectuate change (Volberda 1998).

The mix of dynamic capabilities that endow a firm with organizational flexibility is often conceived in the form of a hierarchy of capabilities (Suarez, Cusumano and Fine 1995, Grant 1996, Winter 2003, Sanchez 2004). Defining those routines related to the execution of the primary process and permit a firm to 'make a living' in the short term as zero-level or 'ordinary' routines, one can also perceive of capabilities that operate to extend, modify or create ordinary routines (Winter 2003, Helfat et al. 2007). These capabilities may imply first order change, i.e. changing the throughput of ordinary routines. Such capabilities are based on present structures and goals of the organization and result in the capacity to change the volume and mix of activities or 'operational flexibility' (Grant 1996, Volberda 1996, Zollo and Winter 2002). But these capabilities may also imply even higher-order types of change (Winter 2003, Eisenhardt and Martin 2000, Helfat et al. 2007), which reflect management's ability to reconfigure the firm's resource set more fundamentally, adapt the organizational structure, or even change the nature of organizational activities.

The hierarchy of dynamic capabilities is reflected in a hierarchy of flexibility types ranging from steady-state flexibility (zero-level routines) to operational flexibility, structural flexibility, and strategic flexibility (Ansoff and Brandenburg 1971, Volberda 1996, 1998, Johnson et al. 2003, De Toni and Tonchia 2005). The various types of flexibility are distinguished by the speed of response and the variety of capabilities related to each type (Volberda, 1996). Figure 2.1 depicts the

hierarchy of dynamic capabilities and flexibility types.

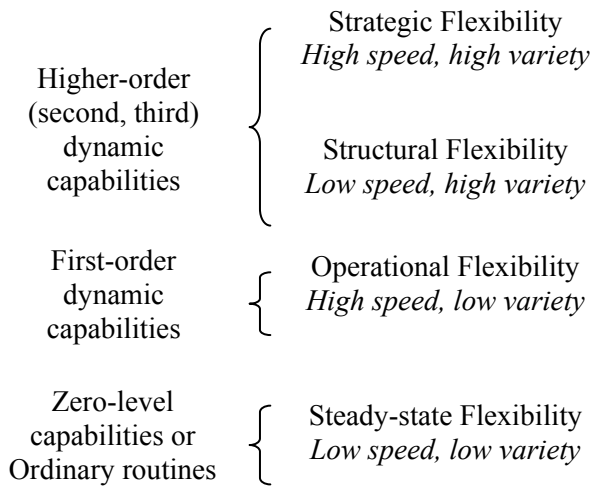

Figure 2.1 A hierarchy of dynamic capabilities and flexibility types

Organizational responsiveness

Deploying dynamic capabilities often poses strong demands on the organizational foundations (Volberda 1996, Teece 2007), as capabilities can be utilized efficiently only if supported by an appropriate firm architecture (Grant 1996). The concern here is with the controllability of the organization, which depends on requisite conditions to foster flexibility. For instance, operational flexibility requires a technology with multipurpose machinery, universal equipment, and an extensive operational production repertoire (Adler 1988). Similarly, innovation flexibility requires a structure of multifunctional teams, few hierarchical levels, and few process regulations (Quinn 1985, Schroeder et al. 1986). The design adequacy of the organization, therefore, determines the *potential for flexible capabilities*. Organizational flexibility is the outcome of an

interaction between (1) the responsiveness of firm resources and (2) the mix of managerial dynamic capabilities (Volberda 1996).

The hierarchical nature of the flexibility mix is reflected in the organization design parameters that provide the leeway for different levels of capabilities to be developed and deployed. The ability to actuate managerial capabilities depends on the design adequacy of the organizational conditions, such as the organization's culture, structure, and technology (Zelenovic 1982, Volberda 1996, 1998). As Grant (1996) argues, capabilities can be utilized efficiently only if the hierarchy of capabilities corresponds to the architecture of the firm, i.e. if the configuration of a firm's technology, structure, and culture correspond with the capabilities they support. As particular design parameters correspond primarily to specific types of capabilities, the hierarchical nature of flexible capabilities is reflected in the organization design.

Next, we will derive four core propositions with respect to a number of fundamental relationships between specific constructs in the nomological net. Each of these propositions represents a specific perspective from literature. A fifth proposition is added in which the structural interrelationships between constructs are specified in a hierarchical model, completing the nomological net of organizational flexibility.

Core propositions

The interrelationships between the components of organizational flexibility as identified in the previous section can be partially deducted from extant literature. These core propositions will be formulated as testable hypotheses in the following sections. The remaining relationships within the model can be modelled according to the assumption of the hierarchical nature of the concept.

Operational flexibility and design of technology

First order dynamic capabilities enable the firm to adapt the mix and

volume of activities at high speed and, as such, provide operational flexibility. Operational flexibility consists of capabilities based on present structures and goals of the organization and relates to the volume and mix of activities rather than the kinds of activities undertaken by the firm (Grant 1996, Volberda 1996, Zollo and Winter 2002). Operational flexibility provides rapid response to changes that are familiar and typically leads to temporary fluctuations in the firm's activity. The objective of operational flexibility is to maximize efficiency and minimize risk in a volatile market. In strategic management literature, operational flexibility is also referred to as output flexibility (Mills 1986, Fiegenbaum and Karnani 1991). The potential for operational flexibility is determined by the existing *technology* of a firm (Volberda 1998, p. 135). Technology refers to the hardware (such as machinery and equipment) and the software (knowledge) used in the transformation of inputs into outputs, as well as the configuration of hardware and software employed by the firm. The design of technology can range from routine to non-routine, corresponding to the opportunities for routine or first-order capabilities (Perrow 1967). Routine technologies, characterized by process or mass modes of production, specialized transformation means, and limited operational production repertoires, limit the potential for operational flexibility (Volberda 1998). Non-routine technology is characterized by small batch or unit modes of production combined with a group layout, multipurpose means of transformation, and a large operational production repertoire. These features provide sufficient leeway for rapid changes in the volume of primary activities and the mix of products brought forward by the firm.

HYPOTHESIS 1: *Non-routine technologies are positively related to operational flexibility*.

Structural flexibility and organizational structure

Higher order capabilities can be oriented at the administrative framework or at the resources and competences of the firm (Penrose 1959, Winter 2003).

Change routines oriented at the administrative framework of a firm, i.e. the organizational structure and its decision-making and communication routines, provide structural flexibility (Krijnen 1979, Lorenzoni and Baden-Fuller 1995, Volberda 1998). Structural flexibility consists of managerial capabilities to adapt the organizational structure, and its decision and communication processes, to suit changing conditions in an evolutionary way (Krijnen 1979).

Structural flexibility provides leeway for operational flexibility, but foremost for strategic flexibility. When faced with revolutionary changes, management needs great internal leeway to facilitate the renewal or transformation of existing structures and processes. The link between structural flexibility and strategic flexibility is supported by the reasoning of Sanchez and Mahoney (1996) who state that by facilitating loose coupling between organizational units, modularity in organizational design can reduce the cost and difficulty of adaptive coordination, thereby increasing the strategic flexibility of firms to respond to environmental change. Ansoff and Brandenburg (1971) linked various basic organizational forms such as centralized functional forms, decentralized divisional forms, project management forms, and innovative forms to various types of flexibility. Further, concerning decision and communication processes, Dougherty and Hardy (1996) found that organizations must (re)configure their systems to facilitate sustained innovation.

The potential for structural flexibility is determined by the actual structure of the organization. Organizational structure comprises not only the actual distribution of responsibilities and authorities (basic form), but also the planning and control systems and the process regulations of decision-making, coordination, and execution (Volberda 1996). To cope with an increased demand for flexibility caused by market volatility and uncertainty, firms require flexible organizational boundaries (networks, joint ventures) and flat structures with basic elements of hierarchy that accommodate efficient managerial processing of information

(Buckley and Casson 1998). The opportunities for flexible capabilities depend on the structural design of the organization, which can be distinguished as either mechanistic or organic (Burns and Stalker 1961). Mechanistic structures are characterized by highly regulated processes and elaborate planning and control systems, specialization of tasks, and high degrees of formalization and centralization. Particularly when the type of formalization is coercive, there's little space for non-routine responses (Adler and Borys 1996). In such mechanistic structures, only minor and incremental changes are possible, thereby limiting the potential for structural flexibility. Organic structures, on the other hand, are characterized by a basic organization form that can deal with increased coordination needs between interfacing units, a rudimentary performance-oriented planning and control system that allows for ambiguous information and necessary experimentation and intuition, and limited process regulation (Ansoff and Brandenburg 1971, Khandwalla 1977, Van de Ven 1986, Volberda 1998). Such organic structures accommodate efficient managerial processing of information and facilitate adaptation of organizational structures and processes, which increases the potential for structural flexibility.

HYPOTHESIS 2: *Organic structures are positively related to structural flexibility*.

Strategic flexibility and organizational culture

Strategic flexibility reflects the presence of higher order capabilities oriented at changing the nature of activities and the goals of the organization (Aaker and Mascarenhas 1984). A broad variety of dynamic capabilities relate to strategic flexibility (Eisenhardt and Martin 2000): creating new product market combinations (Krijnen 1979), dismantling current strategies (Harrigan 1985), using market power to deter entry and control competitors (Porter 1980), the ability to shift or replicate core manufacturing technologies (Galbraith 1990), and the capability to switch gears relatively quickly and with minimal resources

(Hayes and Pisano 1994), changing existing routines, developing new competencies, and, overall, changing the strategic course of the firm. Within this definition, strategic flexibility stems from those capabilities that provide a variety of strategic options that can be implemented at relatively high speed. Such flexible capabilities enable management to change the nature of activities and are related to the goals of the organization or the environment (Aaker and Mascarenhas 1984, Volberda 1996). Deploying flexible capabilities involves altering strategies and tactics to adapt to rapidly changing markets. This broad definition captures most definitions of strategic flexibility in the extant literature, in particular those of Ansoff (1965: diversified pattern of product-market investments) and Krijnen (1979: creating new product market combinations), Harrigan (1985: repositioning in a market, changing game plans, dismantling current strategies), Porter (1980: using market power to deter entry and control competitors), Galbraith (1990: ability to shift or replicate core manufacturing technologies), and Hayes and Pisano (1994: capability to switch gears relatively quickly and with minimal resources).

Organizational culture can be conceived as a set of beliefs and assumptions held commonly throughout the organization and taken for granted by its members. These idea systems are implicit in the minds of organization members and to some extent shared (Bate 1984, Hofstede 1980). The degree to which strategic flexibility reduces the response time to unforeseen detrimental events depends greatly upon the people involved, organizational values, structure, decision-making process, degree of formality, management technology, etc. (Eppink 1978). Strategic capabilities are primarily constrained by psychological and organizational biases that affect the attention, assessments, and actions of decision-makers in ways that prevent them from recognizing and reacting to problems in a timely fashion (Shimizu and Hitt 2004, Sanchez 2004). Further, the beliefs and assumptions that form an organization's culture (Hofstede 1980) may

constrain managerial capabilities by specifying broad, tacitly understood rules for appropriate action in unspecified contingencies (Camerer and Vepsalainen 1988). Strategic flexibility often requires changes in fundamental norms and values, which can be accomplished only within the context of broad and easily changeable idea systems (Newman et al. 1972). Innovative cultures provide a high potential for strategic flexibility because management that are open to new and unfamiliar signals from the environment can respond quickly to unforeseen detrimental events. Further, innovative cultures are open to and generate a wide range of response options, including unorthodox response options that can prove highly effective (Volberda 1998).

HYPOTHESIS 3*: Innovative cultures are positively associated with strategic flexibility.*

Information processing capabilities

In rapidly changing environments, there is obvious value in the ability to reconfigure the firm's asset structure (Amit and Schoemaker 1993, Volberda 1998, Teece et al. 2002, Denrell et al. 2003). In such environments, correct and timely signaling of alterations in competitive forces is of crucial importance (Eppink 1978, Amit and Schoemaker 1993, Volberda 1998). This requires constant surveillance of markets and technologies (Teece et al. 1997) or, more broadly, environmental information processing capabilities. Of particular importance are information processing capabilities that enable the firm to identify the nature of the changing market environment and sense opportunities that it holds (Teece et al. 2002). Furthermore, information processing capabilities are required to sense the need to reconfigure the firm's asset structure and to accomplish the necessary internal and external transformation (Amit and Schoemaker 1993). Third, information processing capabilities are required to determine the adequate volume

(number of capabilities) and composition (lower-order vs higher-order capabilities) of flexible capabilities (Volberda 1996). In a broader sense, the environmental information processing capabilities of management determine how existing flexible capabilities are expanded and redeployed (Kogut and Zander 1992, Grant 1996) as well as how new capabilities are developed (Eisenhardt and Martin 2000).

HYPOTHESIS 4: *Information processing capabilities are positively associated with strategic flexibility.*

Hierarchy of relationships

The four hypotheses proposed above posit core determinants of organizational flexibility as deduced from existing theory. We argue, however, that these are not independent relationships. The nature of the interrelationships between the three types of flexible capabilities and the organization design parameters is hierarchical, including key vertical relationships between lower-level capabilities and higher-level capabilities. Collis (1994) is particularly explicit in arguing that dynamic capabilities govern the rate of change or ordinary capabilities. Taking this logic one step further, we argue that second order capabilities govern the rate of change of first-order capabilities, that third-order capabilities govern second-order capabilities, and so on. Furthermore, the components of organizational flexibility become increasingly interdependent with the level of the flexible capabilities involved. Such upward interdependencies have been described by Sanchez (2004) as a hierarchy of competence modes and corresponding flexibility types. Because the capacity of an organization to successfully create value by defining and implementing a new strategic logic depends on each of these complementary competence modes, each competence mode can act as a potential bottleneck that limits the overall competence of the organization.

The literature provides additional evidence for a multitude of variables acting on organizational flexibility. Strategic flexibility is not a simple function of innovative cultures and enhanced information processing capabilities. Operational practices can significantly affect management's options to change competitive priorities (De Toni and Tonchia 2005, p. 538). Loose coupling between organizational units and modularity in organizational design can reduce the cost and difficulty of adaptive coordination (Sanchez and Mahoney 1996) resulting in opportunities to continuously rearrange the structure throughout the process, i.e. structural flexibility, which has a positive impact on strategic flexibility (Volberda, 1998, p. 145). Also, the potential for strategic flexibility is directly affected by the technology employed and the firm's basic organizational form. Non-routine technologies can deal with the many exceptions and unstructured problems related to strategic change (Perrow 1967), give leeway for search processes (Volberda 1998), and drastically reduce life cycles in design and production stages (Meredith 1987). Grouping, or the choice of departmentalization, affects the speed of reaction as it affects the required level of coordination between firm units (Khandwalla 1977, Volberda 1998, p. 138). Furthermore, structure affects a firm's ability to sense new opportunities (Van de Ven 1986, Khandwalla 1977, Quinn 1985).

We define a hierarchical structure of sub-dimensions of organizational flexibility and argue that lower-order managerial capabilities and matching organizational design parameters contribute to higher-order flexible capabilities.

An increase in operational flexibility and non-routine technology, for example, may contribute to an increase in strategic flexibility, but not necessarily as the firm may not have any objective to increase strategic flexibility. An increase in strategic flexibility, on the other hand, does require changes to organization design parameters and lower-order capabilities such as technology and the operational flexibility enabled by that technology. Therefore, strategic flexibility

reflects the degree of operational flexibility, but operational flexibility does not reflect strategic flexibility.

Based on the arguments above, we hypothesize that a model that takes into account the joint effects of these variables and the hierarchical nature of the constructs (see Figure 2.2), will demonstrate a better fit with empirical data than a model based solely on individual, horizontal relations (Figure 2.1).

HYPOTHESIS 5: *The hierarchical model of organizational flexibility will provide a better fit with the data than the non-hierarchical model.*

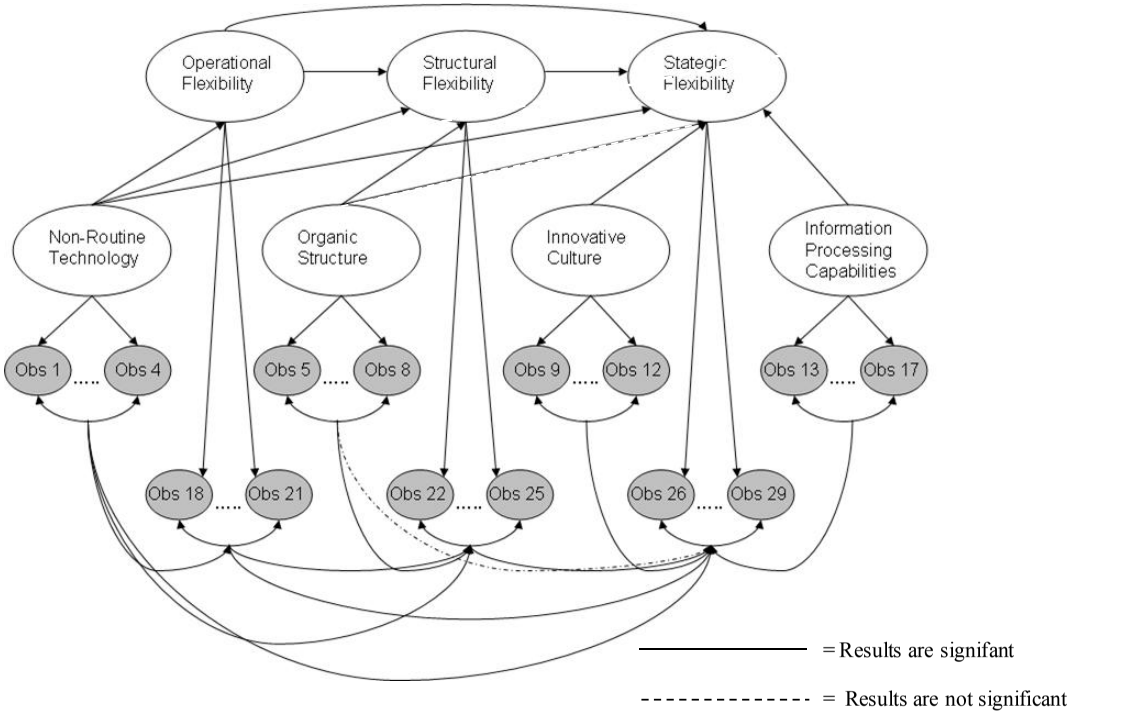

Figure 2.2 Nomological net of organizational flexibility

The upper half of Figure 2.2 presents the full conceptual specification of the nomological net of organizational flexibility proposed in this paper, i.e. the theoretical framework. Next we develop empirical mirror image of the theoretical framework: the observable manifestations of the variables and the interrelationships among and between them.

2.3 Methods and Results

Sample

Data was collected from a panel of organizations in the Netherlands using a structured questionnaire. The sample contains 3,259 responses from 1,904 organizations including firms in various size classes across 13 sectors of economic activity (see Appendix A. Sample Characteristics). Data was collected in the period 1996–2006 and respondents were executives or senior managers able to assess firm level conditions.

To assess potential problems of single source bias, we collected multi-informant data from 133 organizations, which allowed us to examine interrater reliability and interrater agreement. Using the subset of firms for which we have multiple respondents (ranging from 5 to 34 respondents per firm), we calculated an interrater agreement score, r_{wg}, for each study variable (James et al. 1993). The median interrater agreement ranged from .68 to .80, which exceeds the generally accepted minimum of .60 (Glick 1985). In addition, examination of within-group reliability coefficients revealed a strong level of interrater reliability (Jones et al. 1983), with intra-class correlations ranging from .75 to .93 and high significance (p<.001).

Data measurement from one particular context could also be subject to context measurement effects, artifactual covariations that result from the context in which measures are obtained independent of the content of the construct under investigation (Podsakoff et al. 2003). This bias is caused by the fact that both the

predictor and criterion variable are measured at the same point in time using the same medium. Several tests are available to examine whether context measurement bias distorted relationships between the variables. We first performed Harman's one-factor test on the self-reported items of the latent constructs included in our study. The hypothesis of one general factor underlying the relationships was rejected ($p<.01$). In addition, we found multiple factors and the first factor did not account for the majority of the variance. Second, a model fit of the measurement model of more than .90 (see notes Table 3.1) suggests no problems with common context bias (Bagozzi, Yi and Phillips 1991). Third, the smallest observed correlation among the model variables can function as a proxy for common method bias (Lindell and Brandt 2000).

Table 2.3 (on page 44) shows an insignificant correlation value of (r = -.01) to be the smallest correlation between the model variables, which indicates that common method bias is not a problem. Finally, we performed a partial correlation method (Podsakoff and Organ 1986). The highest factor between an unrelated set of items and each predictor variable was added to the model. These factors did not produce a significant change in variance explained, again suggesting no substantial common method bias. In sum, we conclude that the evidence from a variety of methods supports the assumption that neither common rater bias nor common method bias account for the study's results.

Construct measurement

In order to develop the observables in the nomological net of organizational flexibility, we generated a list of items reflecting the constructs and organized a survey. The measures we used for our constructs are perceptual because perceptual measures are more appropriate for measuring managerial behaviour than archival measures (Bourgeois 1980). We generated an initial list of Likert-type items based on the definitions of the constructs and by reviewing the literature that relates to these dimensions. Furthermore, exploratory interviews with management consultants and audits within various firms served as a basis for item generation and content validity assessment.

We used items related to the *technology* of the firm (see Table 2.2), which we adapted from the work of Hill (1983), Perrow (1967) and Hickson et al. (1969). Items related to *organizational structure* were adapted from Burns and Stalker (1961), Pugh et al. (1963), Lawrence and Lorsch (1967), Mintzberg (1979) and Hrebiniak and Joyce (1984). Items related to *organizational culture* were based on the work of Ouchi (1979), Camerer and Vepsalainen (1988) and Hofstede et al. (1990). Indicators of *information processing capabilities* were adapted from Hayes and Pisano (1994), Henderson and Cockburn (1994) and Grant (1996). Items reflective of *operational flexibility* were adapted from Richardson (1996) and

(Kogut and Zander, 1992) and items reflective of *structural flexibility* were adapted from Richardson (1996) from Krijnen (1979), Pennings and Harianto (1992). Finally, items reflective of *strategic flexibility* were adapted from Krijnen (1979), Mascarenhas (1982), Harrigan (1985) and Porter (1980).

We first investigated the psychometric properties of the scales using exploratory factor analysis on a sub-sample of 182 firms. We then analyzed each dimension of the scales using principal component procedures and varimax rotation to assess their unidimensionality and factor structure. Items that did not satisfy the following criteria were deleted: (1) items should have communality higher than .3; (2) dominant loadings should be greater than .5; (3) cross-loadings should be lower than .3; and (4) the scree plot criterion should be satisfied (Briggs and Cheek 1988).

The reliabilities of the dimensions of each scale were assessed by means of the Cronbach alpha coefficient. Each separate dimension achieved an alpha varying between .66 and .74 (see Table 2.2), which exceeds the commonly used threshold value for exploratory research (Nunnally 1967). Variables with relatively low reliability are technology (α = .69), culture (α = .69), and operational flexibility (α = .66). These are all variables for organizational-level constructs that are broad in conceptual scope (i.e. constructs defined by two or more distinct elements or underlying dimensions). Their reliability sufficiently exceeds the threshold level of .55 recommended for such constructs by Van de Ven and Ferry (1980). In addition, composite reliabilities range between .80-.85., which is substantially above the commonly accepted threshold value of .70, and average variance extracted measures exceed the commonly accepted threshold value of .50 (Hair et al. 1998). Furthermore, all items have correlations greater than .50 with their respective constructs, which suggests satisfactory convergent validity of the scale items (Hulland 1999).

Table 2.2 Items and model variables

Constructs		Factor loadings	Item correlation w. total score
Non-routine technology (α = .67, composite reliability = .80, average variance extracted = .50)			
Obs 1	The lay-out and set-up of our primary process can be changed easily.	0.63	0.67
Obs 2	Our equipment and information systems can be used for multiple purposes.	0.77	0.76
Obs 3	Our employees master several methods of production and operations.	0.81	0.78
Obs 4	Our organization is up to date regarding 'know-how'.	0.61	0.61
Organic structure (α = .75, composite reliability = .84, average variance extracted = .58)			
Obs 5	Our organization uses extensive and structured systems for planning and control. (R)	0.72	0.72
Obs 6	In our organization, the division of work is defined in detailed descriptions of jobs and tasks. (R)	0.83	0.81
Obs 7	In our organization, everything has been laid down in rules. (R)	0.85	0.83
Obs 8	In our organization there are a lot of consultation bodies. (R)	0.63	0.67
Innovative culture (α = .70, composite reliability = .82, average variance extracted = .54)			
Obs 9	For our organization goes: "The rules of our organization can't be broken, even if someone means that it is in the company's best interest." (R)	0.68	0.72
Obs 10	Deviating opinions are not tolerated in our organization. (R)	0.84	0.81

Constructs		Factor loadings	Item correlation w. total score
Obs 11	Creativity is highly appreciated in our organization.	0.65	0.68
Obs 12	The person that introduces a less successful idea in our company can forget about his/her career. (R)	0.76	0.72
Information processing capabilities (α = .70, composite reliability = .81, average variance extracted = .50)			
Obs 13	In our organization we often carry out an extensive competitor analysis.	0.72	0.71
Obs 14	Competitors do not hold any secrets for us.	0.70	0.61
Obs 15	In our organization, we systematically monitor technological developments concerning our products/services and the production/service process.	0.72	0.73
Obs 16	Customers' needs and complaints are systematically registered in our organization.	0.62	0.67
Obs 17	In our industry, we always are first to know what's going on.	0.70	0.68
Operational flexibility (α = .66, composite reliability = .80, average variance extracted = .50)			
Obs 18	In our organization we can easily vary the production and/or service capacity when demand changes.	0.64	0.66
Obs 19	Our organization can easily outsource activities of the primary process.	0.74	0.73
Obs 20	Our organization can easily hire in temporary employees to anticipate demand fluctuations.	0.75	0.74
Obs 21	Our organization can easily switch between suppliers.	0.68	0.69
Structural flexibility (α = .69, composite reliability = .81, average variance extracted = .52)			
Obs 22	In our organization, tasks and functions can easily be modified.	0.72	0.71

Constructs		Factor loadings	Item correlation w. total score
Obs 23	Our organizational structure is not fixed and can easily be modified.	0.81	0.79
Obs 24	Control systems are modified often in our organization.	0.62	0.63
Obs 25	People in our organization don't have a fixed position, but often carry out various jobs.	0.72	0.74
Strategic flexibility (α = .76, composite reliability = .85, average variance extracted = .59)			
Obs 26	Our organization can easily add new products/services to the existing assortment.	0.72	0.73
Obs 27	In our organization, we apply new technologies relatively often.	0.80	0.79
Obs 28	Our organization is very active in creating new product-market combinations.	0.83	0.82
Obs 29	In our organization, we try to reduce risks by assuring we have products/services in different fases of their lifecycles.	0.72	0.73

R = 'Reversed item'

χ^2 = 455 d.f. = 312 CFI = 0.96 RMSEA = 0.05

Table 2.3 Descriptive statistics and pair wise correlation matrix between major variables

		Mean	Std. deviation	(1)	(2)	(3)	(4)	(5)	(6)
(1)	Non-routine technology	4.20	1.12						
(2)	Organic structure	4.29	1.30	-0.05**					
(3)	Innovative culture	5.40	1.10	0.26**	-0,27**				
(4)	Info proc. capabilities	4.29	1.10	0.28**	0.25**	0.17**			
(5)	Operational flexibility	3.74	1.23	0.27**	-0,03	0.15**	0.14**		
(6)	Structural flexibility	3.43	1.13	0.30**	-0,29**	0.13**	0.10**	0.29**	
(7)	Strategic flexibility	4.37	1.30	0.48**	-0,01	0.29**	0.45**	0.26**	0.36**

** Correlation is significant at the 0.01 level (2-tailed)

2-Stage Structural Equation Modelling

We used 2-stage structural equation modelling (SEM), to validate the measurement model and test the relationships between the observables. In the first phase, we performed confirmatory factor analysis with EQS version 6.1 to validate the scales that resulted from the exploratory factor analysis. We performed the confirmatory factor analysis on an independent sample of 1,904 firms and found a satisfactory fit for the measurement model (see notes Table 2.2). The root-mean-squared estimated residual (RMSEA) equals .05 and the confirmatory factor index (CFI) equals .96. The CFI of .96 is above the threshold value of .90, indicating a good fit, and the RMSEA of .05 does not exceed the critical value of .08 (Bentler and Bonett 1980). We used robust estimate techniques to assess sensitivity to the normality assumption and found a satisfactory fit (CFI = .98, RSMEA = .04). We verified the discriminate validity of the scales by comparing the highest variance between any of the constructs and the variance extracted from each of the constructs (AVE) (Hair et al. 1988). In all cases, each construct's average variance extracted is larger than its correlations with other constructs. Furthermore, none of the confidence intervals between any of the constructs contained 1.0 (Anderson and Gerbing 1988). Given the variety of supporting indices, we may conclude that the measurement model is acceptable.

In the second phase of analysis, we used EQS version 6.1 to estimate the relationships between the observables of the nomological network. The results of the estimated model are presented in Table 2.4. Because it is recommended that centred variables be used in the SEM analysis (Williams et al. 2003), we rescaled the variables into standardized Z-scores. We created two structural equation models: one model with non-hierarchical relationships only and one model representing the full hierarchical model. The path coefficients of both models using Normal theory maximum likelihood estimation are given in Table 2.4.

Table 2.4 SEM Maximum Likelihood Estimates of the structural paths (N=3216)

	Model I Non-Hierarchical Path Model	Model II Hierarchical Path Model
Model fit		
GFI (absolute fit index)	.91	.99
CFI (comparative fit index)	.69	.98
RMSEA (absolute fit index)	.17	.07
90% confidence interval RMSEA	.16< >.18	.05< >.08
Structural paths		
Technology → Operational flexibility	.26 ***	.26 (.02) ***
Technology → Structural flexibility		.23 (.02) ***
Technology → Strategic flexibility		.27 (.02) ***
Structure → Structural flexibility	.25 ***	.23 (.02) ***
Structure → Strategic flexibility		-.02 (.01)
Culture → Strategic flexibility	.21 ***	.15 (.02) ***
Information processing capabilities → Strategic flexibility	.45 ***	.36 (.02) ***
Operational flexibility → Structural flexibility		.14 (.02) ***
Operational flexibility → Strategic Flexibility		.06 (.01) **
Structural flexibility → Strategic flexibility		.26 (.02) ***
* = p < .05 ** = p < .01 *** = p < .00	Model R-Square .23***	Model R-Square .37***

The hypothesis tests conducted in the structural equation modelling context assume that the data used to test the model arise from a joint multivariate normal distribution. If data are not joint multivariate normal distributed, the chi-square test statistic of overall model fit will be inflated and the standard errors used to test the significance of individual parameter estimates will be deflated. We used the robust estimation procedure to correct the model fit chi-square test statistic and standard errors of individual parameter estimates (Satorra and Bentler 1988). However, comparison with the ML solution did not indicate any significant changes. In addition, Mardia's kappa test suggests no problematic kurtosis. Thus, we conclude that the non-normality of the data did not produce a problematic violation of the assumption of a joint multivariate normal distribution.

As indicated by the fit indices, both models show a sufficient absolute fit

(GFI = .91 and GFI = .99). However, a fit of .91 indicates that the non-hierarchical model can be improved. Furthermore, absolute fit indices impose no baseline for any particular data set, and therefore can yield favourable results for a model with small relationships across measures. However, the comparative fit index (CFI) is a relative fit index adjusted for degrees of freedom and compares the model with a baseline null model, which assumes that all covariances between constructs are zero. The CFIs differ significantly between the non-hierarchical and the hierarchical model (CFI = .69 and CFI = .98, respectively). The CFI of the non-hierarchical model is insufficient, whereas the CFI of the hierarchical model indicates that further improvement of the model is unlikely. Thus, the hierarchical model demonstrates a much better improved fit over the null model than does the non-hierarchical model. This result is also confirmed by the RMSEA scores of the two models. The non-hierarchical model fails to meet the minimum level for fit according to this fit index. Furthermore, the confidence interval of the non-hierarchical model is far beyond the maximum level of RMSEA (.08), whereas the confidence interval of the hierarchical model falls comfortably below the threshold value. Finally, the total R-square of the hierarchical model (.37) is substantially higher than the R-square of the non-hierarchical model (.23). The hierarchical model accounts for about 37% of the variance in strategic flexibility, which can be considered substantial considering the perceptual nature of the data. All added hierarchical relations are significant, except the path coefficient between structure and strategic flexibility. This suggests that the impact of organizational structure on strategic flexibility is fully mediated by structural flexibility rather than and that no significant direct relationship between structure and strategic flexibility exists.

We conclude that the hierarchical model provides a much better fit with the data than the non-hierarchical model, which supports hypothesis 5.

The path coefficients from technology → operational flexibility are

similar and highly significant in both models (p<.001), which supports hypothesis 1 that technology is positively related to operational flexibility. The path coefficients from organic structure → structural flexibility are also similar and highly significant in both models (p<.001), which supports hypothesis 2 that organic structure is positively related to structural flexibility. The path coefficients from innovative culture → strategic flexibility and information processing capabilities → strategic flexibility are both substantial and highly significant (p<.001), which supports hypotheses 3 and 4. The effect of the information processing capabilities → strategic flexibility path coefficient is more than twice as strong as the innovative culture → strategic flexibility path coefficient, indicating that the impact of information processing capabilities is larger than the impact of culture.

We conducted sensitivity analyses for our results by estimating structural equation models that included industry dummies and firm size as control variables. The model as presented in Table 2.4 and the above results were robust to the inclusion of these controls. In addition, we tested the model while removing the direct relationship between organic structure and strategic flexibility. Removing this relationship slightly improved model fit (CFI = .99; RSMEA .03). Finally, we conducted a Lagrange multiplier test on this re-specified model and found that no alternative specification of the parameters would lead to a model that better represents the data.

2.4 Discussion

Management literature recognizes the need for organizations to respond in a flexible manner to changes in an increasingly turbulent business environment and to develop various dynamic capabilities to facilitate specific kinds of change. Despite a wealth of conceptual articles dealing with the multidimensional aspects of organizational flexibility, the number of empirical studies investigating such multidimensionality is limited (Dreyer and Grønhaug 2004). Further theory

building will benefit from a comprehensive and empirically validated nomological net, incorporating dimensions of dynamic capabilities and organizational design variables and specifying constructs, observables, and relationships.

The present paper develops a nomological net of organizational flexibility and presents measures of various constructs as well as a theoretical model specifying the relationships between these constructs. We present a hierarchical structure of sub-dimensions of organizational flexibility and find that lower-order managerial capabilities and matching organizational design parameters contribute to higher-order flexible capabilities. This hierarchical and multi-dimensional model demonstrates a strong fit with the empirical data of a large sample of firms.

Having validated a first nomological net and the core propositions of a theory of organizational flexibility, subsequent studies may advance the theory in several respects. First, assumed relationships for which empirical results have been inconsistent can be revisited to search for more comprehensive models including multiple, potential opposing relationships. A model in which multiple perspectives are analyzed simultaneously may reveal complex interactions between variables that are omitted from most straightforward, single perspective studies.

Second, nearly all definitions of organizational flexibility incorporate the business environment as the criterion to which organizational flexibility should be aligned for strategic fit (e.g. Ansoff 1965, Scott 1965, Eppink 1978, Krijnen 1979, Aaker and Mascarenhas 1984, Volberda 1996, 1998). Helfat et al. (2007) coin the tem ‘evolutionary fitness’ to describe the fit between dynamic capabilities and the context in which the organization operates. The nomological net presented in the present paper allows the development and empirical testing of contingency models in which the performance of dynamic capabilities is related to the market environment. More specifically, our model enables researchers to distinguish the effects of various dimensions of environmental turbulence, such as the level of market dynamism and the level of market unpredictability, in relation to different

types of flexible capabilities. For example, Volberda (1996, 1998) theorized about the discriminate effects between dimensions of environmental turbulence and different types of flexible capabilities. Empirical testing of such propositions comes within reach with the model developed in the present paper.

Third, the model developed in this paper enables analysis of the criteria used by successful firms regarding appropriate strategies and their organizational design. Organizational flexibility theory assumes that firms should match the flexibility mix with the organizational design and the degree of environmental turbulence (Volberda 1996). However, it remains unclear whether firms strive to continuously adjust managerial capabilities and organizational design variables to changes in the task environment, as contingency theory holds (Drazin and Van de Ven 1985, Donaldson 2001, Venkatraman 1989), or whether firms actually conform to the institutional pressures of the business environment, as propagated by institutional theorists (DiMaggio and Powell 1983, 1991, Scott 2001, Zucker 1987). Extended with environmental variables, the model and measurement instruments presented in this study provide the means to simultaneously investigate propositions regarding contingency fit and institutional fit between organizational flexibility and the business environment.

Managerial implications

The notion of a hierarchical structure of dynamic capabilities and the associations of different types of flexibility with organizational design variables may increase the effectiveness of managerial interventions in at least two ways.

First, such a notion supports the managerial application of the principle of minimum intervention. The principle of minimum intervention contends that managers attempt to implement strategy within the constraints of economic efficiency, choosing courses of action that solve their problems with minimum costs to the organization (Hrebiniak and Joyce 1984). As the scope of interventions increases, i.e. when more higher-order capabilities and more tacit

organizational variables are subject to a change process, not only do the costs increase but so do the risks of unintended consequences. Using the model proposed in this paper, managers and professionals should be able to better limit the scope of interventions to those parts of the organization and capability set that are relevant to the situation at hand.

Second, the comprehensive model presented here facilitates the coordination of change efforts across the different functions and hierarchical layers of the organization. Our model clarifies the link between operational capabilities and strategic capabilities and elaborates the function of organizational design variables with respect to creating organizational flexibility. Using the nomological net developed in this paper, it is possible to model the effects of various intervention measures for improved insight. Most importantly, managers can use our hierarchical model to help coordinate change efforts across the organization, ensuring that operational and strategic levels are aligned, and that both tangible (technology) and intangible (cultural) aspects of the organization are accounted.

Limitations

While this study demonstrates considerable support for our conception of organizational flexibility, we must address a few limitations. Although our study includes a wide variety of firms, all were active in one particular country, The Netherlands. This may have biased the results as organizational flexibility may be partly dependent on institutional and cultural factors. Furthermore, this study did not control for variables such as firm size and industry. Such variables may also moderate the relationships proposed in this study or affect the impact of some variables on organizational flexibility as an outcome. Future studies might control for these limitations in order to further nuance the results presented here.

Conclusion

The present study demonstrates that organizational flexibility is a multidimensional construct that benefits from multiple angles of study. Our results confirm a number of straightforward hypotheses linking specific organizational design variables to specific types of flexibility. On their own, these hypotheses are not novel and have been the subject of prior studies. However, we extended the model of organizational flexibility to reflect relationships in a hierarchical structure: lower-order dynamic capabilities contribute to higher-order capabilities and organizational design variables associated with lower-order capabilities contribute to higher-order capabilities as well. Building organizational flexibility, therefore, is best approached not by focusing on a single type of flexibility, but by making adjustments with regard to a variety of interacting variables. Studying organizational flexibility, on the other hand, requires the application of a rather comprehensive model to rule out the risks associated with underspecified models that omit relevant aspects of organizational flexibility. The nomological net of organizational flexibility presented and validated in the present study should enable both managers and scholars to approach this important concept more accurately.

3 The Superior Effects of Flexible Dynamic Capabilities in Hypercompetitive Markets[2]

Abstract

This study provides an empirical test of a core proposition in dynamic capability theory and a number of derivative propositions. The strategic flexibility which a firm obtains from developing a mix of dynamic capabilities provides it with a capacity to respond to changes in the environment in a manner superior to firms with less developed capability sets. Particularly, the level of unpredictability affects the need for strategic flexibility and the effectiveness of higher-order or strategic flexible capabilities. Further, the composition of the flexibility mixes of firms varies with the differences in market conditions. We link our theoretical model to observables which are developed from a dataset of 3,259 respondents from 1,904 companies of various sizes across 15 industries and apply hierarchical regression analysis. Results provide support for all propositions, except for the existence of economic alternatives to strategic flexibility in less turbulent markets.

[2] This chapter is based on work with Ernst Verwaal and Henk Volberda.

3.1 Introduction

Driven by technological innovations, the globalization of markets, and powerful socio-economic trends, the level of competition has increased in many markets and across industries. To prosper in hypercompetitive markets, contemporary management literature prescribes to develop a variety of dynamic capabilities at firm level. A common proposition holds that the strategic flexibility which a firm obtains from developing a mix of dynamic capabilities provides it with a capacity to respond to unpredictable changes in the environment in a manner superior to firms with less developed capability sets. Empirical evidence regarding this proposition is scant however, and some essential questions remain unanswered. Does strategic flexibility pay-off only in hypercompetitive markets, or is there economic value in all types of markets, regardless of the level of turbulence? And, as developing and deploying strategic flexible capabilities requires complex interventions in the design of the organization, are there economic alternatives to strategic flexibility?

The resource-based view (RBV) of the firm proposes that firms that control valuable, scarce and non-substitutable resources gain at least temporarily competitive advantages by using these resources to develop and implement strategies. Notwithstanding a substantial body of empirical evidence for resource-based theories (see Barney and Arikan 2001, Barney, Wright and Ketchen 2001), RBV does not adequately explain how and why certain firms *renew their competitive advantage* in situations of rapid and unpredictable change (Eisenhardt and Martin 2000: 1106).

Scholars have been documenting increasing levels of competition in the business context for decades (e.g. Lawrence and Lorsch 1967, D'Aveni 1994, Bettis and Hitt 1995), or fluctuating levels of competition at least, for that matter (McNamara et al. 2003). Across industries, over time competitive advantage has become significantly harder to sustain and persistent firm outperformance is

increasingly a matter not of a single advantage maintained over time but more a matter of concatenating over time a sequence of competitive advantages (Wiggins and Ruefli 2005).

The dynamic capabilities approach has developed in strategic management literature to extend resource-based theory to dynamic markets. In markets where the competitive landscape is shifting and industry structure changes frequently, the dynamic capabilities by which firm managers manipulate and reconfigure internal and external resource bundles in order to create *new competitive advantages* become the source of persistent outperformance (Teece et al. 1997, Eisenhardt and Martin 2000, Helfat et al. 2007). The effectiveness of dynamic capabilities, therefore, is assumed to be context dependent (Newbert 2007, Brouthers et al. 2008).

A firm's ability to deploy a variety of dynamic capabilities in response to environmental changes is reflected in the flexibility mix, and particularly in the level of strategic flexibility (Volberda 1996, Buckley 1997, Eisenhardt and Martin 2000, Johnson et al. 2003). Despite repeated calls for more research on strategic flexibility and performance consequences (e.g. Bettis and Hitt 1995 Hitt, 1998, Johnson et al. 2003), the hypothesis that strategic flexibility is positively related to firm performance in dynamic or hypercompetitive markets has hardly been tested straightforwardly (Suárez et al. 2003). Resource-based studies in general and empirical studies in particular are considered weak in addressing the issue of context specificity (Priem and Butler 2001).

Some in-depth anecdotal evidence of the context specific performance effects of strategic flexibility is provided by Evans (1991) and Volberda (1998). Worren et al.'s (2002) study of strategic flexibility in product competition highlights empirical linkages to the market context yet is too focused to generalize findings to strategic flexibility in general. A recent study by Nadkarni and Narayanan (2007) indeed suggests a positive empirical relationship between

strategic flexibility and performance in fast-clockspeed industries. Industry level analysis has an important shortcoming, however. Referring to heterogeneity in strategies, Newbert (2008) argues that a specific resource or capability may be found to exhibit a strong correlation with competitive advantage and/or performance in a particular context, that resource or capability may simply not fit with the enterprise-level strategies of all firms operating in that context. Analyses at industry level may therefore overlook relevant variations in firm context.

The present study advances the body of empirical evidence by accounting for *context specificity at firm level*. More generally, our study substantiates a core proposition of dynamic capability theory in a hypothetical-deductive manner (Popper 1965). Establishing the validity of a theory's core propositions – in the present case the proposition that the performance of dynamic capabilities is dependent on the type of external change – may move the theorizing in a literature toward maturity and is important for further theory building in general. This applies to management in particular because some of the most intuitive theories introduced in the literature wind up being unsupported by empirical research (Miner 1984, Colquitt and Zapata-Phelan 2007). Further, we demonstrate that not all dimensions of environmental turbulence have similar performance consequences (conform Duncan 1972, Volberda 1998, Davis et al. 2007) and investigate potentially economic alternatives to strategic flexibility in less turbulent environments (conform Volberda 1998, Winter 2003, Davis et al. 2007).

Applying a firm-level approach to analyze the effects of market turbulence not only advances theory, it also facilitates management and professionals in strategic analysis and firm specific strategy development. Quantification and analysis of strategic flexibility have been cumbersome to accomplish (Skordoulis 2004). The normative model developed in the present paper uses primary data that can be collected with a self-administered survey capturing variables with perceptive measures and is applicable by scholars, managers, and professionals to

a wide range of organizations.

Next, we proceed to define the central constructs in our study: strategic flexibility and environmental turbulence, and develop a theoretical model with hypotheses. The third section outlines the research methods and the fourth section presents the analysis and results. We conclude by discussing the results in the light of existing theory and the implications for future research and managerial practice.

3.2 Theory Development

In the tradition of contingency theory, the present study tries to identify context settings and organizational settings that ought to be matched for superior performance (cf. Hambrick 1983). According to Zeithaml, Varadarajan and Zeithaml (1988) and Tosi and Slocum (1984) contingency theory-building involves three types of variables (contingency variables, response variables and effectiveness variables) and congruency or a notion of fit. In the present study, the contingency variable is the degree of environmental turbulence, and the response variable the mix of flexible managerial capabilities. Effectiveness is measured as firm performance. Next, these variables will be elaborated and modelled in structural relationships.

Strategic flexibility

The concept of strategic flexibility pivots on the ability to take a variety of actions in response to environmental change (Evans 1991, Buckley 1997, Johnson et al. 2003) and as such reflects the presence of dynamic capabilities within a firm (Bahrami 1992; Eisenhardt and Martin 2000). Strategic flexible capabilities enable management to change the nature of activities and are related to the goals of the organization or the environment (Aaker and Mascarenhas 1984, Volberda 1998). Deploying flexible capabilities involves altering strategies and tactics to adapt to rapidly changing markets.

A broad variety of dynamic capabilities relate to strategic flexibility, such

as: diversifying product-market investments (Ansoff 1965), creating new product market combinations (Krijnen 1979), repositioning in a market, changing game plans, dismantling current strategies (Harrigan 1985), using market power to deter entry and control competitors (Porter 1980), the ability to shift or replicate core manufacturing technologies (Galbraith 1990), and the capability to switch gears relatively quickly and with minimal resources (Hayes and Pisano 1994). An important criterion for dynamic capabilities to provide strategic flexibility is the speed with which they can be activated. Strategic flexibility stems from those capabilities that provide a variety of options that can be implemented at *relatively high speed* (Volberda 1996).

Other terms that broadly denote the same concept as strategic flexibility include strategic responsiveness (Ansoff and Brandenburg 1971), adaptive capacity (Astley and Brahm 1989), transformative capability (Garud and Nayyar 1994), and strategic response capability (Bettis and Hitt 1995).

Existing literature proposes that the strategy-performance relationship is moderated by a variety of industry and environmental variables (Hambrick 1983) and that superior performance is linked not only to strategy, but also to other organizational and environmental factors which influence the success or failure or a given strategy (Barney 1991). The pattern of effective dynamic capabilities depends upon market dynamism (Eisenhardt and Martin 2000, Davis et al. 2007) as dynamic capabilities are context dependent (Helfat et al. 2007). Likewise, the performance consequences of strategic flexibility are contingent upon the level of environmental turbulence.

The construct of strategic flexibility is part of the broader nomological net of *organizational* flexibility (see chapter 2). One can conceive of a hierarchy of dynamic capabilities (Suarez, Cusumano and Fine 1995, Grant 1996, Winter 2003, Sanchez 2004, Danneels 2008), and this hierarchy is reflected in a hierarchy of flexibility types ranging from steady-state flexibility (zero-level routines) to

operational flexibility, structural flexibility, and strategic flexibility (Ansoff and Brandenburg 1971, Volberda 1996, Johnson et al. 2003, De Toni and Tonchia 2005). Strategic flexibility is perceived to be the highest order of flexibility and is in part created through lower-order flexibility types such as operational flexibility and structural flexibility (see chapter 2). Lower order flexibility types focus on the development of efficient routines and can be sufficient to cope in less turbulent environments. The sufficiency of the flexibility mix, therefore, must be continuously matched with the degree of environmental turbulence (Volberda 1996).

Environmental turbulence

Congruent with a dynamic perspective on resources and competitive advantage, we assume that environmental change can be turbulent (Baaij et al. 2007, Volberda 1998) and competitive advantages can be nullified rapidly (D'Aveni 1994, Eisenhardt and Martin 2000).

Various characteristics of competitive forces contribute to environmental turbulence. A turbulent environment is a dynamic, unpredictable, expanding, fluctuating environment (Khandwalla 1977). Environmental turbulence is defined as a complex aggregate of various dimensions, of which the level of dynamism, the level of complexity, and the level of unpredictability of external change reflect the degree of change in competitive forces (Volberda 1998: 190-191). Dynamism describes the degree to which competitive forces remain basically stable over time or are in a continual process of dynamic change, and captures both the frequency and intensity of change (cf. Duncan 1972). The complexity of the environment depends on the number of factors within the competitive environment and their relatedness (Lawrence and Lorsch 1967, Thompson 1967, Lawrence 1981). The level of unpredictability reflects the extent to which cause-effect relationships concerning competitive forces are unclear (Thompson 1967). Unclearness of cause-effect relationships may be due to a lack of clarity of information, when data

concerning future developments are unclear (Lawrence and Lorsch 1967), ignored by management (Lawrence 1981, Bahrami 1992) or simply unavailable (Lau 1996, Volberda 1998). When assessing environmental turbulence, the influence of unpredictability outweighs the influence of the level of dynamism and complexity (Volberda 1998).

This definition captures most of the dimensions attributed in definitions of constructs analogous to environmental turbulence (e.g. D'Aveni 1994: *Hypercompetition*, Davis et al. 2007: *Market dynamism*, Fine 1998 and Nadkarni and Narayanan 2007: *Industry clockspeed*). Furthermore, modelling environmental turbulence with multiple dimensions separating dynamism and complexity from unpredictability responds to critiques by Volberda (1998) and Davis et al. (2007) on models trying to capture such a broad concept in terms of a single environmental attribute.

Interaction effects and performance consequences

The effectiveness of strategic flexible capabilities can be expressed in terms of their evolutionary fitness. Evolutionary fitness is a performance yardstick for dynamic capabilities and depends on how well the dynamic capabilities of an organization match the context in which it operates. Helfat et al. (2007: 7-9) identify four important influences on evolutionary fitness of a dynamic capability: quality, cost, market demand, and competition.

The quality and cost of a dynamic capability, or technical fitness, is an internal measure of capability performance. Developing and maintaining strategic flexible capabilities entails developing lower order capabilities for structural and/or operational flexibility as well, and poses strong demands on the organization's design (see chapter 2) resulting in high costs and less efficient organization. Therefore, unless the market demands high levels of flexibility, the cost of deploying and maintaining such higher-order capabilities constrain their evolutionary fitness. We proceed by identifying market conditions that favour

strategic flexibility and develop and economic rationale for less turbulent market conditions.

First of all, strategic flexibility is most beneficial to performance when the level of uncertainty concerning environmental changes is high. This uncertainty may stem from inherent unpredictability of outcomes of change events (Aaker and Mascarenhas 1984, Lau 1996) or from the fact that changes are unforeseen (Eppink 1978, Bahrami 1992). Uncertainty and unpredictability are recurring themes in virtually all studies that relate strategic flexibility to environmental factors. Eppink (1978) speaks of 'unforeseen environmental changes', Aaker and Mascarenhas (1984) of 'substantial, uncertain and fast-occurring environmental changes', Bahrami (1992) of 'unanticipated changes', and Lau (1996) of 'responding to uncertainties'.

In fundamentally unpredictable environments, the organization is confronted with highly unfamiliar changes. When responding to these changes, the organization has no specific experience and therefore no routine answer to tackle them. The organization thus has to reduce the need for information processing and has to develop strategic flexibility to facilitate radical changes (Volberda 1998). The first factor we predict to affect the effectiveness of strategic flexibility, therefore, is the level of unpredictability.

HYPOTHESIS 1. *The effect of strategic flexibility on firm performance is positively moderated by the level of unpredictability.*

In a dynamic environment that is largely predictable, on the other hand, the evolutionary fitness of strategic flexible capabilities may be limited and a more efficient type of flexibility comes from dynamic capabilities of the first order, or operational flexibility. Operational flexibility consists of routine capabilities that are based on present structures and goals of the organization and operate on the volume and mix of firm activities. Although the variety of change in the environment may be high in dynamic markets, when change is familiar or can be

foreseen, management can develop a comprehensive set of efficient and routine response capabilities. When the scope of flexible capabilities of an organization is limited to first-order capabilities and operational flexibility, the demands on the responsiveness of the organization design are less high and firms can operate with more conservative cultures and mechanistic structures (see chapter 2) increasing overall efficiency.

In a dynamic environment that is largely predictable, therefore, the optimal organization form employs a mix of dynamic capabilities dominated by first-order capabilities (Winter 2003), fine-grained routines (Eisenhardt and Martin 2000) or operational flexibility (Volberda 1998: 296) providing superior technical fitness compared to strategic flexible capabilities. This implies that, although strategic flexibility may provide sufficient response capacity, operational flexibility is more effective in predictable markets.

We hypothesize first on the isolated effectiveness of operational flexibility and strategic flexibility when controlling for unpredictability. Both response variables are predicted to individually show increasingly positive effects on performance when the level of dynamism increases.

HYPOTHESIS 2. *In predictable markets, the effect of operational flexibility on firm performance is positively moderated by the level of dynamism.*

HYPOTHESIS *3.* *In predictable markets, the effect of strategic flexibility on firm performance is positively moderated by the level of dynamism.*

Second, we develop our hypothesis on the comparative effects of operational flexibility and strategic flexibility in highly dynamic, but predictable markets. We predict operational flexibility to trump the effect of strategic flexibility in such markets, as argued before.

HYPOTHESIS *4.* *The effectiveness of operational flexibility trumps*

the effectiveness of strategic flexibility in dynamic but predictable markets.

We do not develop hypotheses on the individual interaction effects of operational flexibility and unpredictability. Whereas operational flexibility may provide an economic alternative to strategic flexibility in dynamic but predictable markets, operational flexibility provides no refuge for firms operating in unpredictable markets, other than that it augments to strategic flexibility (see chapters 2 and 3). Two attempts by Pagell and Krause (1999, 2004) to empirically validate a relationship between environmental uncertainty and operational flexibility have failed to show a significant relationship.

Further, although structural flexibility is recognized as a separate dimension of organizational flexibility, such capabilities function to augment to operational flexibility and strategic flexibility in particular. Interaction effects between structural flexibility and individual dimensions of environmental turbulence have not been described in literature, nor can such hypotheses be derived from the propositions developed by Volberda (1996).

Finally, the complexity dimension of environmental turbulence is not taken into account in our analysis. Complexity is argued to be an important factor in environmental turbulence (Duncan 1972, Lawrence 1981, Volberda 1998). A direct relationship between the level of complexity and dynamic capabilities or flexibility types has not been described in literature, however.

3.3 Method

Sample

Data was collected from a panel of organizations in the Netherlands using an online questionnaire. The sample contains 3,259 responses from 1,904 organizations including firms in various size classes across 15 sectors of economic activity (see Appendix A. Sample Characteristics). Data was collected in the

period 1996–2006 and respondents were executives or senior managers able to assess firm level conditions.

To assess potential problems of single source bias, we collected multi-informant data from 133 organizations, which allowed us to examine interrater reliability and interrater agreement. Using the subset of firms for which we have multiple respondents (ranging from 5 to 34 respondents per firm), we calculated an interrater agreement score, r_{wg}, for each study variable (James et al. 1993). The median interrater agreement ranged from .68 to .80, which exceeds the generally accepted minimum of .60 (Glick 1985). In addition, examination of within-group reliability coefficients revealed a strong level of interrater reliability (Jones et al. 1983), with intra-class correlations ranging from .75 to .93 and high significance ($p<.001$).

Data measurement from one particular context could also be subject to context measurement effects, artifactual covariations that result from the context in which measures are obtained independent of the content of the construct under investigation (Podsakoff et al. 2003). This bias is caused by the fact that both the predictor and criterion variable are measured at the same point in time using the same medium. Several tests are available to examine whether context measurement bias distorted relationships between the variables. We first performed Harman's one-factor test on the self-reported items of the latent constructs included in our study. The hypothesis of one general factor underlying the relationships was rejected ($p<.01$). In addition, we found multiple factors and the first factor did not account for the majority of the variance. Second, a model fit of the measurement model of more than .90 (see notes Table 3.1) suggests no problems with common context bias (Bagozzi, Yi and Phillips 1991). Third, the smallest observed correlation among the model variables can function as a proxy for common method bias (Lindell and Brandt 2000). Table 3.2 (on page 70) shows descriptive statistics and a pooled correlation matrix for all variables. An

insignificant correlation value of (r = -.01) shows to be the smallest correlation between the model variables, which indicates that common method bias is not a problem. Finally, we performed a partial correlation method (Podsakoff and Organ 1986). The highest factor between an unrelated set of items and each predictor variable was added to the model. These factors did not produce a significant change in variance explained, again suggesting no substantial common method bias. In sum, we conclude that the evidence from a variety of methods supports the assumption that neither common rater bias nor common method bias account for the study's results.

Construct measurement

In order to develop the observables in our study, we generated a list of items reflecting the constructs (see Table 3.1) and organized a survey. The measures we used for our constructs are perceptual because perceptual measures are more appropriate for measuring managerial behaviour than archival measures (Bourgeois 1980). We generated an initial list of Likert-type items based on the definitions of the constructs and by reviewing the literature that relates to these dimensions. Furthermore, exploratory interviews with management consultants and audits within various firms served as a basis for item generation and content validity assessment.

Items reflective of operational flexibility were adapted from Richardson (1996) and (Kogut and Zander 1992). Items reflective of strategic flexibility were adapted from Krijnen (1979), Mascarenhas (1982), Harrigan (1985) and Porter (1980). Items reflecting the level of unpredictability and dynamism in the environment were adapted from Dill (1958), Duncan (1972), Lawrence and Lorsch (1967) and Thompson (1967).

Table 3.1 Items and model variables

Constructs		Factor loadings	Item correlation w. total score
Market dynamism (α = .84, composite reliability = .88, average variance extracted = .56)			
Obs 33	Changes in our market are very intense.	0,73	0,72
Obs 34	In our market, customers frequently demand completely new products and/or services.	0,74	0,73
Obs 35	In the market we operate in, changes happen continuously.	0,81	0,80
Obs 36	Our offering of products/services to our customers changes constantly.	0,75	0,74
Obs 37	In our market, the amount of products and/or services to be supplied changes often en quickly.	0,73	0,74
Obs 38	In the market we operate in, each day something changes.	0,71	0,73
Unpredictability of changes (α = .75, composite reliability = .81, average variance extracted = .47)			
Obs 43	Of what happens in our market, nothing remains unknown to us. (R)	0,73	0,71
Obs 44	Information that we need concerning our market, we are bound to get. (R)	0,81	0,79
Obs 45	In our market, it is hard to make decisions based on reliable information.	0,51	0,58
Obs 46	We have sufficient information about our competitors. (R)	0,68	0,69
Obs 47	We have sufficient insight and information about our customers. (R)	0,67	0,66
Operational flexibility (α = .66, composite reliability = .80, average variance extracted = .50)			

Constructs		Factor loadings	Item correlation w. total score
Obs 18	In our organization we can easily vary the production and/or service capacity when demand changes.	0.64	0.66
Obs 19	Our organization can easily outsource activities of the primary process.	0.74	0.73
Obs 20	Our organization can easily hire in temporary employees to anticipate demand fluctuations.	0.75	0.74
Obs 21	Our organization can easily switch between suppliers.	0.68	0.69
Strategic flexibility (α = .76, composite reliability = .85, average variance extracted = .59)			
Obs 26	Our organization can easily add new products/services to the existing assortment.	0.72	0.73
Obs 27	In our organization, we apply new technologies relatively often.	0.80	0.79
Obs 28	Our organization is very active in creating new product-market combinations.	0.83	0.82
Obs 29	In our organization, we try to reduce risks by assuring we have products/services in different fases of their lifecycles.	0.72	0.73
Firm performance (α = .83, composite reliability = .89, average variance extracted = .74)			
Obs 30	Our organization is very profitable.	0,77	0,82
Obs 31	In comparison with similar organizations, we are doing very well.	0,91	0,88
Obs 32	Our competitors can be jealous of our performance.	0,89	0,87

R = 'Reversed item'

χ^2 = 455 d.f. = 312 CFI = 0.96 RMSEA = 0.05

Item selection

We first investigated the psychometric properties of the scales using exploratory factor analysis on a sub-sample of 182 firms. We then analyzed each dimension of the scales using principal component procedures and varimax rotation to assess their unidimensionality and factor structure. Items that did not satisfy the following criteria were deleted: (1) items should have communality higher than .3; (2) dominant loadings should be greater than .5; (3) cross-loadings should be lower than .3; and (4) the scree plot criterion should be satisfied (Briggs and Cheek 1988).

The reliabilities of the dimensions of each scale were assessed by means of the Cronbach alpha coefficient. Each separate dimension achieved an alpha varying between .66 and .74 (see Table 3.1), which exceeds the commonly used threshold value for exploratory research (Nunnally 1967). Variables with relatively low reliability are technology (α = .69), culture (α = .69), and operational flexibility (α = .66). These are all variables for organizational-level constructs that are broad in conceptual scope (i.e. constructs defined by two or more distinct elements or underlying dimensions). Their reliability sufficiently exceeds the threshold level of .55 recommended for such constructs by Van de Ven and Ferry (1980). In addition, composite reliabilities range between .80-.85., which is substantially above the commonly accepted threshold value of .70, and average variance extracted measures exceed the commonly accepted threshold value of .50 (Hair et al. 1998). Furthermore, all items have correlations greater than .50 with their respective constructs, which suggests satisfactory convergent validity of the scale items (Hulland 1999).

Control variables

In our model, we include control variables for firm size and industry effects. Researchers have identified organizational size as a critical variable

moderating the relationship between strategy and performance (Dobrev and Carroll 2003, Hofer 1975, Smith et al. 1989). Firm size is measured by the number of organizational members to be organized (Blau 1970), as the number of organizational members determines the structure that is required (Abdel-khalik 1988, Donaldson 2001). Size is therefore appropriately operationalized in empirical studies by the number of employees (Pugh et al. 1969) as reported in the firm's financial reports. Further, as the impact of particular production technologies may vary substantially between types of industries, we control for industry effects by including dummy variables for industrial firms, trade firms and service firms.

3.4 Results

Descriptive statistics and a pooled correlation matrix for all variables included in the study are presented in Table 3.2. We assessed multicollinearity by examining tolerance and the Variance Inflation Factor (VIF). Tolerance values in all models exceed the value of .7 and VIF-scores are less than 1.3, indicating no concerns for multicollinearity (Fornell and Larcker 1981).

Table 3.3 presents the results of the hierarchical regression analysis of the effects of strategic flexibility and unpredictability on performance. Model I displays the effects of control variables. The model includes 4 out of 5 dummy variables for type of industry. The dummy variable for Miscellaneous Firms was left out and used as the reference group. Except for Firm Age, all control variables show significant effects. Model II introduces the response variable Strategic Flexibility and the contingency variable Unpredictability. Direct of effects of both Strategic Flexibility ($\beta = .320$, $p < .001$) and Unpredictability ($\beta = -.204$, $p < .001$) are significant and substantial ($\Delta R2 = .158$, $p < .001$).

Table 3.2 Descriptive statistics and pairwise correlation matrix between major variables

		Mean	Std. Dev	N	(1)	(2)	(3)	(4)
(1)	Dynamism	4.195	1.184	3278	1.000			
(2)	Unpredictability	3.316	0.988	3277	.042	1.000		
					(.017)			
(3)	Operational flexibility	3.745	1.232	3279	.080	-.150	1.000	
					(.000)	(.000)		
(4)	Strategic flexibility	4.374	1.295	3285	.445	-.131	.255	1.000
					(.000)	(.000)	(.000)	
(5)	Firm performance	4.820	1.240	3273	.150	-.241	.097	.372
					(.000)	(.000)	(.000)	(.000)

Table 3.3 Hierarchical regression of organisational flexibility, environmental turbulence and interaction terms on firm performance

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI
(Constant)	4,608 ***	4,106 ***	4,097 ***	4,899***	4,336***	4,373***
Firm size	0,039 **	0,052 ***	0,052 ***	0,030	0,027	0,025
Firm age	-0,008	-0,013	-0,014	-0,009	-0,009	-0,010
Industrial firms	0,096 ***	0,093 ***	0,091 ***	0,064**	0,075**	0,073**
Trade firms	0,059 ***	0,031 **	0,030 **	0,046*	0,040*	0,038*
Service firms	0,124 ***	0,107 ***	0,107 ***	0,131***	0,140***	0,140***
Non-profit organizations	-0,106 ***	-0,069 ***	-0,068 ***	-0,094***	-0,080***	-0,080***
Unpredictability: absence of info		-0,204 ***	-0,201 ***			
Strategic flexibility		0,320 ***	0,323 ***			
Unpredictability x Strategic flexibility			0,051 ***			
Dynamism					0,082***	0,074***
Operational flexibility					0,060**	0,062***
Dynamism x Operational flexibility						0,057**
	r^2 = .038	r^2 = .195	r^2 = .198	r^2 = .035	r^2 = .046	r^2 = .049
	F = 19.687	F = 87.650	F = 79.151	F = 8.566	F = 8.597	F = 8.203

*** Significant at the 0.01 level (2-tailed).

Table 3.3 (continued)

Variables	Model VII	Model VIII
(Constant)	3,805 ***	3,851 ***
Firm size	0,036 *	0,026
Firm age	-0,012	-0,016
Industrial firms	0,042 *	0,039
Trade firms	0,034	0,029
Service firms	0,115 ***	0,109 ***
Non-profit organizations	-0,071 ***	-0,069 **
Dynamism	-0,078 ***	-0,108 ***
Strategic flexibility	0,344 ***	0,366 ***
Operational flexibility		
Dynamism x Strategic flexibility		0,140 ***
Dynamism x Operational flexibility		
	r^2 = .131	r^2 = .150
	F = 27.233	F = 28.260

*** Significant at the 0.01 level (2-tailed).

Model III enters the moderator variable expressing congruency between the response variable and the contingency variable. The mean centred interaction term ZStrategic Flexibility x ZUnpredictability demonstrates significant effects. Although both the additional variance explained and the effect seem hardly substantial ($\Delta R2 = .003$ and $\beta = .051$), the change in F-values between Model II and Model III is significant ($p < .01$), as is the effect of the interaction term ($p < .01$). These results support Hypothesis 1.

Figure 3.1 plots the effect of strategic flexibility on performance with varying environmental conditions. Visual inspection brings a number of insights. First, regardless of the level of unpredictability, strategic flexibility is positively related to firm performance and above average strategic flexibility is related to above average performance in both predictable and unpredictable markets. Second, the performance consequences of strategic flexibility in unpredictable markets are substantial and even with relatively little strategic flexibility firms will demonstrate above average performance. Third, firms endowed with high strategic flexibility operating in unpredictable markets outperform firms with equal strategic flexibility operating in predictable markets.

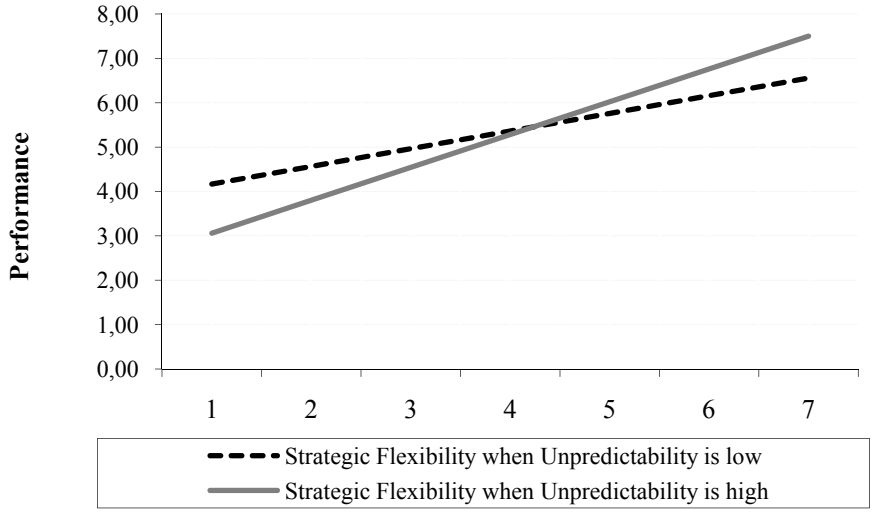

Figure 3.1 Effects of strategic flexibility on firm performance with varying environmental conditions

The effects and interaction of strategic flexibility and *dynamism*, as opposed to unpredictability, are not displayed in Table 3.3. These are noteworthy to mention, however, with respect to the assumption that the degree of unpredictability should outweigh the influence of the level of dynamism when assessing environmental turbulence. When the unpredictability variable was replaced by the dynamism variable in Model III, the effects remained rather stable for strategic flexibility ($\beta = .363$, $p < .001$) and the interaction term ZStrategic Flexibility x ZDynamism ($\beta = .068$, $p < .001$). The direct effect of dynamism is substantially less negative to performance, however ($\beta = .04$, $p < .005$), indicating that the firm's strategic flexibility should be foremost congruent to the level of unpredictability.

Further to the right in Table 3.3, the results of the hierarchical regression analyses concerning Hypotheses 2 (Models IV to VI) and on the next page concerning Hypotheses 3 (Models VII and VIII) are displayed. For regression analysis, we selected only cases with less than the median score on the

Unpredictability variable. We then entered the control variables in Model IV. The effects of three control variables are non-significant. Compared to Model I the control variable Firm Size and the dummy for Trade Firms are no longer affecting firm performance.

Model V enters the response and contingency variables Operational Flexibility and Dynamism. Direct effects of both variables are significant, β Operational Flexibility = .060 ($p < .05$) and β Dynamism = .082 ($p < .01$), although the additional variance explained compared to the model with control variables is hardly substantial ($\Delta R2 = .011$, $p < .001$).

Model VI enters the (mean-centred) moderator variable expressing congruency between the response variable Operational Flexibility and the contingency variable Dynamism. The interaction term demonstrates significant effects ($\beta = .057$, $p < .05$), providing support for Hypothesis 2 on the positive effects of operational flexibility in dynamic, but predictable markets.

Model VII builds on the base model Model IV and enters the direct effects of Strategic Flexibility and Dynamism, still for the selection of cases operating in predictable markets. The dummy variable for Industrial Firms is no longer significant, in addition to the previously mentioned non-significant control variables. Both the effects of Strategic Flexibility ($\beta = .344$, $p < .001$) and Dynamism ($\beta = -.078$, $p < .01$) are significant. The effect of strategic flexibility appears to be much stronger compared to operational flexibility. Furthermore, the direct effect of dynamism has become negative in Model VII.

Model VIII enters the mean-centred interaction term of strategic flexibility and dynamism, which is positive and significant ($\beta = .140$, $p < .001$). This provides support for Hypothesis 3, arguing for strategic flexibility as an alternative for operational flexibility in predictable, but dynamic markets.

Hypothesis 4 pinpoints our argument that strategic flexibility is a less efficient alternative in predictable markets compared to operational flexibility.

Figure 3.2 depicts the effects of strategic flexibility and operational flexibility when dynamism is high and unpredictability low. Visual inspection learns that, although the slope of the effects of strategic flexibility is steeper, according to our models operational flexibility renders greater returns. These results provide evidence for Hypothesis 4 modelling the superiority of operational flexibility compared to strategic flexibility in predictable markets.

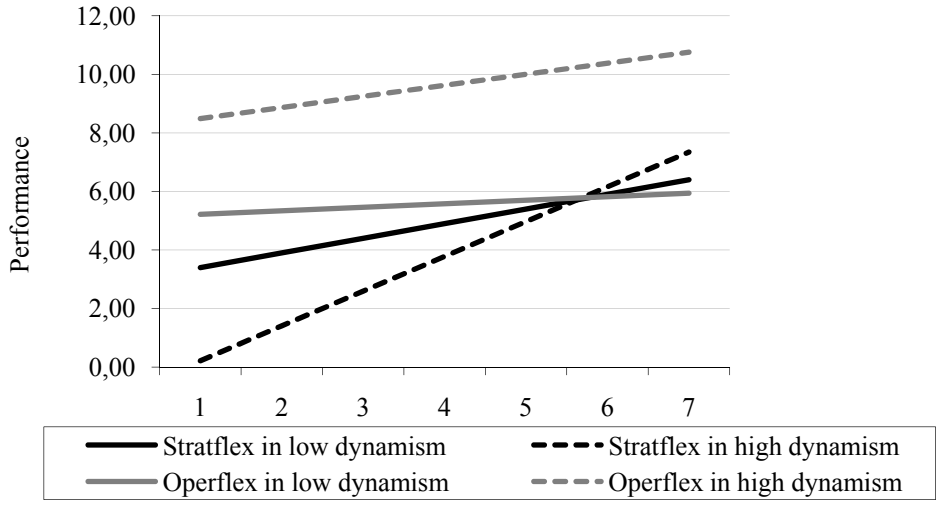

Figure 3.2 Effects of strategic flexibility and operational flexibility on firm performance with varying environmental conditions

Subsequent investigation of the composition of the flexibility mixes of firms in turbulent versus non-turbulent markets does reveal a change in the ratio of operational flexibility to strategic flexibility. Non-turbulent markets are those cases with Z-scores below -1 for Dynamism and Unpredictability (n=130). Turbulent markets are those cases with Z-scores greater than 1 for Dynamism and Unpredictability. Whereas in stable and predictable markets the average ratio of operational flexibility to strategic flexibility is 1.29, in turbulent markets the ratio drops to .78. A T-test (see Table 3.4) shows that the inequality of means between these groups is significant ($p < .01$).

Table 3.4 T-test for equality of means between non-turbulent and turbulent markets

Ratio Operational Flex / Strategic Flex	N	Mean	Std. deviation	Std. error mean
Stable and Predictable	130	1.293	.627	.055
Dynamic and Unpredictable	74	.778	.381	.044

		Levene's test for inequality of variances		t-test for equality of means			
		F.	Sig.	t	df	Sig. (2-tailed)	Mean difference
Ratio	Equal variances assumed	13.307	.000	6.422	202	.000	
	Equal variances not assumed			7.299	201.139	.000	.516

3.5 Discussion

We began this paper by noting the relevance of theory explaining the behaviour and performance of firms in hypercompetitive markets. Dynamic capability theory posits that in hypercompetitive markets, the strategic flexibility obtained from higher-order dynamic capabilities becomes the source of persistent outperformance. Empirical evidence supporting this hypothesis is scant and mostly anecdotal, however. The present study advances the body of empirical evidence by accounting for *context specificity* of flexible capabilities at *firm level* using perceptual data obtained from a large sample of firms.

There are several contributions by this study. First, consistent with a contingency perspective on dynamic capability theory, the set of dynamic capabilities ought to be matched to context settings for superior performance. Our results demonstrate positive interaction effects between the level of unpredictability – a factor of environmental turbulence – and strategic flexibility (H1), and between the level dynamism – a second factor of environmental turbulence – and operational flexibility (H2) and strategic flexibility (H3) respectively. With that, our results provide empirical support for a core proposition

in dynamic capability theory. Such findings have been provided previously at industry-level at best (Nadkarni and Naranayan 2007), while accounting for heterogeneity at firm level has been argued to be better suited to analyze resource or capability effectiveness (Newbert 2008, Brouthers et al. 2008).

Second, a derivative of our study concerns the relative weight to be given to various dimensions of environmental turbulence. As expressed explicitly by Volberda (1998: 196), and more implicitly by many others, unpredictability outweighs dynamism as far as the direct (negative) effects on firm performance are concerned.

Third, consistent with the notion of a hierarchy of dynamic capabilities and supporting organization design parameters (see §2.2Theory Development), when there's no specific demand for higher order capabilities, lower order capabilities have superior technical fitness. In other words, the costs of developing and sustaining lower order types of flexibility are substantially lower than the costs of deploying higher order types of flexibility while both types are equally effective to deal with predictable market turbulence. Our results demonstrate superior performance effects of operational flexibility compared to strategic flexibility when the level of unpredictability in the environment is low (H4). This notion is present in various conceptual definitions of organizational flexibility and dynamic capabilities (Suarez, Cusumano and Fine 1995, Grant 1996, Volberda 1996, Winter 2003, Sanchez 2004, Helfat et al. 2007) yet has not been tested on a large dataset as of yet.

Operational flexibility also appear to play a much bigger role in the flexibility mix of firms in stable and predictable markets compared to highly turbulent markets. This points at the options and costs of developing strategic flexibility through other means than operational flexibility, such as structural flexibility and highly responsive organization designs.

Implications and future research

Within the theoretical domain, besides the implications for empirical studies into organizational flexibility and environmental turbulence, our work has implications with respect to the analysis of the performance of dynamic capabilities.

Future empirical work should account for variance within the broad constructs of dynamic capabilities and organizational flexibility. Our work demonstrates the existence of various types of flexibility and the variation in context specificity. Both operational and strategic flexibility provide a response capacity to environmental change and these responses are *fundamentally different*; different in the order of change effectuated by these capabilities (cf. Winter 2003) and different in the structural relationship with various dimensions of environmental turbulence (cf. Volberda 1996). Furthermore, our work brought forward indications that the composition of the flexibility mix changes with the kind of environmental turbulence faced by the company. In a future research project, the composition of the flexibility mix and the organization design choices applied by firms operating in hypercompetitive markets should be investigated into more detail to provide insights into the variations in the way highly flexible firms develop.

This work also has implications for research into the performance of dynamic capabilities. Performance of dynamic capabilities is argued to be dependent upon internal factors, the quality and costs of developing and deploying capabilities, and upon external factors such as market demand and competition for dynamic capabilities (Helfat et al. 2007). Variance in the performance of firms in our dataset seems to be determined primarily by the technical fitness of the dynamic capabilities of those firms: firms equipped with (higher-order) dynamic capabilities outperform firms with less or lower-order dynamic capabilities, but not in low turbulence environments. Future research might try to distinguish more

specifically the technical fitness from evolutionary fitness.

Within the managerial and professional domain, our work presents a normative model using relatively easy to obtain primary data at firm level. Such a model enables managers and professional to apply the concept of context specific dynamic capabilities to practice and structure decision-making concerning those capabilities.

Conclusion

Dynamic capability theory stresses the importance of organizational processes aimed at reconfiguring internal and external resource bundles in order to create new competitive advantages. Such processes may take the shape of dynamic capabilities and the mix of dynamic capabilities should match the context in which they're deployed. Applying a framework of organizational flexibility, with various types of flexibility reflecting the presence of different kinds of dynamic capabilities, this study provides insights into context specificity and performance of various types of dynamic capabilities. Our results indicate that the performance effects of strategic flexible capabilities are greater in a turbulent environment. However, contrary to what we expected, lower-order types of flexibility do not outperform higher-order types of flexibility in predictable markets. Strategic flexibility seems to trump the effect of operational flexibility in any type of market. Interestingly, in less turbulent markets firms do seem to draw more on potentially more economic ways to develop organizational flexibility, such as operational flexibility, compared to highly turbulent markets.

4 Firm Size and Strategic Flexibility: Understanding Equifinality and Performance Consequences[3]

Abstract

Small firm size is often associated with strategic flexibility, yet scholarly research shows contradicting ideas and findings about the nature of the relationship and does not address size related performance implications. Building on arguments from dynamic capabilities as well as organization design literature, we propose a set of mediators, which affect the capability to create strategic flexibility. Subsequently, we apply organizational economics to argue how firm size affects the capacity to generate rents.

Using archival and survey data from 1,904 firms across 15 industries, we empirically demonstrate opposing mediating effects between firm size and strategic flexibility and show how firm size positively moderates performance consequences of strategic flexibility. The findings contribute to the literature by highlighting that firm size and strategic flexibility do not have a one-dimensional relationship and that both small and large develop strategic flexibility through different means. Furthermore, we show large firms are in a better position to generate rents from strategic flexibility.

[3] This chapter is based on an article with Ernst Verwaal and Henk Volberda, submitted to Strategic Management Journal in February 2009 and presently under review.

4.1 Introduction

Are small firms better equipped than large firms to compete in today's hypercompetitive markets, as often assumed in both academic and management literature? Or can large firms' scale and scope advantages contribute to strategic flexibility as well, as some scholars bring forward? We argue that scholarly literature on firm size and flexibility foregoes the complex nature of strategic flexibility, which questions the validity of earlier findings. We reject a one-dimensional perspective on the effects of firm size on strategic flexibility and propose that the relationship is mediated by a set of organizational factors. Furthermore, we argue that differences in value generating capabilities constrain small firms' capacity to generate rents from strategic flexibility.

A variety of scholars has described and documented increasing levels of competition in the business context (e.g. D'Aveni 1994, Kraatz and Zajac 2001, McNamara et al. 2003, Wiggins and Ruefli 2005). As a consequence, competitive advantages are nullified rapidly requiring firms to develop dynamic capabilities (Teece et al. 1997, Eisenhardt and Martin 2000, Helfat et al. 2007). One can conceive of a hierarchy of dynamic capabilities (Suarez, Cusumano and Fine 1995, Grant 1996, Winter 2003, Sanchez 2004) and this hierarchy is reflected in a hierarchy of flexibility types. These range from steady-state flexibility (ordinary operating routines) to operational flexibility, structural flexibility, and strategic flexibility (Ansoff and Brandenburg 1971, Volberda 1996, Johnson et al. 2003, De Toni and Tonchia 2005). In this hierarchy, strategic flexibility trumps lower order types of flexibility: it benefits from other types of flexibility and may substitute for them (see §2.2) and has superior performance effects (see §3.2).

Meanwhile, researchers recognize organizational size as a critical variable moderating the relationship between strategy and performance (Hofer 1975, Smith

et al. 1989, Donaldson 2001, Dobrev and Carroll 2003) and empirical studies demonstrated basic differences in the behaviours and characteristics of small firms compared to large firms (Chen and Hambrick 1995, Dean et al. 1998). According to Chen and Hambrick (1995: 477), the significance of organizational size in shaping competitive dynamics indicates a need and an opportunity for much more research on this important strategy topic.

Many authors argue for superior strategic flexibility of smaller firms (e.g. Penrose 1959: 220, Quinn 1985, Gupta and Cawthon 1996, Bougrain and Haudeville 2002). A commonplace assumption holds that it is less easy to coordinate effectively and utilize resources well in a large firm than in a smaller firm (Majumdar 2000). Empirical evidence is scant, however (Dean et al. 1998) and often applies a partial or simplistic perspective on organizational flexibility, failing to recognize the true variance in strategy implementation (e.g. Haveman 1993, Ebben and Johnson 2005, Fiegenbaum and Karnani 1991). The effects of firm size on the performance effects of strategic flexibility, the most important type of flexibility, have not been studied empirically, which limits the relevance of these studies for strategic management.

Furthermore, the literature is inconclusive on the nature of the relationship: various authors argue that due to the sheer size and diversity of their resources and routines large organizations can exhibit high levels of strategic flexibility as well (e.g. Boeker 1991, Bowman and Hurry 1993, Haveman 1993, Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007). Or, as Rajagopalan and Spreitzer (1997) put it in their review of strategic change literature, the theoretical quandary of whether firm size is a source of inertia or a source of resources for strategic flexibility remains unanswered (Rajagopalan and Spreitzer 1997: 48-49).

Existing literature, foregoes the complex nature of flexibility, is inconclusive and hardly touches upon the performance effects of strategic

flexibility for small and large firms. Such partial or oversimplified perspectives with a limited interpretation of flexibility may cause findings to be misinterpreted. They also explain the existence of contradictions in literature. It points to a gap in the literature with respect to the true relationship between firm size and organizational flexibility. The present paper addresses these limitations in the literature. We test our model on a large sample of firms and are first to empirically investigate performance consequences. We find strong support for opposing mediating effects and the moderating effect of firm size on performance consequences of strategic flexibility.

Next, the paper proceeds to reconcile different perspectives in strategic management literature to develop an explanatory model which unravels the complexity of the firm size and strategic flexibility relationship and relates firm size and strategic flexibility to firm performance. In the method section we describe our panel of respondents and firms and validate our measures. We then test our hypotheses with rich survey and archival data and, finally, discuss the implications for scholarly research and managerial practice.

4.2 Theory and Hypotheses

Strategic flexibility refers to a firm's ability to develop and deploy capabilities that enable managers to reconfigure the firm's resource base quickly and effectively (Eisenhardt and Martin 2000, Helfat et al. 2007), change the nature of their activities (Aaker and Mascarenhas 1984), or dismantle its current strategies (Harrigan 1985). Strategic flexibility requires a large variety of dynamic capabilities which can be applied at high speed (Volberda 1996) and is generally perceived as a requisite capability to compete successfully in turbulent environments where competitive advantages can be nullified rapidly (D'Aveni 1994). The concept of strategic flexibility has been described and studied by numerous authors (e.g. Eppink 1978, Aaker and Mascarenhas 1984, Bahrami, 1992, Sanchez 1995, Volberda 1996, 1998, Buckley and Casson 1998, Hitt et al.,

1998). Other terms that broadly denote the same concept include strategic responsiveness (Ansoff and Brandenburg 1971), adaptive capacity (Astley and Brahm 1989), transformative capability (Garud and Nayyar 1994), and strategic response capability (Bettis and Hitt 1995).

Firm size and the development of strategic flexibility

Traditional organization design theory states that effective strategic flexibility requires a responsive organization (Sanchez 1995, Lei et al., 1996, Volberda 1998), or more specifically: non-routine technologies (Perrow 1967, Hage and Aiken 1969), an organic structure (Burns and Stalker 1961, Khandwalla, 1977, Quinn 1985) and an innovative culture (Eppink 1978, Weick 1985, Johnson 1987).

In the organization design perspective, large firms owe their scale and efficiency advantages to a complex system of repetitive and specialized routines (Barney 1997, Dobrev and Carroll 2003: 542), the proliferation of which reduces the speed and effectiveness of dynamic capabilities in general (Nelson and Winter 1982, Volberda 1998, Eisenhardt and Martin 2000) and increases structural inertia (Hannan and Freeman 1984).

Small firms are generally perceived to deploy more non-routines technologies (Mills and Schumann 1985, Ballantine et al. 1993, Chen and Hambrick 1995, Sanchez and Mahoney 1996), organic structures (Neilsen 1974, Chen and Hambrick 1995, Forbes and Milliken 1999, Das and Husain 1993, Busenitz and Barney 1997), and innovative cultures (Fiegenbaum and Karnani 1991, Gupta and Cawthon 1996, Levy and Powell 1998). From an organization design perspective, large size would therefore be associated with inferior organizational responsiveness and therefore inferior strategic flexibility.

The dynamic capabilities approach brings in a different dimension of strategic flexibility related to environmental information processing. In rapidly

changing environments there is obvious value in the ability to sense the need to reconfigure the firm's asset structure, and to accomplish the necessary internal and external transformation (Amit and Schoemaker 1993, Volberda 1998, Teece et al. 2002, Denrell et al. 2003). In such environments, correct and timely signaling of alterations in competitive forces is of crucial importance (Eppink 1978, Amit and Schoemaker 1993, Volberda 1998). This requires constant surveillance of markets and technologies (Teece et al. 1997, Helfat et al. 2007, Teece 2007) or, more broadly, environmental information processing capabilities.

Larger firms are equipped with greater information processing capacity (Mohan-Neill 1995, Strandholm and Kumar 2003) and more advanced information processing capabilities (Verwaal and Donkers 2002) compared to small firms and are better positioned to identify a richer set of potential solutions and better endowed to more astutely evaluate the viability of these alternatives (Winter 1987, Cohen and Levinthal 1990, Bercovitz and Mitchell 2007). Small firms, on the other hand, employ less specialized staff than larger firms, which limits their capacity to search and monitor their environment (Nooteboom 1993: 291). From a dynamic capabilities perspective, large size would therefore be associated with increased flexibility.

These perspectives each have their theoretical and empirical underpinnings but assume a single dimensional concept of strategic flexibility. Reconciling the organization design and dynamic capabilities perspectives into a multi-dimensional model of strategic flexibility would overcome the limitations of single lens approaches and may provide a more nuanced understanding of the firm size and strategic flexibility relationship. We propose that firm size has opposing effects on the underlying dimensions of strategic flexibility and that both large and small firms may demonstrate strategic flexibility, be it with different compositions. A model which includes the underlying dimensions of strategic flexibility and how they mediate the firm size and strategic flexibility relationship

(see Figure 4.1) would therefore better explain variation in strategic flexibility than a model assuming a *direct* relationship between firm size and strategic flexibility.

> HYPOTHESIS 1. *The relationship between firm size and strategic flexibility is negatively mediated by a) non-routine technology, b) organic structure, and c) innovative culture and positively mediated by d) external information processing capabilities.*

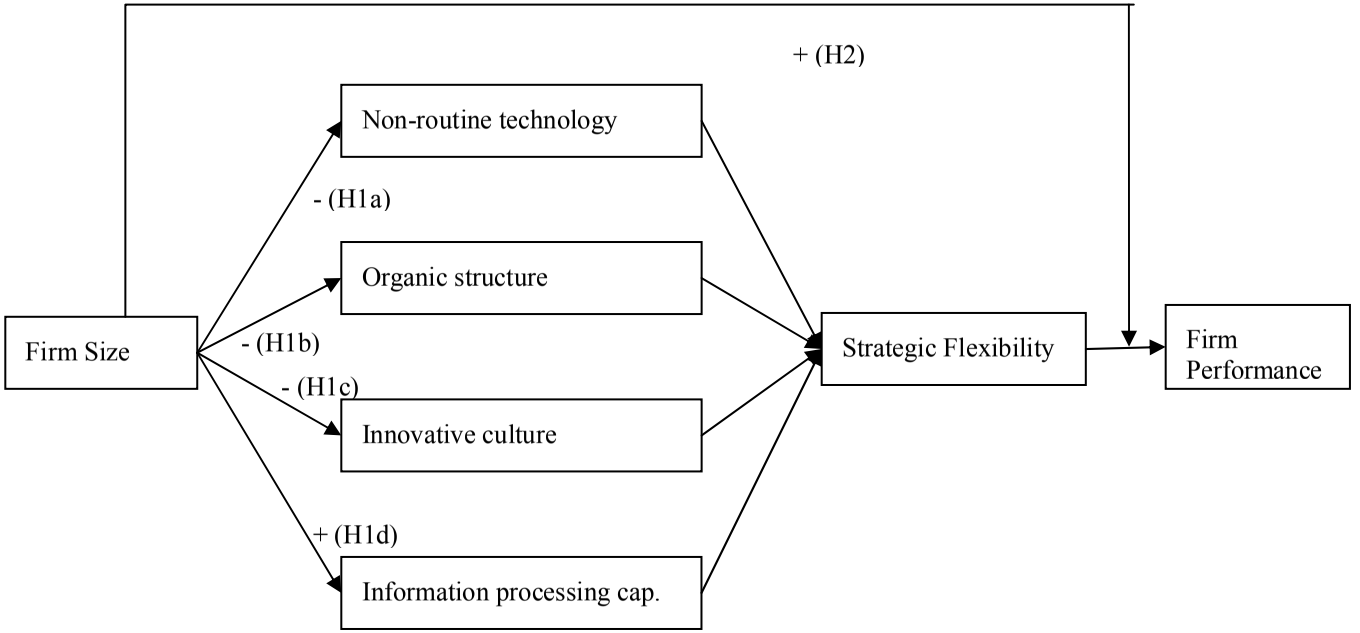

Figure 4.1 Theoretical framework and hypotheses

Firm size and rents generated from strategic flexibility

Assuming that both small and large firms are able to develop strategic flexibility, be it through different means, the question remains whether their flexible capabilities perform equally. Helfat et al. (2007) points at three factors that determine the performance of dynamic capabilities, or 'evolutionary fitness': technical fitness, market demand and competition. Market demand and competition refer to the extent to which strategic flexibility matches with the requirements from the external environment. Technical fitness denotes how effectively a dynamic capability performs its intended function when normalized (divided) by its cost (Helfat et al. 2007: 7), i.e. technical fitness is a function of the quality of a dynamic capability and the costs to create and utilize that capability. We propose that smaller firms achieve less technical fitness compared to large firms: they incur higher costs and generate less rents from strategic flexibility as they are more dependent on external resources and less efficient in obtaining such resources.

At all levels of organizational flexibility, firms depend to a high extent on external resources (Volberda 1998). Small firms have limited in-house resources available and are therefore more dependent on external parties than large firms (Dyer and Singh 1998, Bercovitz and Mitchell 2007) and therefore are at a disadvantage in generating rents in conditions of high external task interdependence (Penrose 1959, Klein, Crawford, and Alchain 1978, Mosakowski 2002).

Two arguments from the organizational-economics literature explain the disadvantage of smaller firms in generating rents from complementary and interdependent resources: market power and transaction costs.

Market power is frequently suggested as an advantage of large size (e.g. Scherer and Ross 1990, Dean et al. 1998). Through market power, larger firms can exert more bargaining power over external partners and will be more efficient in

generating rents from required resources.

As smaller firms are more likely to capitalize on their niche-filling (Chen and Hambrick 1995) and product-differentiating capabilities (Dean et al. 1998), small firms' strategies are more likely to require specific adaptation of suppliers and buyers and this may weaken their capacity to appropriate value from those transactions.

Furthermore, the transaction costs incurred by small firms in the search and monitoring of transaction partners impose considerable set-up costs regardless of the size of the connection with a transaction partner, and thus weigh more heavily for smaller firms (Verwaal and Donkers 2002).

Larger firms may also enjoy the benefits of transparency, a higher level of institutional trust, and reputation. (Nooteboom 1993: 291) which further reduce transaction costs and improve their bargaining position in exchange relationships. In addition, large firms with high market power may be able to neutralize the impact of transaction costs (Shervani et al. 2007).

Therefore, from a variety of perspectives we may conclude that small firms are more dependent on external resources to develop strategic flexibility and less able to generate rents from new resource combinations created with external partners. Figure 4.1 depicts the moderating effect of firm size as stated in our second hypothesis.

-HYPOTHESIS 2: *The effects of strategic flexibility on firm performance are positively moderated by firm size.*

4.3 Methods

Sample

Data was collected from a panel of organizations in the Netherlands using a structured questionnaire. The sample contains 3,290 responses from 1,904 organizations. The sample consists of various size classes and includes profit and

non-profit firms across 15 sectors of economic activities (see Appendix A. Sample Characteristics). Data was collected in the period 1996–2006 and respondents were executives or senior managers able to assess firm level conditions.

To assess potential problems of single source bias, we've collected multi-informant data for 133 organizations, which allows us to examine interrater reliability and interrater agreement. Using the subset of firms for which we have multiple respondents (ranging from 5 to 34 respondents per firm), we have calculated an interrater agreement score, r_{wg}, for each study variable (James et al. 1993). The median interrater agreement ranged from .68 to .80, suggesting adequate agreement as it exceeds the generally accepted cut-off point of .60 (Glick 1985). In addition, examination of within-group reliability coefficients revealed a strong level of interrater reliability (Jones et al. 1983), with intra-class correlations ranging from .75 to .93, and significant ($p < .001$).

Data measurement from one particular context could also be subjected to context measurement effects, which refers to any artifactual covariation produced from the context in which measures are obtained independent of the content of the construct themselves (Podsakoff et al. 2003). This bias is caused by the fact that both the predictor and criterion variable are measured at the same point in time using the same medium. Several tests are available to examine whether context measurement bias may augment relationships between the variables. We first performed Harman's one-factor test on the self-reported items of the latent constructs included in our study. The hypothesis of one general factor underlying the relationships was rejected ($p<.01$). In addition, we found multiple factors and the first factor did not account for the majority of the variance. Second, a model fit of the measurement model of more than .90 suggests no problems with common context bias (Bagozzi, Yi and Phillips 1991). Third, the smallest observed correlation among the model variables can function as a proxy for common method bias (Lindell and Brandt 2000). Table 4.2 on page 101 shows an

insignificant correlation value of (r = -.01) to be the smallest correlation between the model variables, which indicates that common context bias is not a problem. Finally, we performed a partial correlation method (Podsakoff and Organ 1986). The highest factor between an unrelated set of items and each predictor variable was added to the model. These factors did not produce a significant change in variance explained, again suggesting no substantial common context bias. In sum, we conclude that the evidence from a variety of methods supports the assumption that common rater and common context bias does not account for the study's results. Furthermore, our size measure is based on archival data and the performance measure proved to be highly correlated with archival measures of firm performance (Pearson correlation of .69 with *Return On Assets*) and was consistently significant at $p < 0.01$ ($n = 56$).

Measures

Firm size

The size contingency is measured by the number of organizational members to be organized (Blau 1970), as the number of organizational members determines the structure that is required (Abdel-Khalik 1988; Donaldson 2001). Size is therefore appropriately operationalized in empirical studies by the number of employees (Pugh et al. 1969) as reported in the firm's financial reports. Alternative measures such as sales volume have been shown to be highly correlated with number of employees (Smith et al. 1989), but are at best proxies for the size contingency (Donaldson 2001, p. 21). Under Dutch external reporting requirements, information on the number of employees is in general better available than on any of the proxies so there is no need to use these alternative measures of the size contingency. The explanatory variable we use is the natural logarithm of firm size, *LN(Firm size)*, and not the absolute number of employees, as we assume the relationship between size and strategic flexibility to be curvilinear. The negative curvilinear relationship is rendered linear by

transforming size logarithmically (see Blau and Schoenherr 1971).

Theory variables

To develop a measure of strategic flexibility, items were adapted from the work of Krijnen (1979), Mascarenhas (1982), Harrigan (1985), and Porter (1980). Items reflective of the technology dimension of organizational responsiveness were taken from Hill (1983), Perrow (1967), Hickson et al. (1969) and range from routine to non-routine. Items reflecting the organization structure dimension were adapted from Burns and Stalker (1961), Pugh et al. (1963), Lawrence and Lorsch (1967), Mintzberg (1979), and Hrebiniak and Joyce (1984) and range from mechanistic to organic. The organization culture dimension is reflected by items taken from Ouchi (1979), Hofstede (1980), Camerer and Vepsalainen (1988), and Hofstede et al. (1990) and ranges from conservative to innovative. Lastly, indicators of environmental information processing capabilities were adapted from Hayes and Pisano (1994), Henderson and Cockburn (1994), Volberda (1996), and Grant (1996).

Firm performance

Archival data on firm performance are available for a limited number of firms but survey measures of performance have been shown to be correlated quite highly with archival measures in organizations (Dess and Robinson 1984). Many small firms are exempted from reporting information on firm performance, thus, given the limited availability of the data, firm performance was measured using a scale with three survey items adopted from Jaworski and Kohli (1993). We tested the scale against archival data and on its intercoder agreement and intercoder reliability qualities. The survey measure proved to be highly correlated with accounting performance data (Pearson correlation of .69) and was consistently significant at $p < 0.01$ ($n = 56$). Both the interrater agreement score (cf. James et al. 1993) and the interrater reliability score (cf. Jones et al. 1983) for this scale are

adequate, with median r_{wg} = .76 and average within-group alpha coefficient of .95.

Control variables

In our model, we include several control variables for the degree of environmental turbulence and for industry effects and firm age. The environment is a well-established factor in contingency theory (Burns and Stalker 1961; Donaldson 2001) and most authors dealing with the topic of strategic flexibility explicitly include the environment in their definitions and models (e.g. Eppink 1978, Sanchez 1995, Johnson et al. 2003). Environmental turbulence is a resultant of three underlying dimensions: dynamism, complexity, and unpredictability of the changes concerning competitive forces in the firm's environment as described in the literature (Khandwalla 1977, Babüroglu 1988). To measure unpredictability, we use two indicators, the extent to which information about external change is absent and the extent to which cause-effect relationships are clear, conform Volberda (1998). The items reflecting the market dynamism and complexity of the task environment were adapted from Dill (1958), Duncan (1972), Lawrence and Lorsch (1967), and Thompson (1967).

We control for firm age, measured by the number of years from its founding, since age may influence the degree to which the organizational culture has been conserved, resources have been accumulated, and routines have proliferated. Further, as the impact of particular production technologies may vary substantially between types of industries, we control for industry effects by including dummy variables for manufacturing firms, trade firms, service firms, and non-profit organizations.

Table 4.1 Items and model variables

Constructs		Factor loadings	Item correlation w. total score
Dynamism (α = .84, composite reliability = .88, average variance extracted = .56)			
Obs 33	Changes in our market are very intense.	0,73	0,72
Obs 34	In our market, customers frequently demand completely new products and/or services.	0,74	0,73
Obs 35	In the market we operate in, changes happen continuously.	0,81	0,80
Obs 36	Our offering of products/services to our customers changes constantly.	0,75	0,74
Obs 37	In our market, the amount of products and/or services to be supplied changes often and quickly.	0,73	0,74
Obs 38	In the market we operate in, each day something changes.	0,71	0,73
Complexity (α = .82, composite reliability = .88, average variance extracted = .65)			
Obs 39	In our market, many factors need to be taken into account when making decisions.	0,82	0,82
Obs 40	In our market, new developments come from various directions.	0,76	0,77
Obs 41	In our market, everything is interrelated.	0,80	0,80
Obs 42	In our market, a decision has effect on numerous aspects.	0,84	0,83
Unpredictability: absence of information (α = .75, composite reliability = .81, average variance extracted = .47)			

Constructs			Factor loadings	Item correlation w. total score
Obs 43	Of what happens in our market, nothing remains unknown to us.	R	0,73	0,71
Obs 44	We are bound to get the information that we need concerning our market.	R	0,81	0,79
Obs 45	In our market, it is hard to make decisions based on reliable information.		0,51	0,58
Obs 46	We have sufficient information about our competitors.	R	0,68	0,69
Obs 47	We have sufficient insight and information about our customers.	R	0,67	0,66
Unpredictability: unclear cause-effect relations (α = .64, composite reliability = .78, average variance extracted = .53)				
Obs 48	A clear trend can be seen in the changes in our market.	R	0,61	0,66
Obs 49	Our market is completely unpredictable.		0,85	0,83
Obs 50	It is very hard to determine what is about to happen in our market.		0,81	0,80
Technology (routine <> non-routine) (α = .67, composite reliability = .80, average variance extracted = .50)				
Obs 1	The layout and set-up of our primary process can be changed easily.		0,63	0,67
Obs 2	Our equipment and information systems can be used for multiple purposes.		0,77	0,76
Obs 3	Our employees master several methods of production and operations.		0,81	0,78
Obs 4	Our organization is up-to-date regarding 'know-how'.		0,61	0,61
Organizational structure (mechanistic <> organic) (α = .75, composite reliability = .84, average variance extracted = .58)				

Constructs			Factor loadings	Item correlation w. total score
Obs 5	Our organization uses extensive and structured systems for planning and control.	R	0,72	0,72
Obs 6	In our organization, the division of work is defined in detailed descriptions of jobs and tasks.	R	0,83	0,81
Obs 7	In our organization, everything has been laid down in rules.	R	0,85	0,83
Obs 8	In our organization, there are a lot of consultation bodies.	R	0,63	0,67
Organizational culture (conservative <> innovative) (α = .70, composite reliability = .82, average variance extracted = .54)				
Obs 9	For our organization, goes: 'The rules of our organization can't be broken, even if someone means that it is in the company's best interest'.	R	0,68	0,72
Obs 10	Deviating opinions are not tolerated in our organization.	R	0,84	0,81
Obs 11	Creativity is highly appreciated in our organization.		0,65	0,68
Obs 12	The person that introduces a less successful idea in our company can forget about his/her career.	R	0,76	0,72
Information processing capabilities (α = .70, composite reliability = .81, average variance extracted = .40)				
Obs 13	In our organization, we often carry out an extensive competitor analysis.		0,72	0,71
Obs 14	Competitors do not hold any secrets for us.		0,60	0,61
Obs 15	In our organization, we systematically monitor technological developments concerning our products/services and the production/service process.		0,72	0,73

Constructs		Factor loadings	Item correlation w. total score
Obs 16	Customers' needs and complaints are systematically registered in our organization.	0,62	0,67
Obs 17	In our industry, we are always first to know what's going on.	0,70	0,68
Strategic flexibility (α = .76, composite reliability = .85, average variance extracted = .59)			
Obs 26	Our organization can easily add new products/services to the existing assortment.	0,72	0,73
Obs 27	In our organization, we apply new technologies relatively often.	0,80	0,79
Obs 28	Our organization is very active in creating new product–market combinations.	0,83	0,82
Obs 29	In our organization, we try to reduce risks by assuring we have products/services in different phases of their life cycles.	0,72	0,73
Firm performance (α = .83, composite reliability = .89, average variance extracted = .74)			
Obs 30	Our organization is very profitable.	0,77	0,82
Obs 31	In comparison with similar organizations, we are doing very well.	0,91	0,88
Obs 32	Our competitors can be jealous of our performance.	0,89	0,87

R = 'Reversed item'

Item selection

The measures we used for our constructs are perceptual, except for the size measure which is based on archival data. Our preference for perceptual data reflects our choice to operationalise the strategic flexibility construct and its underlying dimensions in terms of managerial perceptions because perceptual measures are more appropriate for explaining managerial behaviour than archival measures (Bourgeois 1980).

We generated an initial list of Likert-type items based on the definitions of the constructs and by reviewing the literature that relates to these dimensions. Furthermore, exploratory interviews with management consultants and audits within various firms served as a basis for item generation and content validity assessment.

The psychometric properties of the scales were investigated using exploratory factor analysis. The different dimensions of the scales were analyzed using principal component procedures and varimax rotation to assess their unidimensionality and factor structure. Only items that satisfied the following criteria were included: (1) items should have communality higher than .3; (2) dominant loadings should be greater than .5; (3) cross-loadings should be lower than .3; and (4) the scree plot criterion should be satisfied (Briggs and Cheek 1988).

The reliabilities of the dimensions of each scale were assessed by means of the Cronbach alpha coefficient. Each separate dimension achieves an alpha varying between .66 and .84 (see Table 4.1). Variables with relatively low reliability are technology ($\alpha = .69$) and culture ($\alpha = .69$). These are all variables for organizational-level constructs that are broad in conceptual scope (i.e. constructs defined by two or more distinct elements or underlying dimensions). Their reliability exceeds the level of .55 recommended for such constructs by Van de Ven and Ferry (1980). Furthermore, all items have correlations of more than .50

with their respective constructs, which suggests satisfactory convergent validity of the scale items.

Each perceptual measure is comprised of three to six items and measured on a 7-point scale. We used confirmatory factor analysis with EQS version 6.1 to validate the scales resulting from the exploratory factor analysis. A satisfactory fit was achieved with root-mean-square estimated residual RMSEA = .05 and confirmatory factor index CFI = .94.

4.4 Results and Analysis

Descriptive statistics and a pooled correlation matrix for all variables included in the study are presented in Table 4.2. The opposing relationships proposed in hypotheses 1a and 1b appear to be supported, considering the negative coefficient between firm size and organizational responsiveness as opposed to the positive coefficient between firm size and information processing capabilities. Strategic flexibility appears to be positively correlated to both variables, as our first hypothesis suggests.

Table 4.2 Descriptive statistics and pairwise correlation matrix between major variables

		Mean	Std. Dev	N	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Firm size (LN)	5.679	2.110	3290	1						
(2)	Technology	4.199	1.125	3266	-.185	1					
					(.000)						
(3)	Organizational structure	3.715	1.298	3283	-.297	.052	1				
					(.000)	(.003)					
(4)	Organizational culture	5.395	1.097	3285	-.277	.258	.266	1			
					(.000)	(.000)	(.000)				
(5)	Information processing capabilities	4.295	1.102	3278	.134	.284	-.248	.170	1		
					(.000)	(.000)	(.000)	(.000)			
(6)	Strategic flexibility	4.374	1.295	3285	.003	.483	.005	.287	.450	1	
					(.883)	(.000)	(.758)	(.000)	(.000)		
(7)	Firm performance	4.820	1.240	3273	.032	.294	-.105	.202	.435	.372	1
					(.071)	(.000)	(.000)	(.000)	(.000)	(.000)	

In order to test hypothesis 1a-d, we developed a structural path model (see Figure 4.1) and examined model fit and coefficients between factors with EQS 6.1 (See Table 4.3). Results show a RMSEA of .05 and a CFI of .97, indicating good fit, and the model's R-square reaches .59. Results show negative effects between firm size and technology (ß = -.174, $p < .001$), structure (ß = -.246, $p < .001$) and innovative culture (ß = -.165, $p < .001$), and a positive effect between firm size and external information processing capabilities (ß = .043, $p < .001$). With respect to the right hand side of the model, all variables are positively related to strategic flexibility. Together, these results provide support for hypotheses 1a-d.

Table 4.3 **SEM Maximum Likelihood Estimates of the structural paths (N=2914).** Unstandardized coefficients with standard errors between brackets.

	Path Model	
Model fit		
GFI (absolute fit index)	.990	
CFI (comparative fit index)	.970	
RMSEA (absolute fit index)	.050	
90% confidence interval RMSEA	.042	.058
R-Squared	.585	
Structural paths		
LN (Employees) → Technology	-.174 (.013)	***
LN (Employees) → Organizational structure	-.246 (.014)	***
LN (Employees) → Organizational culture	-.165 (.012)	***
LN (Employees) → Information processing cap.	.043 (.012)	***
Technology → Strategic flexibility	.395 (.018)	***
Organizational structure → Strategic flexibility	.037 (.016)	*
Organizational culture → Strategic flexibility	.171 (.019)	***
Information processing cap. → Strategic flexibility	.369 (.019)	***
Control variables		
Industrial firms	.226 (.051)	***
Trade firms	.459 (.113)	***
Service firms	.248 (.045)	***

* = $p < .05$ Two-tailed significance.
** = $p < .01$
*** = $p < .001$

In order to test hypothesis 2, we used hierarchical regression analysis of

the effects on firm performance, entering firm size and strategic flexibility as well as the interaction term stating the mean-centred product of firm size and strategic flexibility (see Table 4.4). Results demonstrate that both firm size (ß =.029, $p <$ 0.01) and strategic flexibility (ß =.313, $p < 0.01$) are positively related to firm performance (Model II). Entering the interaction term in Model III, firm size becomes less significant as a predictor of performance ($p < 0.05$), while the interaction term proves to be significant and positive, as predicted (ß =.035, $p <$ 0.01). These results provide support for the second hypothesis stating that performance consequences of strategic flexibility increase with firm size.

The results prove to be sensitive to the inclusion of very large firms. When firms with more than 5,000 employees are excluded from the sample, firm size is no longer a significant predictor of performance. This indicates that very large firms are at a performance advantage vis á vis smaller firms, irrespective of their strategic flexibility.

Table 4.4 Hierarchical regression of strategic flexibility, firm size, and interaction term on firm performance

Variables	Model I		Model II		Model III	
(Constant)	5.060	***	4.092	***	4.145	***
Firm age	-4.8E-5		-5.7E-5		-6.0E-5	
Industrial firms	.375	***	.260	***	.255	***
Trade firms	.344	*	.235	*	.236	*
Service firms	.318	***	.272	***	.271	***
Non-profit organizations	-.367	***	-.275	***	-.269	***
Market dynamism	.109	***	-.028		-.028	
Complexity of task environment	.072	***	.037	*	.036	
Unpredictability: absence of info	-.292	***	-.242	***	-.240	***
Unpredictability: unclear cause-effect	-.060	**	-.038	*	-.039	*
LN(Employees)			.029	***	.022	**
Strategic flexibility			.313	***	.314	***
LN(Employees) x Strategic flexibility					.035	***
	$r^2 = .118$		$r^2 = .199$		$r^2 = .204$	
	F = 42.410		F = 64.041		F = 60.720	

*** Significant at the 0.01 level (2-tailed).

** Significant at the 0.05 level (2-tailed).

* Significant at the 0.10 level (2-tailed).

4.5 Discussion

Recapitulating, on a general level the present study corroborates long standing assumptions about organizational size as a critical variable moderating the relationship between strategy and performance (cf. Donaldson 2001, Dobrev and Carrol 2003) and about basic differences in the characteristics of small firms and large firms (cf Chen and Hambrick 1995, Dean et al. 1998).

More specifically, we investigated the relationship between firm size and strategic flexibility, aiming to resolve some of the contradictions in management literature about the nature of this relationship and to strengthen the scant body of empirical evidence on this topic.

We contribute to the literature by adding and testing a set of factors mediating the relationship between firm size and strategic flexibility and a by introducing firm size as a moderator on the performance consequences of strategic flexibility.

Summarized, we propose first that strategic flexibility is a result of both organizational responsiveness and external information processing capabilities and that firm size has opposing relationships with these dimensions. This implies that small and large firms can achieve strategic flexibility through different means, i.e. there's equifinality in strategic flexibility.

Including the underlying dimensions of strategic flexibility in the equation has surfaced aspects of variation in strategy implementation between small and large firms, as suggested by Fiegenbaum and Karnani (1991), Haveman (1993) and Ebben and Johnson (2005).

Fiegenbaum and Karnani (1991), particularly, point at different arguments from economic literature and organization literature. We argued that different perspectives favour small firms or large firms and there's a need to include multiple perspectives to highlight variations in the way firms van achieve strategic

flexibility. Passing over such variation might lead to false conclusions, particularly Type II errors, as the null-hypothesis stating there are no differences between small and large firms may be falsely accepted. This becomes clear in our sample, where firm size does not correlate with strategic flexibility (see Table 4.2), while we demonstrated significant effects between firm size and the underlying dimensions of strategic flexibility (see Table 4.3).

Second, we argue how rent generation capacity is affected by firm size. Once large firms are able to overcome inertia and achieve superior strategic flexibility, scale and scope advantages increase their returns at an increasing rate. Therefore, it is important to note that although there's equifinality in strategic flexibility for small and large firms, there's a significant effect of firm size on the ability to generate rents from strategically flexible capabilities.

Limitations and future research

Our sample contains firms which have business in some way in The Netherlands and might therefore be culturally biased. However, as the sample contains multinational corporations as well and respondents with other nationalities than Dutch, we believe that this bias did not affect results strongly.

Although our dataset spans multiple years, respondents have not been structurally invited to fill out the survey in subsequent years, preventing us from carrying out longitudinal analysis. Such an analysis might shed more light on causal relationships in general and particularly on the effects of organizational growth on flexibility.

The identification of opposing relationships between organization variables and firm size points to equifinality in the way small and large firms develop strategic flexibility. However, not all variation in organizational responsiveness and information processing capabilities is explained by firm size, leaving room for firms to overcome certain barriers related to organizational size.

Our findings indicate that a fraction of all firms achieves 'ambidexterity', i.e. found ways to develop information processing capabilities and at the same time a responsive organization. Although the body of literature on ambidexterity has been growing in recent years (Gibson and Birkinshaw 2004, O'Reilly and Tushman 2004, Gupta et al. 2006, Jansen et al. 2006), little is currently known about the antecedents and performance effects of ambidexterity in relation to firm size. Post hoc analysis of so-called ambidextrous firms reveals that on average such firms are significantly smaller than the average firm. However, with on average 1507 employees, these firms can not be classified as small firms. A future in-depth study of these ambidextrous firms might answer whether this point of approximately 1500 employees indeed represents an optimum in the trade-off between information processing capabilities and organizational responsiveness, and secondly which trade-offs these firms made and how they surmounted the paradoxical nature the firm size and flexibility relationship.

In conclusion, we have presented a comprehensive model that demonstrates the complexity of the firm size – strategic flexibility relationship and unravels the performance consequences. Our framework addresses the role of organization design and dynamic capabilities in creating strategic flexibility within small and large firms, and pinpoints the effects of firm size on the capacity to generate rents from strategic flexibility. We are hopeful that by recognizing this, future studies will refrain from applying one-dimensional models and acknowledge the true complexity of strategic flexibility. Particularly, ambidexterity in small and large firms promises to be an interesting avenue for future research.

5 Organizational Adaptation, Institutional Forces and Firm Performance: Towards a Synthesis of Contingency and Institutional Fit[4]

Abstract

Drawing on contingency and institutional fit approaches, we examine complementary and interdependent sources of synergy of the organization with the environment. Prior scholarly research has examined both theories and compared their impact on organizational fit and performance. In this paper, we investigate how forces for task specific adaptation (and consequently population heterogeneity) and institutional forces (pressing firms to isomorphism) interact in the formation of firm performance. We test our theoretical framework using a dataset of 3,259 respondents from 1,904 companies regarding organizational adaptation and institutional demands on organizational flexibility, across a broad range of industries and firm size classes. Results show that contingency and institutional fit are complementary and interdependent explanations of firm performance. The impact of contingency misfit on performance is higher than for institutional misfit. However, we find that under high levels of institutional fit, contingency misfit has a substantially lower impact on firm performance compared to high levels of institutional misfit. These findings suggest that institutional fit is an important contingency factor in the formation of firm performance.

[4] This chapter is based on work with Ernst Verwaal, Henk Volberda, Antonio Verdu Jover and Marten Stienstra.

5.1 Introduction

What criteria do successful firms use regarding appropriate strategies and their organizational design? Do they strive to continuously adjust specific organization variables to specific elements in the task environment, or are firms conforming to the institutional pressures of the business environment? Different scholarly research streams in the strategic management literature acknowledged that fit of the organization with environmental demands is an important condition to gain and sustain high firm performance (Burton and Obel 2004). According to contingency theory, high performance is a consequence of fit between organization and environmental contingencies (Drazin and Van de Ven 1985, Donaldson 2001, Venkatraman 1989). Institutional theory, on the other hand, is also primarily concerned with the organization's relationship with the environment yet explains firm performance as a consequence of legitimacy (DiMaggio and Powell 1983, Scott 2001, Zucker 1987), leading to the notion of institutional fit (Kondra and Hinings 1998), or congruence of the organization's characteristics with ideal profiles. The different underlying mechanisms of these fit approaches lead to different and often conflicting predictions of firm performance. Integrating these perspectives is important because neither perspective can explain the success of organizational behaviour in its own right.

In contingency theory fit, firms have a firm-specific drive for contextual adaptation of organizational variables leading to organizational heterogeneity, whereas in institutional theory, fit is a consequence of institutional forces from the institutional environment and is industry-specific, leading to compliance to institutional pressures and homogeneity of firms through isomorphism. Although contingency theory and institutional theory use different conceptualizations of fit, both perspectives are open systems theories (Ashby 1956, Von Bertalanffy 1951, Scott 2003). In open systems theory, the primary explanation of performance is synergy as the sum of interconnected elements. Contingency and institutional fit

approaches are co-alignment approaches that focus on different types of synergy of the organization with the environment, and therefore can be combined. The two perspectives on organizational fit may have important linkages which may be unnoticed if they are studied in isolation. Thus, we propose that if important linkages are present between the different types of synergy, failure to integrate the two approaches may lead to incomplete understanding of the organization-environment relationship and incorrect predictions of firm performance.

Prior scholarly research (Carroll 1993, Child et al. 2003, Greening and Gray 1994, Gupta et al. 1994, Kraatz and Zajac 1996) has examined both theories and compared their impact on organizational change and performance. However, these studies did not investigate the impact on firm performance of conceptual and empirical linkages between the two approaches. If such linkages exit and are substantial, a single-lens approach of fit may produce incorrect theoretical predictions and conclusions. In this study, we address this gap in the literature and explicitly focus on how forces for uniqueness (and consequently for population heterogeneity) and institutional forces, pressing firms to isomorphism (and then to population homogeneity), *interact* in the formation of firm performance.

The paper proceeds as follows. First, we define the notion of fit and introduce a model of organizational flexibility (Volberda, 1996, 1998) that will be instrumental in specifying and testing hypotheses regarding various notions of fit. Hypotheses will be formulated with respect to a contingency fit-based model, which captures factors related to specific requirements of the task environment, and an institutional fit-based model, which captures pressures for conformity from the institutional environment. Furthermore, we develop hypotheses on the combined and interaction effects of these models. Since we are interested in the performance implications of homogeneity/heterogeneity in organizational and environmental variables, we use a large-scale cross-sectional sample of firms, across a wide range of industries and firm size classes, to test our hypotheses.

Thirdly, we present the results, finding that contingency and institutional fit are complementary and interdependent explanations of firm performance, and show that the combination of both theories produce superior insights in the relationship between fit and firm performance. The implications for management and scholarly work are discussed in the final section.

5.2 Theory and Hypotheses

The notion of fit

The concept of fit has been explored widely in organization and strategy literatures and covers much of the descriptive and prescriptive research in this arena. Fit is a polyvalent concept, rooted in contingency theory and population ecology (Van de Ven 1979) and developed in the fields of organization theory (Drazin and Van de Ven 1985, Van de Ven and Drazin 1985) and strategic management (Venkatraman 1989). The concept of fit has been used by both organization theorists and strategic management scholars as a key element explaining firm performance. Although the concept originated in contingency theory, it has been increasingly used in institutional theory in order to identify performance implications (Kondra and Hinings 1998). Our study analyzes fit implications for performance across these main organizational theories: contingency and institutional theory.

The notion of fit has been extensively defined in the literature. From a contingency perspective, Van de Ven and Drazin (1985) used three different definitions of fit based on three perspectives: the selection approach, the interaction approach and the systems approach. They used the selection approach to conceptualize fit as co-alignment between environmental characteristics and organizational variables. From the interaction approach, fit is "an interaction effect of organizational context and structure on performance" (p. 339). From the systems approach, fit is "the internal consistency of multiple contingencies,

structural and performance characteristics" (p. 334). Venkatraman (1989) defines fit as co-alignment of variables (internal and/or external) that explain the effects on a third variable such as performance (criterion-specific). These authors suggested different frameworks in order to clarify the concept of fit and its corresponding operationalization. In this paper, we link the different notions of fit with two major organizational theories and we explain how fit affects performance according to different theories. A summary of the main characteristics of the contingency and institutional fit approaches is presented in Table 5.1.

Table 5.1 Overview of institutional and contingency fit approaches

	Institutional Theory	**Contingency Theory**
Type of organizational fit	Normative fit (Naman and Slevin 1993) or institutional fit (Kondra and Hinings 1998)	Situational or contingency fit (Zajac et al. 2000, Burton et al. 2002)
Description	Organizations must fit ideal profiles, defined by characteristics, practices and designs that perform better (DiMaggio and Powell 1983, Venkatraman and Prescott 1990, Naman and Slevin 1993, Kondra and Hinings 1998)	Some characteristics of context must be co-aligned with some characteristics of other variables (structure, strategy, culture and technology) (Burns and Stalker 1961, Woodward 1965, Hofer 1975, Porter 1980, Donaldson 1987, Venkatraman and Prescott 1990)
Criterion variable	Performance through legitimacy	Performance through adaptation
Sources of synergy	Isomorphism	Adaptation

To enable empirical tests of the theoretical framework, we use Volberda's (1996) model of organizational flexibility (see Figure 5.1). The notion of fit plays a central role in organizational flexibility theory as the sufficiency of the flexibility and the adequacy of organization design are assumed to depend on the turbulence in the environment. The analytical model can be decomposed in internal

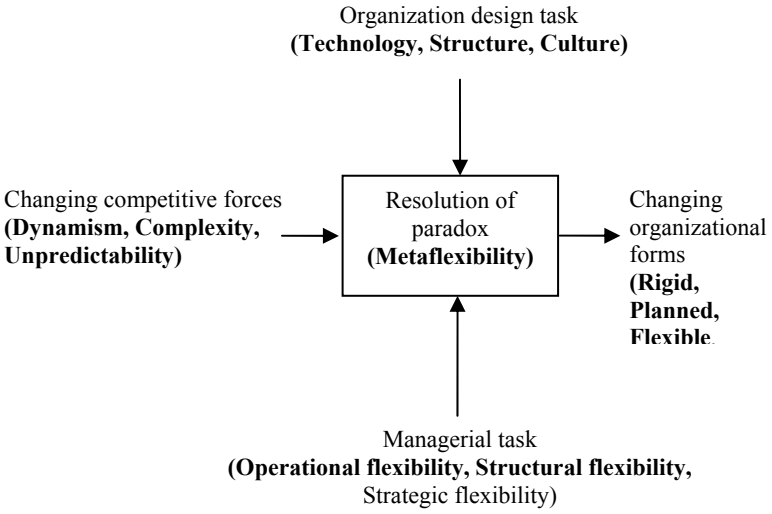

Figure 5.1 Framework of organizational flexibility (source Volberda 1996)

be decomposed in internal organizational and external environmental components, which allows us to test the contingency fit using selection and interaction approaches (Drazin and Van de Ven 1985). Furthermore, the model includes organization design parameters among its variables, which allows us to compare internal and external practices and thus analyze institutional fit as profile deviation (Venkatraman and Prescott 1990). Organization design parameters that promote organizational flexibility are relatively easy to observe by outsiders, and thus mimetic isomorphism (DiMaggio and Powell 1983) is testable.

Organizational fit within contingency theory

Contingency theory is a mid-range theory that involves identifying and matching context settings with organizational settings (Hambrick 1983). Since the 1960s, a large amount of research has been conducted using contingency theory as

the principal framework, relating the task environment to organizational characteristics (Burns and Stalker 1961; Emery and Trist 1965; Lawrence and Lorsch 1967; Woodward 1965) or to strategic management (Hambrick 1983; Hofer 1975; Porter 1980).

Contingency theory suggests that the appropriate organizational structure and management style depend on a set of 'contingency' factors (Tosi and Slocum 1984). There is no best way of organizing; the appropriate form depends on the kind of task environment that a firm is dealing with (Donaldson 2001). Task environmental conditions are considered a direct source of variation in organizational forms. Some authors suggest some appropriate forms depending on the speed of environmental change (Burns and Stalker 1961), rate of technological innovation (Woodward 1965) or level of uncertainty (Lawrence and Lorsch 1967). Neo-contingency theorists (Hamel and Prahalad 1994; Hrebiniak and Joyce 1985; Zajac et al. 2000) add a dynamic perspective of fit, in which adaptation is a dynamic process that is both managerially and environmentally inspired. Donaldson (2001) proposes a quasi-fit as a key to obtain high performance, since the permanent disequilibrium triggers a constant search for strategic and structural change. Contingency fit was examined in research by Roth and Morrison (1992) on environment-strategy co-alignment and more recently in research by Hitt et al. (2001) on resource strategy. Rice (1992) found support for a fit hypothesis through the match between information processing demand as an external variable and information processing capability as an internal variable. Priem (1994) explained high performance as a consequence of strategy-structure-environment matches based on executive judgments. Burton et al. (2002) used contingency fit to describe the internal consistency of multiple contingencies (size, climate, strategy, environment, leadership preferences) and multiple structural characteristics. Zajac et al. (2000) used contingency theory in a multi-contingent environment-strategy fit defined as strategic fit. Others supported the fit hypothesis using the alignment

of a few variables such as organization structure and dimensions of knowledge (Birkinshaw et al. 2002). Venkatraman and Prescott (1990) referred to contingency fit when a few characteristics of contextual variables are co-aligned with a few characteristics of other variables (structure, strategy, culture, technology). Thus, contingency theories include a variety of approaches which either focus on the effectiveness of fit across a variety of firms or focus on the adaptation processes by which individual firms achieve fit with their task environment. The first approach requires a comparison across firms that differ in organizational and task environmental variables, whereas the latter requires longitudinal study of organizational adaptation processes. In this paper, we focus on the first question: i.e. the performance implications of fit across a variety firms (Drazin and Van de Ven 1985; Venkatraman 1989).

According to Zeithaml et al. (1988) and Tosi and Slocum (1984), contingency theory-building involves three types of variables (contingency variables, response variables, effectiveness variables) and congruency or a notion of fit. Contingency variables are related to environmental context, and response variables to organizational structure or managerial actions. Effectiveness can be considered as performance in a narrow sense (Lawrence and Lorsch 1967). The essential premise of contingency theory is that effectiveness (high performance) can be achieved in more than one way. High performance is a consequence of co-alignment between a limited number of organizational and environmental factors (Tosi and Slocum 1984; Donaldson 1987).

Venkatraman (1989) suggests that the definition of contingency fit depends on the criterion-specificity and the number of variables in the fit equation. There are two main operational definitions of fit in the literature – interaction and congruence (Pennings 1987). However, as suggested by Donaldson (2001, p. 189-191) a multiplicative interaction fails to capture the relationship between contingency fit and performance. Therefore, we use in this study the concept of fit

as congruence which holds that high performance occurs when organizational response variables match environmental variables. Central to this notion is the fit line and deviation from that fit line. The fit line is considered to be a line of iso-performance (Van de Ven and Drazin 1985), meaning that for each value of the contingency, there is a value for the organizational variables that constitutes fit and produces the highest performance for that value of the contingency. All fits are equally good and better than misfits. The fit line can be identified empirically by finding a pattern between the contingency variable and organizational response variables amongst the high-performing firms. The hypothesis would hold, in this case, that deviation from the fit line has negative performance effects.

The identification of fit (or misfit) involves a two-step procedure. The first step involves the selection of a sub-sample of high-performing firms and regression of the organizational response variable on the contingency variable. Second, deviation from the resulting fit line is calculated for all firms. The hypothesis holds that deviation is negatively related to firm performance. According to the congruence definition of contingency fit, the impact of organizational response variables on firm performance depends on environmental characteristics according to the following equation:

$$Y = f(X, Z, X–X_Z)$$

where Y = firm performance, X = organizational response variables, Z = environmental characteristics and X_Z reflects the optimal value of X as determined by the fit line at point Z.

Application of contingency fit in the organizational flexibility framework

Within the organizational flexibility framework the degree of environmental turbulence represents the contingency variable, which is operationalized as the product of the level of dynamism within the market

environment and the degree to which changes are unpredictable (cf. Volberda 1998, Duncan 1972). This definition captures most of the dimensions attributed in definitions of constructs analogous to environmental turbulence (e.g. D'Aveni 1994: *Hypercompetition*, Davis et al. 2007: *Market dynamism*, Fine 1998 and Nadkarni and Narayanan 2007: *Industry clockspeed*). Organizational flexibility represents the response variable. When we apply the contingency fit equation to the organizational flexibility framework, X will be reflected by the firm's flexibility and Z will be reflected by the level of environmental turbulence. Deviation from the optimal fit line, expressed as the coefficient of environmental turbulence and organizational flexibility amongst high-performing firms, will negatively impact firm performance.

> *HYPOTHESIS 1 (H1). High firm performance is explained by the contingency fit of organizational flexibility and the level of environmental turbulence*

Organizational fit within institutional theory

Institutional theory examines the influence of the institutional context on the organizational structure (Scott 2001; Tolbert and Zucker 1996; Wicks 2001). DiMaggio and Powell (1983) describe three isomorphic processes – coercive, mimetic and normative – leading organizations to become increasingly similar. Coercive isomorphism results from pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function. Mimetic isomorphism derives from uncertainty and ambiguity surrounding goals. Normative isomorphism derives from professionalization. These forces may result in bandwagon pressures (Abrahamson and Rosenkopf 1993), according to which strategies diffuse through

an organizational field once a strategy is perceived to be legitimate. From the imperative of legitimacy-seeking behavior, organizations tend to follow the behavior of more successful firms (Haveman 1993), resulting in a high fit with the institutional environment. More recently, Oliver (1997) has suggested five main sources of firm homogeneity: regulatory pressures, strategic alliances, human capital transfers, social and professional relationships and competency blueprints. Firms seek out competency blueprints including direct imitation of successful competitors' best practices.

Institutional fit can be defined "as the degree of compliance by an organization with the organizational form of structures, routines and systems prescribed by institutional norms" (Kondra and Hinings 1998, p. 750). The criterion variable, which explains performance, is legitimacy (of social context), which ensures public support (DiMaggio and Powell 1983; Meyer and Rowan 1977; Zucker 1977). Institutional theory suggests that many aspects of organizations are driven by the desire to achieve fit with the institutional environment. Institutional fit may lead to inefficient organizational practices and structures; however, it increases organizational legitimacy, which in turn increases performance through different reinforcing mechanisms such as collective learning (Levitt and March 1988), access to resources (D'Aunno et al. 1991) and power (Fligstein 1987). Collective learning occurs as patterns of cognitive associations and causal beliefs are institutionalized into routines, which are diffused by coercive, mimetic and normative processes (DiMaggio and Powell 1983; Levitt and March 1988). Adoption of institutionalized routines increases organizational performance by the relative efficiency of learning from others compared with individual learning. Furthermore, the diffusion of institutionalized routines enhances legitimacy and power of the organizations (Meyer and Rowan 1977; Tolbert and Zucker 1983), which increases their ability to obtain needed resources from their environment (D'Aunno et al. 1991). High performers cope effectively

with the institutional requirements of the environment, so that they are considered as ideal profiles, and followers try to imitate them in order to increase their own performance. Thus, the institutional environment exerts strong pressures for institutional fit or adoption of practices of ideal profiles of organizational forms.

Institutional fit involves a comparison of internal and external organizational variables of structure, routines and systems (Kondra and Hinings 1998). Assessment of institutional fit requires the determination of the profile of high-performing firms, as they are assumed to have reached fit with the institutional context (cf. Kondra and Hinings 1998). Low performance would then be a consequence of misfit, which implies deviation from the ideal profile of high-performing firms. Deviation, or non-compliance, relates to the organizational form of structures, routines and systems (Kondra and Hinings 1998).

Application of institutional fit in the organizational flexibility framework

The organization design variables in the organizational flexibility framework represent the structure and systems variables wich are observable by other firms. These elements need to be matched internally, but particularly to the institutional context. The institutional context is represented by the profile of high-performing firms, i.e. firms ought to mimic the organization design of high performing firms to create institutional fit.

The equation will reflect the three organization design variables as identified in Volberda's frameworkof organizational flexibility (1996), i.e. the degree to which the firm's technology is non-routine, the degree to which the organizational structure is organic (as opposed to mechanistic), and the degree to which the organizational culture is open to innovation (as opposed to conservative). Furthermore, we include the external information processing practices of organizations which enable firms to predict external change more or less.

Misfit is than determined as the sum of the absolute deviations of these variables from the value as determined by the profile of high-performing firms. Misfit is than predicted to have negative effects on firm performance.

HYPOTHESIS 2 (H2). High firm performance is explained by the institutional fit of the firm's technology, structure, culture, and information processing practices with the average profile of high performing firms.

Complementary linkages between contingency and institutional fit

Contingency and institutional fit provide different explanations of firm performance. According to contingency theory, managers, taking into account the internal characteristics of the firm, analyze carefully the specific task environment and use more suitable practices or develop new ones in order to adapt, whereas in institutional theory the institutional norms pressure managers to copy best practices and other firms' ideas.

In the literature, we find different studies on contingency and institutional theory discussing their complementarities. Gupta et al. (1994), drawing on both contingency and institutional theory, studied coordination and control of organizational members, finding that an institutional approach better explains coordination and control in more institutionalized environments. They demonstrated that the two perspectives can be combined to study the effect of institutional forces to explain work-unit performance. From a sociological view, Carroll (1993) explained firms' successes using the adaptation-selection perspective, suggesting complementarities between contingency and institutional theories for the understanding of the homogeneity-heterogeneity of firms in different industries. Other studies have combined both theories to explain the organizational change and performance in transition economies, considering the

institutional constraints from the former political systems. Child et al. (2003) analyzed a large sample of firms in Hong Kong managing operations in China. They used alternative perspectives to explain business performance (natural selection, strategic adaptation, contingency) and reported empirical evidence that both business and institutional environment, strategic managerial action and the fit between firm organization and environmental contingencies all have significant influence on performance. They also discussed the complementarities of the perspectives: "although the business and institutional environments do have a significant influence on the performance of the cross-border affiliates in a transition economy, performance can be improved through strategic managerial action" (Child et al. 2003, p. 253). These contributions, which demonstrate the apparent coexistence of contingency and institutional fit, support the notion that both fit approaches independently explain firm performance.

The origin of both fit approaches is the open systems theory (Ashby 1956; Von Bertalanffy 1951). In open systems theory, the basic principle that explains performance is synergy as the sum of interconnected elements (Siggelkow 2001). Fit means co-alignment among variables, and both contingency and institutional theories have used this notion in order to explain high performance from different sources of synergy of the organization with the environment. Synergy in contingency theory refers to the interconnection of the organization with specific environmental demands, whereas synergy in institutional fit refers to the interconnection of the organization with the uniform institutional demands of the industry environment. Organizations can increase their performance by increasing synergies with either the specific task environmental demands or the uniform institutional environmental demands. From this perspective, a composite measure of contingency and institutional fit, taking into account the synergies from organizational adaptation towards fit with specific environmental demands and conformism with institutional environmental demands, should better explain firm

performance.

Delmestri (1998) proposed a theoretical model to explain the evolution of organization structures in the machine-building industry. Even though Germany and Italy have different educational and industrial relations systems, successful machine-building firms are increasingly similar due to institutional forces. According to the author, two different institutional contexts can lead organizations to adopt similar managerial practices, and strategic choices are not tied to institutional pressures. In a review of the literature, we find some evidence that managerial discretion plays an important role in responses to institutional pressures. Greening and Gray (1994) analyzed the variability of organizational structures in responding to the environment by comparing institutional theory and resource dependence theory. The authors proposed a contingency model integrating the institutional pressures on firm structures with the managerial discretion within the constraints of other organizations that control critical resources for them, as both theories complement each other.

Other studies advocate some contingency properties in institutional theory. Boiral (2003), analyzing the ISO 9000 standards implementation, discovered that institutional pressures that create isomorphic organizations by leading them to identical models are reinterpreted and modified within organizations, based on managers' personal opinions and attitudes. Also, in an empirical study about total quality management in the banking sector, isomorphic processes do not always lead organizations to higher performance (Llorens and Verdu 2004). Washington and Ventresca (2004) found that the institutional environment supports changes in organizational strategy and does not only constrain or pressure organizations to conform as understood inside the 'iron cage'. The authors show an alternative view of institutional isomorphism in which institutional process mechanisms can facilitate organizational change. Following this reasoning, high performance can be explained outside the pressures of the institutional 'iron cage'. Finally, Clark

and Soulsby (1995) argue that contingency and institutional theories complement each other to improve understanding of organizational change of former enterprises in the Czech Republic. They argue that the new managerial conduct coexists with the inertia of old practices that limit organizational change.

Thus, a review of the literature shows several examples of synergies with the task and institutional environment independently augmenting firm performance. Therefore, a composite measure of contingency and institutional fit, taking into account the synergies from organizational adaptation with task and institutional environmental demands, should better explain firm performance.

HYPOTHESIS 3 (H3). High firm performance is explained by the simultaneous co-alignment of organizational variables with specific task and uniform institutional environmental demands.

Interdependent linkages between contingency and institutional fit

Contingency and institutional approaches refer to different types of adaptation mechanisms towards fit. From an institutional perspective, imitation of apparently effective action represents a form of effective adaptation at the level of an entire industry, and the theory treats organizations as sets of interdependent members with common patterns of cognition and beliefs (Argyris and Schon 1978; DiMaggio 1991; Weick 1979). Adaptation occurs as patterns of cognitive associations and causal beliefs are communicated and institutionalized. On the other hand, contingency theory refers to specific task environment adaptation and treats organizations as goal-oriented activity systems that learn to co-align with the demands of a specific environment by repeating successful behaviors and discarding unsuccessful ones (Cyert and March 1963; Levinthal 1991; March 1981). Both approaches assume different learning routines in adaptation towards

fit which are complementary but may also place paradoxical demands on the organization. Indications of such a trade-off between contingency and institutional fit is reported by Lee and Miller (1996). They found that both contingency prescriptions and institutional pressures could explain high firm performance in the same industry. Firms using traditional technologies could benefit from government interventions, and firms employing emergent technologies could benefit from heeding contingency prescriptions. The conclusions point out that within the same institutional context, firms can substitute different strategies to achieve success. However, this does imply that the success of these strategies is independent.

In adaptation towards contingency fit, individual evaluation routines build a perceived reality of the task environment, which leads managers to develop new routines adapted to their particular environment. Managers interpreting their particular task environment must create and develop their own reality in order to make progress on their own paths (contingency fit). In adaptation towards institutional fit, managers share a common set of evaluation routines, which has been institutionalized, and represent a shared reality that shapes the direction of common future paths (institutional fit). These interdependent cyclical processes shape individual and shared realities of managers in their efforts to develop new routines (Garud and Rappa 1994).

Organizational adaptation can also be enhanced by a socially accepted common set of evaluation routines, which facilitates efficient and effective communication and interpretation in a particular environment. High institutional fit may therefore improve the efficiency and effectiveness of organizational adaptation as it will increase acceptance for adaptation to the specifics of the task environment, whereas under high contingency fit, deviation from accepted norms may be more accepted because firms are highly adapted to the specific demands of the task environment. These processes suggest that organizations need to manage

the interdependence between contingency and institutional fit in order to be successful, even when their strategy focuses on one particular type of fit. This argument results in the following hypothesis:

HYPOTHESIS 4 (H4). There will be a weaker, negative relationship between contingency misfit and firm performance when institutional fit is high, and there will be a weaker, negative relationship between institutional fit and firm performance when contingency fit is high.

5.3 Method

Sample

Fit research may be interested in the relationship between fit and performance or the adaptation process towards organizational fit. In our research, we focus on the performance implications of homogeneity/heterogeneity in organizational and environmental variables. Therefore, we need a large cross-sectional sample with substantial variation in organizational and environmental variables. We use a unique large-scale cross-sectional sample of firms across a wide range of industries and firm size classes to test our hypotheses. The sample contains survey and archival data on 3,259 responses from a panel of 1,904 organizations across 13 different industries. The distribution of firms in the database (see Appendix A. Sample Characteristics) is representative for firms with 10 employees or more in the Dutch economy. Survey data for the database was collected in the period 1996–2006 using a structured questionnaire and respondents hold senior management positions in these firms. For 149 organizations, we have multi-informant data (ranging from 2 to 95 respondents per firm), which allowed us to examine interrater reliability and interrater agreement.

Using this subset, we calculated an interrater agreement score, r_{wg}, for each study variable (James et al. 1993). The median interrater agreement ranged from 0.68 to 0.80, which exceeds the level of 0.60 required to justify the use of an aggregated perceptual measure (Glick 1985). In addition, examination of within-group reliability coefficients revealed a strong level of interrater reliability (Jones et al. 1983), with alphas ranging from 0.75 to 0.93.

We use survey data to measure the organizational flexibility and environmental turbulence constructs because survey measures are more appropriate for explaining managerial behaviour than archival measures (Bourgeois 1980). However, a disadvantage of survey information is that the source (the respondent) explains variance between variables, which may partly explain the study's results. To examine whether such common method bias may augment relationships, we first performed Harman's one-factor test on the self-reported items of the latent constructs included in our study. The hypothesis of one general factor underlying the relationships was rejected ($p < 0.01$). In addition, we found multiple factors and the first factor did not account for the majority of the variance. However, this test has several limitations (Podsakoff et al. 2003), so we conducted several additional tests. First, a model fit of the measurement model of more than 0.90 suggests no problems with common method bias (Bagozzi et al. 1991). Second, the smallest observed correlation among the model variables can function as a proxy for common method bias (Lindell and Brandt 2000). The smallest correlation between the model variables is 0.06, which shows no evidence of common method bias. Finally, we performed a partial correlation method (Podsakoff and Organ 1986). The highest factor between an unrelated set of items and each predictor variable was added to the model. These factors did not produce a significant change in variance explained, again suggesting no substantial common method bias. Finally, the firm performance measure proved to be highly correlated with archival measures of firm performance (Pearson correlation of 0.69

with return on assets) and was consistently significant ($p < 0.01$). In sum, we conclude that the evidence from a variety of methods supports the assumption that common method bias does not account for the study's results.

Construct measurement

We generated an initial list of Likert-type items based on the definitions of the constructs and by reviewing the literature that relates to these dimensions. Furthermore, exploratory interviews with management consultants and audits within various firms served as a basis for item generation and content validity assessment. Items reflecting the construct of Organizational Flexibility were adapted from the work of Krijnen (1979), Mascarenhas (1982), Harrigan (1985), Volberda (1998) and Porter (1980). Items reflecting the level of Environmental Turbulence, i.e. the level of unpredictability and dynamism in the environment were adapted from Dill (1958), Duncan (1972), Lawrence and Lorsch (1967) and Thompson (1967). We used items related to the Technology of the firm, which we adapted from the work of Hill (1983), Perrow (1967) and Hickson et al. (1969). Items related to Organizational Structure were adapted from Burns and Stalker (1961), Pugh et al. (1963), Lawrence and Lorsch (1967), Mintzberg (1979) and Hrebiniak and Joyce (1985). Items related to Organizational Culture were based on the work of Ouchi (1979), Camerer and Vepsalainen (1988) and Hofstede et al. (1990). Indicators of Information Processing Practices were adapted from Hayes and Pisano (1994), Henderson and Cockburn (1994), Volberda (1996) and Grant (1996).

Table 5.2 Items and Constructs

	Constructs	Factor loadings	Item correlation with total score
Non-routine technology (α = .67, composite reliability = .80, average variance extracted = .50)			
	The lay-out and set-up of our primary process can be changed easily.	0.63	0.67
	Our equipment and information systems can be used for multiple purposes.	0.77	0.76
	Our employees master several methods of production and operations.	0.81	0.78
	Our organization is up to date regarding 'know-how'.	0.61	0.61
Organic structure (α = .75, composite reliability = .84, average variance extracted = .58)			
R	Our organization uses extensive and structured systems for planning and control.	0.72	0.72
R	In our organization, the division of work is defined in detailed descriptions of jobs and tasks.	0.83	0.81
R	In our organization, everything has been laid down in rules.	0.85	0.83
R	In our organization, there are a lot of consultation bodies.	0.63	0.67
Innovative culture (α = .70, composite reliability = .82, average variance extracted = .54)			
R	For our organization, the following applies: "The rules of our organization can't be broken,	0.68	0.72

	Constructs	Factor loadings	Item correlation with total score
	even if someone believes that it is in the company's best interest".		
R	Deviating opinions are not tolerated in our organization.	0.84	0.81
	Creativity is highly appreciated in our organization.	0.65	0.68
R	The person that introduces a less successful idea in our company can forget about his/her career.	0.76	0.72
Organizational flexibility (α = .76, composite reliability = .85, average variance extracted = .59)			
	Our organization can easily add new products/services to the existing assortment.	0.72	0.73
	In our organization, we apply new technologies relatively often.	0.80	0.79
	Our organization is very active in creating new product-market combinations.	0.83	0.82
	In our organization, we try to reduce risks by ensuring we have products/services in different phases of their life cycles.	0.72	0.73
Information processing practices (α = .70, composite reliability = .81, average variance extracted = .50)			
	In our organization, we often carry out an extensive competitor analysis.	0.72	0.71
	Competitors do not hold any secrets for us.	0.77	0.61

Constructs	Factor loadings	Item correlation with total score
In our organization, we systematically monitor technological developments concerning our products/services and the production/service process.	0.78	0.73
Customers' needs and complaints are systematically registered in our organization.	0.68	0.67
In our industry, we are always first to know what's going on.	0.70	0.68
Firm performance (α = .83, composite reliability = .89, average variance extracted = .74)		
Our organization is very profitable.	0,77	0,82
In comparison with similar organizations, we are doing very well.	0,91	0,88
Our competitors can be jealous of our performance.	0,89	0,87

R = 'Reversed item'

Archival data on Firm Performance was available for a limited number of firms, but survey measures of performance have been shown to be correlated quite highly with archival measures in organizations (Dess and Robinson 1984). Many smaller firms are exempted from reporting information on firm performance. Thus, given the limited availability of the performance data, firm performance was measured using a scale with three survey items adopted from Jaworski and Kohli (1993). We tested the scale against archival data and on its intercoder agreement and intercoder reliability qualities. The survey measure proved to be highly correlated with accounting performance data (Pearson correlation of 0.69) and was consistently significant ($p < 0.01$). Both the interrater agreement score (cf. James et al. 1993) and the interrater reliability score (cf. Jones et al. 1983) for this scale are adequate, with median $r_{wg} = 0.76$ and average within-group alpha coefficient of 0.95.

Control variables

In our model, we include control variables for firm size and industry effects. Researchers have identified organizational size as a critical variable moderating the relationship between strategy and performance (Dobrev and Carroll 2003, Hofer 1975, Smith et al. 1989). Firm size is measured by the number of organizational members to be organized (Blau 1970), as the number of organizational members determines the structure that is required (Abdel-khalik 1988, Donaldson 2001). Size is therefore appropriately operationalized in empirical studies by the number of employees (Pugh et al. 1969) as reported in the firm's financial reports. Further, as the impact of particular production technologies may vary substantially between types of industries, we control for industry effects by including dummy variables for industrial firms, trade firms and service firms.

Item selection

The psychometric properties of the scales were first investigated using exploratory factor analysis on a subset of firms. The different dimensions of the scales were analyzed using principal component procedures and varimax rotation to assess their unidimensionality and factor structure. Only items that satisfied the following criteria were included: (1) items should have communality higher than 0.3; (2) dominant loadings should be greater than 0.5; (3) cross-loadings should be lower than 0.3; and (4) the scree plot criterion should be satisfied (Briggs and Cheek 1988).

The reliabilities of the dimensions of each scale were assessed by means of the Cronbach alpha coefficient and the construct reliability. Each separate dimension achieves an alpha varying between .67 and .83 (see Table 3), which exceeds the commonly used threshold value of .60 for exploratory research (Nunnally, 1967). Variables with relatively low reliability are technology (α = .67) and culture (α = .70). These are all variables for organizational-level constructs that are moderately broad or broad in conceptual scope (i.e. constructs defined by two or more distinct elements or underlying dimensions). Their reliability sufficiently exceeds the threshold level of .55 recommended for such constructs by Van de Ven and Ferry (1980). In addition, composite reliabilities range between .80-.85., which is above the .70 commonly used threshold value, and average variance extracted measures exceed the .50 value (Hair et al., 1998).

Each construct is covered by three to six items and measured on a seven-point scale. We used confirmatory factor analysis with EQS version 6.1 to validate the scales resulting from the exploratory factor analysis. A satisfactory fit was achieved with root-mean-square estimated residual RMSEA = 0.05 and confirmatory factor index CFI = 0.94. The CFI of 0.94 is considered an indication of good fit, and the RMSEA of 0.05 indicates good model fit because it does not exceed the critical value of 0.08 (Bentler and Bonett 1980). We verified the

discriminant validity of the scales by comparing the highest shared variance between any of the two constructs and the variance extracted from each of the constructs (Hair et al. 1998). In all cases, each construct's average variance extracted (AVE) is larger than its correlations with other constructs, supporting the discriminant validity of the measurement model (Fornell and Larcker 1981). In addition, none of the confidence intervals of the correlation coefficients between any of the constructs contained 1.0 (Anderson and Gerbing 1988). Thus, we may conclude that the measurement model is acceptable, given this variety of supporting indices.

5.4 Results

In this section, the results of our analyses of contingency fit, institutional fit and the interactions between these kinds of fit will be described.

A congruence-based measure of contingency fit (cf. Donaldson 2001) is calculated as the deviation from an optimal fit line. The optimal fit line is determined by estimating the coefficient between the response variable and contingency variable amongst high-performing firms. Deviation scores are than regressed against firm performance. According to congruence based contingency logic, deviation from the optimal fit line will impact negatively on firm performance.

A sub-sample of high performing firms was created by selecting only firms with Z-scores on Firm Performance ≥ 0.50 (n = 1073). The optimal fit line was calculated by regression of the 'Environmental Turbulence' variable on 'Organizational Flexibility' using this subsample ($\beta = 0.23$, $p < 0.01$) (see Table 5.3). Deviation scores are calculated as the absolute deviation of actual flexibility from the optimal fit line, using the following mathematical function:

*Optimal Fitline Deviation = f(Abs(Organizational Flexibility – (Constant + (.23 * Environmental Turbulence))*

Regressing the obtained Optimal Fitline Deviation scores against firm performance should than provide a negative coefficient, as predicted by H1. The results indeed support a negative relationship between contingency misfit and firm performance (β = –0.33, p < 0.01) (see Table 5.4) and thus the evidence supports H1.

	Model I	**Model II**
(Constant)	4.556 ***	4.058 ***
Control variables		
LN(Firm size)	.085 **	.044
Industrial firms	.018	–.005
Trade firms	.066 *	.045
Service firms	.001	–.015
Theory variables		
Environmental Turbulence		.229 ***
R^2	.012**	.062***
F	3.190	14.001
N	1,073	1,073

*** $p < .001$
** $p < .01$
* $p < .05$

Table 5.4) and thus the evidence supports H1.

Table 5.3 Hierarchical Regression of Environmental Turbulence on Strategic Flexibility amongst High-Performing Firms

	Model I	Model II
(Constant)	4.556 ***	4.058 ***
Control variables		
LN(Firm size)	.085 **	.044
Industrial firms	.018	–.005
Trade firms	.066 *	.045
Service firms	.001	–.015
Theory variables		
Environmental Turbulence		.229 ***
R^2	.012**	.062***
F	3.190	14.001
N	1,073	1,073

*** $p < .001$
** $p < .01$
* $p < .05$

Table 5.4 Hierarchical Regression of Optimal Fitline Deviation on Firm Performance

	Model I	Model II
(Constant)	4.440 ***	5.112 ***
Control variables		
LN(Firm size)	.019	.052 **
Industrial firms	.152 ***	.134 ***
Trade firms	.082 ***	.071 ***
Service firms	.191 ***	.169 ***
Theory variables		
Optimal Fitline Deviation		–.331 ***
R^2	.034***	.142***
F	28.444	107.610
N	3,259	3,259

*** $p < .001$
** $p < .01$
* $p < .05$

Institutional misfit is conceived as the deviation from an optimal profile, which is determined by the average profile of high-performing firms in general, rather than a contingency factor.

Again, we created a subsample of high-performing firms (Z-score performance $\geq$ 0.50) and determined the optimal profile by calculating the averages on the organization design variables Technology, Structure, Culture, and Information Processing Practices.

The sum of the absolute deviations of the ideal points (i.e. subsample averages) is considered as Institutional Profile Deviation, and is expected to affect performance negatively within the institutional model. Results show a significant and negative effect of the institutional misfit variable Institutional Profile Deviation' on firm performance (β = -0.22, $p < 0.01$), thereby providing support for Hypothesis 2 (see .Table 5.5).

Table 5.5 Hierarchical Regression of Institutional Profile Deviation on Firm Performance

	Model I		Model II	
(Constant)	4.436	***	5.101	***
Control variables				
LN(Firm size)	.019		.011	
Industrial firms	.155	***	.138	***
Trade firms	.087	***	.090	***
Service firms	.192	***	.189	***
Theory variables				
Institutional Profile Deviation			–.215	***
R^2	.034***		.080***	
F	28.810		56.319	
N	3,235		3,235	

*** $p < .001$
** $p < .01$
* $p < .05$

Third, having found significant effects of contingency fit and institutional fit, we examined the simultaneous impact of these fit approaches. Model II in Table 5.6 shows the simultaneous impact of contingency fit line deviation and institutional profile deviation. In support of Hypothesis 3, the results show that both fit approaches simultaneously explain firm performance; however, contingency fit line deviation has a stronger impact on firm performance (β = –0.30, $p < 0.01$) than institutional profile deviation (β = –0.14, $p < 0.01$). This suggests that both approaches are complementary but that, in our sample, the sources of synergy between organization and environment suggested by contingency fit seem to be stronger than the sources suggested by institutional theory.

Table 5.6 Hierarchical Regression of Contingency Fit, Institutional Fit and Interaction Term on Firm Performance

	Model I	Model II	Model III
(Constant)	4,438 ***	5,468 ***	5,373 ***
Control variables			
LN(Firm size)	0,019	0,043 ***	0,044 ***
Industrial firms	0,155 ***	0,127 ***	0,124 ***
Trade firms	0,087 ***	0,075 ***	0,073 ***
Service firms	0,192 ***	0,170 ***	0,167 ***
Theory variables			
Optimal Fitline Deviation		-0,295 ***	-0,269 ***
Institutional Profile Deviation		-0,140 ***	-0,117 ***
Interaction Fitline Deviation x Profile Deviation			-0,112 ***
R^2	.034***	.160***	.171***
F	28.703	102.524	95.107
N	3232	3232	3232

Finally, we examined the hypothesized negative interaction between the two fit approaches (H4). The interaction is predicted to be negative: i.e. for firms in fit as judged by the contingency approach, institutional fit will have a lower impact on performance, and vice versa. The interaction term is indeed significant and negatively related to performance ($\beta = –0.11$, $p < 0.01$; see Model III in Table 5.6), while the individual fit approaches remain significant, thereby providing support for H4.

To assess the impact of our findings, the interaction on firm performance is plotted in Figure 5.2 and Figure 5.3.

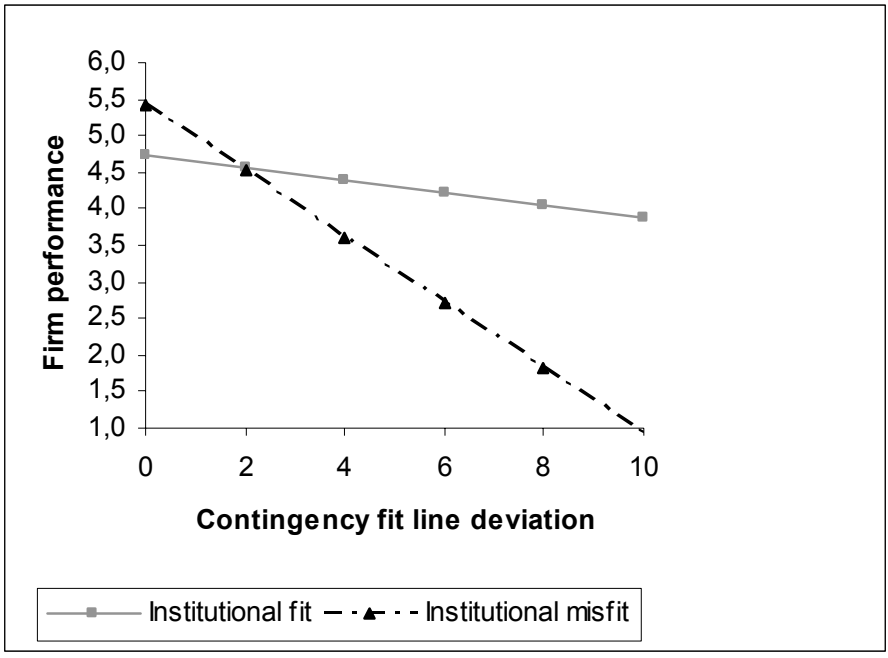

Figure 5.2Effects on Firm Performance of Contingency Fit Line Deviation for Firms with Institutional Fit and Institutional Misfit

The performance effects of changes in the contingency fit of a firm are plotted in Figure 5.2, both for firms with an institutional fit and for firms with an institutional misfit. Both lines have negative slopes, indicating that deviation from the contingency fit line reduces firm performance. However, the slope is considerably less steep for firms with institutional fit.

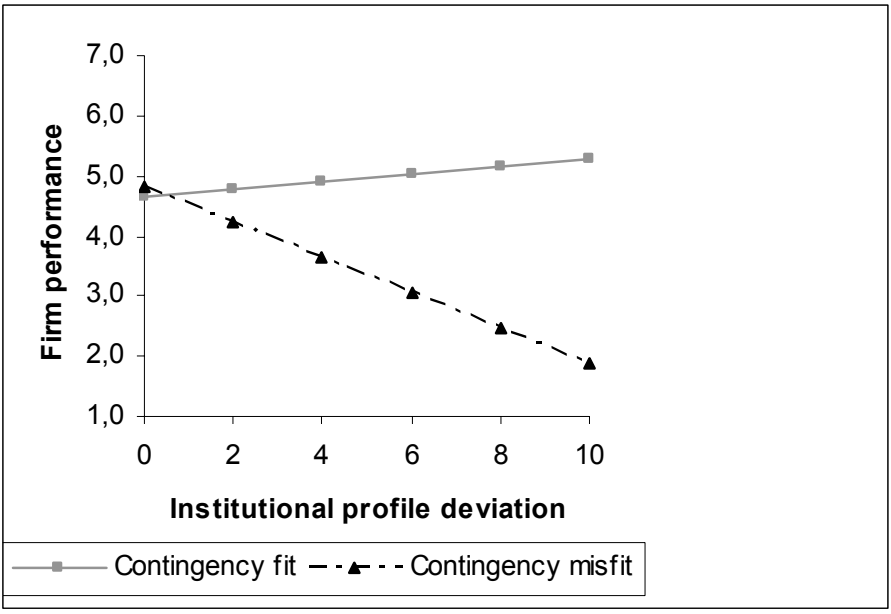

Figure 5.3 Effects on Firm Performance of Institutional Profile Deviation for Firms with High Contingency Fit and High Contingency Misfit

Figure 5.3 shows the performance effects of changes in the institutional fit for firms with contingency fit and misfit. Again, the slope is negative for firms with a contingency misfit. For firms that have a contingency fit, however, the slope is even positive. This indicates that for firms in contingency fit, deviation from the ideal profile (as required by institutional pressures) may augment firm performance rather than decrease it, as predicted by the institutionalist's approach. If we compare Figure 5.2 and Figure 5.3, the independent effect of institutional fit is small compared to contingency fit whereas the interaction effect of contingency fit is small compared to institutional fit. Therefore we may conclude that the main effect of institutional fit is reducing the negative effect of contingency misfit rather than its independent effect on firm performance.

5.5 Discussion

In this paper, we set out to address a fundamental debate in the strategic management literature on the relationship of the organization and the environment, with the goal of contributing to the development of a unifying theory on the relationship between organizational fit and performance. Scholars from different schools of thought used the concept of fit to indicate sources of synergy of the organization with the business environment, a concept that originates from open systems theory. Fit has been adopted as a key element explaining organizational performance in contingency and institutional theories. The results of this study imply that each of these perspectives provides a partial explanation of the synergetic effects between organizational and environmental elements, and that contingency and institutional perspectives refer to complementary environmental demands which influence each other as well. Within a large sample of 3,259 respondents from 1,904 firms operating in 13 different industries, we found strong support for the notion that the combined insights of both theories produce a superior explanation of firm performance.

Carroll (1993) offered a sociological explanation of organizational heterogeneity and finished the paper with the following comment: “So rather than ask why firms differ, I suggest that the fundamental question for strategic management is why successful firms differ” (p. 247). Our findings suggest managers in search of high performance should consider both managerial and organizational practices of best performers and, at the same time, develop practices that are in line with the requirements of their specific environmental conditions. The combination of different attitudes towards organizational learning and alignment produces higher performance than partial positions. Managers may benefit from different criteria simultaneously in order to select what should be done to improve organizational performance. At the same time, they should try to avoid inconsistencies in the different practices they adopt in the context of their

specific firm. Managers need to scan and interpret the environment and *redesign* the internal elements in order to create additional synergy.

Institutional fit is a reference for managers in order to gain legitimacy through coercive, mimetic and normative processes. In this way, managers create synergy between the firm and the institutional environment. Moreover, regardless of the pressure of the institutional environment, managers seeking high performance can achieve this by searching for continuous contingent fit. However, when developing towards high levels of contingency fit, managers need to acknowledge that fit with the task environment is much more effective if these practices are aligned with institutional requirements. If contingency fit is not in line with institutional requirements, firms may need to change these requirements (institutional entrepreneurship) or accept lower firm performance.

The findings of our study are particularly important if we assume that some level of misfit is unavoidable and it may be more realistic to assume a quasi-fit rather than perfect fit of the organization with its environment (Donaldson 2001). If we accept this assumption than strategic discretion of most firms is limited to the right side of Figure 5.2, where the moderating impact of institutional fit is largest. Furthermore, the findings of our study may particularly have important implications for corporate strategic decisions where firms face suddenly unfamiliar task and institutional environments such as in internationalization, unrelated diversification and radical regulatory reform. Under these conditions firms are likely to face simultaneous contingency and institutional misfit. Our analyses suggest that in addition to the independent negative impact of each misfit they also increase negative performance implications of each other. Although firms may be tempted to first increase fit with their task environment they may consider to first decrease institutional misfit as this will substantially reduce the negative effects of contingency misfit on firm performance (see Figure 5.2). Addressing this question will be a fundamental strategic issue for each

organization.

The results of our study are subject to several limitations. Our sample is large but contains firms which are active in The Netherlands and might therefore be biased. Second, although our dataset spans multiple years, respondents have not been structurally invited to fill out the survey in subsequent years. Such an analysis might shed more light on time effects in fit-performance relationships. Finally, our study has shown that contingency and institutional fit are interdependent, however the development process towards system fit remains largely unexplored. The next step from our approach would be to explore the implications for dynamic adaptation processes towards fit. Both approaches assume different but reinforcing learning routines in adaptation towards fit. In adaptation towards institutional fit, managers develop a common set of evaluation routines, which may strengthen their individual evaluation routines, which in turn helps them to develop new routines adapted to their particular environment. These new routines may be used to enhance the collective learning routine, and so a co-evolutionary cycle may emerge that shapes individual and shared organizational routines (Lewin and Volberda 1999). The success of an organization may depend on how well the dynamics of developing individual and shared routines is managed within this adaptation process towards optimal system fit. Understanding the dynamics of adaptation towards system fit could further advance our understanding of how different co-evolutionary development paths influence the relationship between institutional mechanisms, contingency fit and firm performance.

Conclusion

In sum, drawing on contingency and institutional theory this study demonstrated that managers in search for high performance try to adapt to the task environment and simultaneously need to take into account the institutional constraints (isomorphism). These perspectives are not opposing, but

complementary, and interact in what might be termed a system fit. Exploring dynamic co-evolutionary processes of these interactions might be a fruitful subject for future research.

6 Discussion and Conclusions

Despite a substantial body of literature dealing with organizational flexibility (see Carlsson 1989, Volberda 1998, Suárez et al. 2003, Johnson et al. 2003) few empirical studies account for the construct's complexity regarding multidimensional aspects (Dreyer and Grønhaug 2004) and context specificity (Suárez et al. 2003). This hinders theoretical development and application in two ways. First, without models explicating the relationships between various dimensions of organizational flexibility and dimensions of environmental turbulence, formal testing of a theory of organizational flexibility remains troublesome. Furthermore, application of prescriptions following from a theory of organizational flexibility by practitioners appears to be hindered by the lack of a validated measurement instrument that relates external dimensions of environmental turbulence to internal components of flexibility and specifies the conditions of strategic alignment or 'fit'.

Second, some essential questions regarding moderators, mediators and performance consequences remain unresolved in literature. Firm size is recognized as an important factor affecting strategy and performance, but how does firm size affect flexibility? Literature is inconclusive (Rajagopalan and Spreitzer 1997, Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007) and lacking empirical evidence (Dean et al. 1998)?

And what criteria do successful firms apply regarding appropriate flexibility strategies and organizational design? Although a number of studies investigated competing notions of fit (e.g. (Carroll 1993, Child et al. 2003, Greening and Gray 1994, Gupta et al. 1994, Kraatz and Zajac 1996), none of them investigated the interdependent conceptual and empirical linkages between leading approaches.

The present study set out to test a number of long standing propositions in

literature and to develop and test a number of new propositions regarding the issues discussed above. We investigated how firms can organize flexibility and how environmental turbulence interacts with flexibility to affect firm performance. We developed and tested a model specifying the effects of firm size on organizational flexibility and investigated how firms achieve strategic fit.

In doing so, we created a richer understanding of organizational flexibility using hypothetical-deductive logic and formal tests of hypothesis on a large sample of firms using a cross-sectional survey. Four studies addressed separate but intertwined research questions (see Figure 6.1). The next paragraphs will discuss the main findings and theoretical implications, followed by the implications for management. This final chapter will conclude with the limitations of this study and suggestions for future research directions.

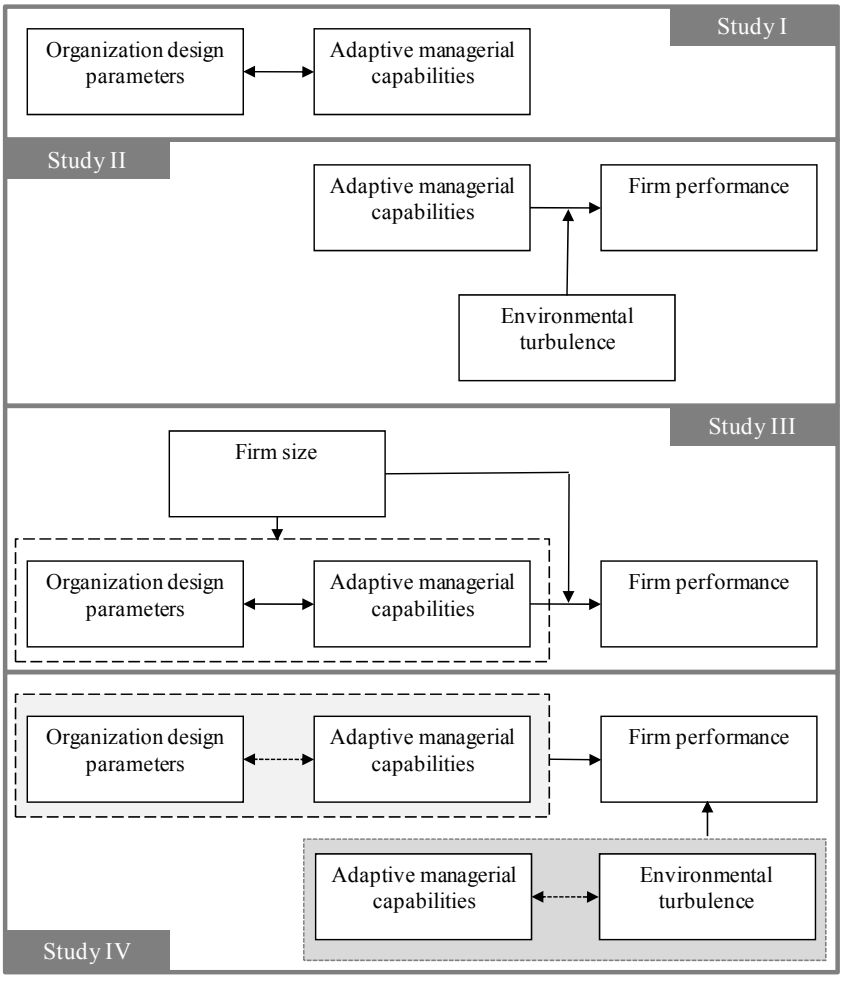

Figure 6.1 Four different perspectives on organizational flexibility and their commonalities in the variables under investigation

6.1 Theoretical Implications of the Main Findings

A central theoretical implication concerns the notion of multiple dimensions reflecting managerial capabilities and organization design parameters that shape organizational flexibility and that have different effects on performance

depending on the environmental turbulence faced at firm level (Ansoff and Brandenburg 1971, Eppink 1978, Volberda, 1996/1998). The results of the first three studies provide empirical support for this core proposition in organizational flexibility theory and enhance our understanding of the complex relationships in a context specific model of organizational flexibility. The findings demonstrate the hierarchical structure of relationships in a nomological net reflecting the internal dimensions of organizational flexibility (Study I), and how the effects on firm performance increase with the level of flexibility provided by the managerial dynamic capabilities, which in turn are positively moderated mostly by the level of external unpredictability and to a lesser extent by the level of market dynamism (Study II). Furthermore, the findings show how firm size has differential effects on distinct organizational design parameters and, although there's equifinality in strategic flexibility for small and large firms, how firm size positively affects the capacity to generate rents from strategic flexibility (Study III). Taken together, the findings of our study stress the importance of addressing organizational flexibility as a multidimensional network of components with context specific effects on firm performance. An overview of the main theoretical implications is provided in Table 6.1. The next paragraphs discuss each of these implications.

Table 6.1 Theoretical implications of the dissertation

Relationship between components of organizational flexibility	
1.	Dimensions of organizational flexibility can be measured simultaneously in a large cross-sectional sample of firms using perceptual measures.
2.	Organization design parameters and types of managerial dynamic capabilities are hierarchically related to form organizational flexibility.
Moderators of effects on firm performance	
3.	There is firm level heterogeneity in the context specificity of dynamic managerial capabilities.
4.	The effects of strategic flexibility on firm performance are moderated by the level of unpredictability of changes in the business environments.
5.	Lower-order types of flexibility are more efficient than higher-order types in less turbulent environments.
Effect of firm size	
6.	Effect of firm size on strategic flexibility is both positively and negatively mediated by distinct organization design parameters.
7.	Although there's equifinality in strategic flexibility for small and large firms, firm size positively affects the capacity to generate rents from strategic flexibility.
Sources of synergy of the organization with the environment	
8.	Both contingency and institutional perspectives provide a partial explanation of the synergetic effects between organizational and environmental elements and refer to complementary but also conflicting environmental demands.
9.	Contingency fit, i.e. the strive to adapt to a unique task-environment, is more effective compared to institutional fit, i.e. the strive to adhere to more universal normative forces. However, fit with the task environment is much more effective if these practices are aligned with institutional requirements.

Theoretical implications Study I

The first study investigated the nature and multifaceted structure of the concept of organizational flexibility. Prior theoretical and empirical studies point at various managerial dynamic capabilities that provide operational, structural

and/or strategic flexibility (Ansoff and Brandenburg 197, Eppink 1978, Suarez, Cusumano and Fine 1995, Grant 1996, Verdú Jover et al. 2005) and at the importance of various organization design parameters that should match the flexibility mix (Zelenovic 1982, Volberda 1996, Sanchez 1995, Hatum and Pettigrew 2006). We provide evidence of the validity of a nomological net that identifies multiple types of flexible managerial capabilities and multiple organization design parameters and relates these constructs in a hierarchical matter. This implies that higher-order types of flexibility are formed by lower-order types and that firms can develop strategic flexibility through various interrelated means. Future studies on organizational flexibility ought to account for such higher-order effects when investigating the effects of distinct types of flexibility to create a better understanding and provide more accurate findings.

We extend management literature in general by establishing the validity of a core proposition concerning the way firms organize for flexibility and providing the empirical means to test and enhance models of organizational flexibility. Furthermore, the nomological net presented in Study I allows the development and empirical testing of contingency models in which the performance of dynamic capabilities is related to the market environment, as has been called for repeatedly (Bettis and Hitt 1995, Hitt 1998, Johnson et al. 2003, Suárez et al. 2003). Thirdly, the model developed in this paper enables analysis of the criteria used by successful firms regarding appropriate strategies and their organizational design, as previously studied by Carroll 1993, Child et al. 2003, Greening and Gray 1994, Gupta et al. 1994, Kraatz and Zajac 1996. More specifically, further study is required to investigate whether firms strive to continuously adjust managerial capabilities and organizational design variables to changes in the task environment, or whether firms actually conform to the institutional pressures of the business environment.

Theoretical implications Study II

Study II investigated the context specificity of managerial dynamic capabilities and organizational effectiveness. Previous conceptual and empirical work stressed the importance of relating a firm's set of dynamic capabilities to the context in which it operates (e.g. Eisenhardt and Martin 2000, Helfat et al. 2007, Newbert 2007, Brouthers et al. 2008). More specifically, numerous authors refer to the level and type of environmental turbulence faced by the firm as the criterion to which the flexibility mix ought to be matched (e.g. Volberda 1996, Dreyer and Grønhaug 2004, Anand and Ward 2004) and particularly to the level of unpredictability that ought to be matched with strategic flexibility (Boynton and Victor 1991, D'Aveni 1994, Sanchez 1995, Volberda 1998).

Our work demonstrates the existence of various types of flexibility and the variation in context specificity. Both operational and strategic flexibility provide a response capacity to environmental change and these responses are fundamentally different; different in the order of change effectuated by these capabilities (cf. Winter 2003) and different in the structural relationship with various dimensions of environmental turbulence (cf. Volberda 1996). In line with what we expected, lower-order types of flexibility outperform higher-order types of flexibility in predictable markets. Operational flexibility trumps the effect of strategic flexibility when change is to some extent predictable. Our data further suggests that in less turbulent markets firms draw on potentially more economic ways to develop organizational flexibility, such as operational flexibility, compared to highly turbulent markets where firms draw much less on operational flexibility and potentially favour others means, such as structural flexibility and innovative cultures to develop their strategic flexible capabilities.

Study II further contributes to the strategic management literature by modelling context specific effects at firm level. Previous studies analyzed effects at industry level (e.g. Nadkarni and Naranayan 2007), while accounting for

heterogeneity at firm level has been argued to be better suited to analyze resource or capability effectiveness (Newbert 2008, Brouthers et al. 2008).

Thirdly, variance in the performance of firms in our dataset seems to be determined primarily by the technical fitness of the dynamic capabilities of those firms: firms equipped with (higher-order) dynamic capabilities outperform firms with less or lower-order dynamic capabilities, even in low turbulence environments. This is somewhat counterintuitive, as many authors focus on the congruency of the flexibility mix with the demands from the environment, providing evolutionary fit (cf. Helfat et al. 2007). Future research should delve into the explanations behind this observation and try to distinguish more specifically technical fitness from evolutionary fitness.

Theoretical implications Study III

The third study investigated the theoretical quandary of whether firm size is a source of inertia or a source of resources for strategic flexibility. Previous studies focused attention on the conflicting positions in literature (Rajagopalan and Spreitzer 1997, Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007). Some authors argue for the superiority of small firms in developing strategic flexibility (e.g. Quinn, 1985, Gupta and Cawthon, 1996, Bougrain and Haudeville, 2002) often pointing at the ease to coordinate effectively and utilize resources well in a small firm. Others, on the other hand, point at the sheer size and diversity of the resources and routines of large organizations that provide them with high levels of strategic flexibility as well (e.g. Boeker, 1991, Bowman and Hurry, 1993, Haveman, 1993, Majumdar, 2000, Kraatz and Zajac, 2001, Bercovitz and Mitchell, 2007).

On a general level the present study corroborates long standing assumptions about organizational size as a critical variable moderating the relationship between strategy and performance (cf. Donaldson, 2001, Dobrev and Carrol, 2003) and about basic differences in the characteristics of small firms and

large firms (cf Chen and Hambrick, 1995, Dean et al., 1998). More specifically, study III demonstrated how firm size is positively related to external information scanning capabilities, but negatively related to components that determine organizational responsiveness, such as the structure and culture of the organization. This implies that small and large firms can achieve strategic flexibility through different means, i.e. there's equifinality in strategic flexibility. Including the underlying dimensions of strategic flexibility in the equation, as suggested by Fiegenbaum and Karnani (1991), Haveman (1993) and Ebben and Johnson (2005), has surfaced aspects of equifinality and variation in strategy implementation between small and large firms that future studies ought to take into account.

Furthermore, the findings of the third study indicate that, although there's equifinality in strategic flexibility for small and large firms, firm size positively affects the capacity to generate rents from strategic flexibility. Once large firms are able to overcome inertia and achieve superior strategic flexibility, scale and scope advantages increase their returns at an increasing rate. Therefore, it is important to note that although there's equifinality in strategic flexibility for small and large firms, there's a significant effect of firm size on the ability to generate rents from strategically flexible capabilities.

Theoretical implications Study IV

Study IV investigated the criteria used by successful firms regarding appropriate flexibility strategies and organizational design. Previous work has examined these criteria and their impact on organizational change and performance using contingency- and institutional-based theories (Carroll 1993, Child et al. 2003, Greening and Gray 1994, Gupta et al. 1994, Kraatz and Zajac 1996). The two perspectives on organizational fit may have important complementary and interdependent linkages which may be unnoticed if they are studied in isolation. Study IV addresses this gap in the literature and explicitly

focuses on how forces for uniqueness (and consequently for population heterogeneity) and institutional forces, pressing firms to isomorphism (and then to population homogeneity), interact in the formation of firm performance. We advance insights into the organization-environment relationship by demonstrating that these perspectives are not opposing, but complementary and interact to provide 'system fit'. In this regard, in order to explain high performance, contingency and institutional fit can be seen as complementary independent dimensions as well as interacting sub-dimensions of system fit (cf. Greening and Gray 1994).

Exploring these interactions might be a fruitful subject for future research, particularly the dynamic adaptation processes towards fit. We believe that a co-evolutionary cyclical process may emerge that shapes organizational routines and poses paradoxical demands on organizations in their efforts to develop new routines (Garud and Rappa 1994). Both contingency- and institutional-based criteria are associated with increasing performance but may act against each other. The success of the organization will depend on how well the paradoxical demands of individual and shared routines are managed within this co-evolutionary adaptation process towards optimal system fit. Future research could use longitudinal analysis of dynamic adaptation processes towards fit in order to explore these dynamic processes in adaptation towards institutional fit (Greenwood and Hinings 1996) and contingency fit (Hrebiniak and Joyce 1984, Hamel and Prahalad 1994, Zajac et al. 2000), in a co-evolutionary adaptation process towards optimal system fit.

6.2 Implications for Management

Apart from the theoretical contribution of this thesis as discussed in the preceding paragraphs, the results of this thesis also have implications for managers and practitioners (see Table 6.2). The studies' results have consequences for management of internal dimensions of organization as well as for management of

fit with the market environment.

Table 6.2 Managerial implications

- Managers aiming to change the flexibility of the organizations should address all components of organizational flexibility and apply a principle of minimum intervention, i.e. refrain from intervening in higher-order components when only lower order types of flexibility are required.

- Interventions should create better fit with the environment; particularly in turbulent environments firms should develop higher-order types of flexibility.

- Interventions should account for both positive and negative effects between capabilities and organization design parameters on one hand and firm size on the other hand.

- Managers should pay in particular attention to the focus of learning efforts; learning from unique experiences in the task environment outweighs learning from high performing peers, yet should not rule out the latter

Study I demonstrated how components of organizational flexibility, such as organizational structure, organizational culture, and managerial dynamic capabilities (see

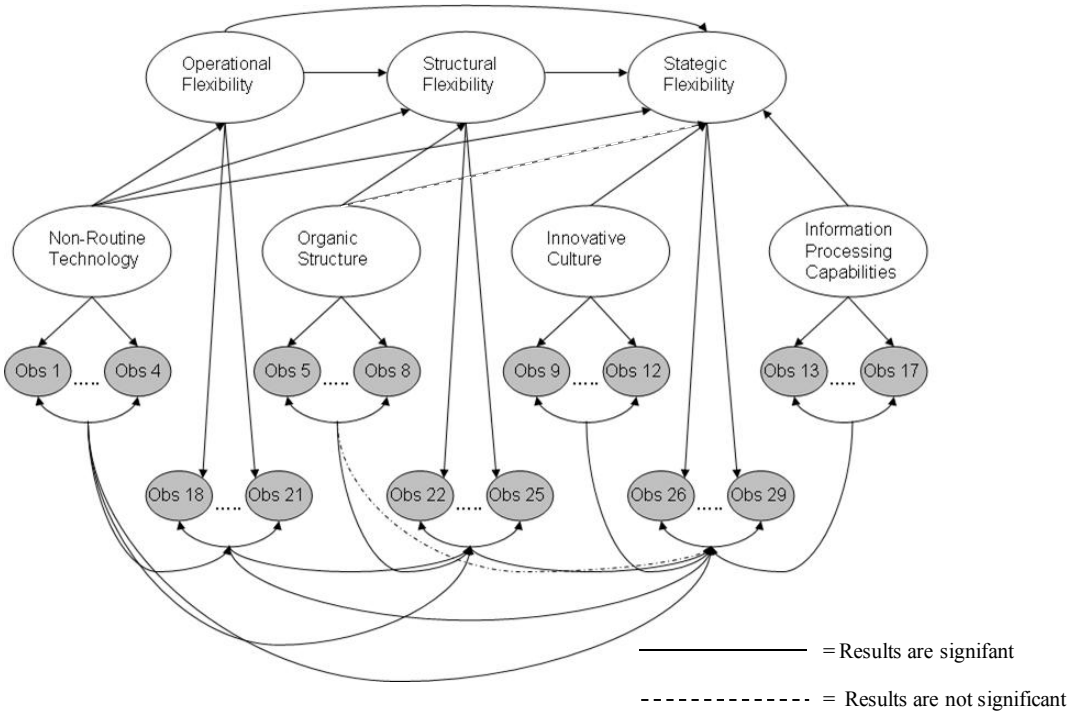

Figure ~~2.2~~ on page 36), all contribute to increasingly higher-order types of flexibility. This new insight enables the application of the principle of minimum intervention. The principle of minimum intervention contends that managers attempt to implement strategy within the constraints of economic efficiency, choosing courses of action that solve their problems with minimum costs to the organization (Hrebiniak and Joyce 1984). The hierarchical structure of relationships in the nomological net informs managers about the minimum scope of interventions required to develop various types of organizational flexibility and models the effects of interventions on distinct components of organizational flexibility. A straightforward implication of the first study might be stated as follows: “Do not intervene in organizational culture, when all the firm need is

operational flexibility. When strategic flexibility is required, address in particular the organization's culture and structural flexibility, among other components."

The second study elaborated on the effects of dimensions of environmental turbulence on firm performance, demonstrating that the performance consequences of flexibility increase in turbulent environments. These findings support managers in decision-making concerning the optimal composition of the flexibility mix to achieve high performance in unpredictable and/or dynamic market conditions. The effects of strategic flexibility appear to be superior to lower-order types of flexibility, i.c. superior to operational flexibility, in unpredictable markets. However, due to the costs involved with developing strategic flexibility, the superiority is limited to unpredictable markets. When change is predictable, operational flexibility provides and effective and much more efficient alternative.

Our study of the relationship between firm size and components of organizational flexibility enables more accurate analysis of organizational and managerial barriers to flexibility by pointing at the different effects of firm size on various organization design parameters. Our findings enable more accurate predictions of effects of firm size and more effective flexibility-oriented interventions in both small and large firms. Moreover, strategic analysis and decision-making concerning potential competitive advantage vis á vis smaller firms is supported, as we demonstrate how large size increases performance effects of strategic flexibility and thereby creates a potential for competitive advantage.

A fourth implication, derived from Study IV, concerns the focus of learning in the organization when aiming to improve this external fit. Our findings suggest managers in search of high performance should consider both managerial and organizational practices of best performers and, at the same time, develop practices that are in line with the requirements of their firm specific context. These

findings focus attention on the paradoxical tensions between learning from others and adjusting to institutional norms on one hand, and individual learning and adjusting to the firm's task specific context. Dealing with such paradoxical tensions is at the heart of strategic management. Should one try to learn from its successful peers, risking a misfit with the specific requirements of an idiosyncratic task environment? Or should one learn to create a unique alignment with the environment faced by the firm, while trying not to deviate from industry norms?

Finally, the model developed and tested empirically in this thesis provides practitioners with a normative model using relatively easy to obtain primary data at firm level. Such a model enables managers and professional to analyze the concept of organizational flexibility and context specific dynamic capabilities more accurately, supporting strategic decision-making with analyzable data.

6.3 Limitations and Future Research Issues

Apart from the limitations that apply to the four individual studies, our study has a number of limitations that span all four studies and merit further research.

A first limitation concerns the operationalization of the construct of organizational flexibility. Although our model includes and distinguishes managerial capabilities from organization design parameters, other perspectives on the composition of organizational flexibility draw attention to different conceptualizations with different components. To what extent these components overlap with the components of our model or actually provide complementary variables, has yet to been seen. For example, Sanchez' five modes of competence share a strong focus on the hierarchical structure of the relationships between these components. An empirical comparison between the relationships of our model, based on Volberda (1991-1998), and Sanchez' model would inform about potential omissions in the model presented in this thesis. Further, some authors

refer to distinct capabilities when analyzing organizational flexibility, for example Dreyer and Grønhaug (2004) point at supply flexibility, production flexibility, and product assortment flexibility. Others apply a more abstract perspective, for example Anand and Ward (2004) focus on mobility and range flexibility as part of manufacturing flexibility. Although construct validity has been analyzed extensively in the present study, future studies might focus exclusively on the identification of components of flexibility and/or typologies of flexibility that extend the model presented here.

Similarly, the way environmental turbulence has been conceptualized and operationalized in management literature varies greatly. We chose to apply a rather abstract definition following Volberda; a definition that fitted nicely to the components of organizational flexibility and enabled us to deduct a number of concrete hypotheses about the interaction between environmental turbulence and organizational flexibility. Other conceptualizations exists, however, which may complement or overlap our definition. For example, how does Eisenhardt and Martin's (2000) definition of 'market dynamism' extend our definition of dynamism as a product of the intensity and frequency of changes to competitive forces?

Furthermore, our definition of environmental turbulence with dynamism, complexity and unpredictability as the central variables, allowed the analysis of firm capabilities relative to their individual task environment. Others argue to analyze such effects at industry level, e.g. Nadkarny and Narayan (2007) relate strategic flexibility to industry clockspeed. We assumed that firm context is heterogeneous, but in a future study the effects between firm capabilities and the environment can be tested simultaneously at firm level and industry level, to test our assumption.

More practical limitations concern the composition of our dataset. Although our study includes a wide variety of firms, all were active in one

particular country, The Netherlands. This may have biased the results as organizational flexibility may be partly dependent on institutional and cultural factors. We believe that this bias did not affect results strongly as the sample contains multinational corporations as well and respondents with other nationalities than Dutch. A comparative study with data (physically) collected in different countries with a different institutional context might shed light on the effects of this bias in our dataset.

Further, although our dataset spans multiple years, respondents have not been structurally invited to fill out the survey in subsequent years, preventing us from carrying out longitudinal analysis. Such an analysis might shed more light on causal relationships in general, and particularly account for potentially delayed effects of firm flexibility. Although our measure of firm performance does not limit respondent's scope to past performance and invites to include a more broad perspective on performance, we cannot rule out that some effects of organizational flexibility become real in a timeframe beyond the scope of our measure.

And finally, longitudinal data may as well shed light on the effects of organizational growth on flexibility. Our analysis of the relationships between firm size and organizational flexibility basically had to be limited to correlations between these variables as we only collected cross-sectional data. A future study may explicitly elaborate on a growth perspective and define causal relationships between changes in firm size and organizational flexibility.

6.4 Conclusion

This thesis started with the notion that although the importance attributed to organizational flexibility in management literature has increased with the level of environmental turbulence, empirical evidence that provide support for this notion - while accounting for the complex nature of the concept of organizational flexibility – is lacking in the literature (Carlsson 1989, Suárez et al. 2003, Dreyer

and Grønhaug 2004, De Toni and Tonchia 2005). Furthermore, we pointed at two fundamental questions that await empirical conclusion. How is firm size related to organizational flexibility (Rajagopalan and Spreitzer 1997, Dean et al. 1998, Majumdar 2000, Kraatz and Zajac 2001, Bercovitz and Mitchell 2007) and what criteria do successful firms apply regarding appropriate flexibility strategies (see Table 6.3)?

Table 6.3 Contingency and institutional perspectives on appropriate criteria for flexibility

Successful firms adjust to task environment
• Drazin and Van de Ven 1985, Venkatraman 1989, Donaldson 2001
Successful firms adjust to institutional norms
• DiMaggio and Powell 1983, Zucker 1987, Kondra and Hinings 1998, Scott 2001

Using a survey and a large cross-sectional sample of firms, our findings provide empirical evidence for some of organizational flexibility theory's core propositions and insight into the complexity concerning the latter two questions.

We showed that organizational flexibility is a multidimensional construct and relates simultaneously to the managerial capabilities that create flexibility and the organization design parameters that support flexibility. The components of these dimensions are hierarchically related to each other, implying that building higher-order types of flexibility depends on the lower-order components. Furthermore, we showed that higher-order types of flexibility provide superior response to environmental turbulence compared to – what we assumed to be more economic – lower order types of flexibility.

Further, we extended our understanding of the relationship between firm size and organizational flexibility by introducing firm size as a mediating factor with opposing relationships with various components of organizational flexibility.

And we extended understanding of the criteria for strategic alignment, simultaneously testing the effects of task specific adaptation and institutional alignment.

The theoretical contribution of this thesis is thereby twofold as is concerns empirical testing of existing theory and extension and refinement of theory. Without instruments for empirical testing and actual empirical tests, the theory of organizational flexibility has gone unsupported for too long and further theorizing has been hindered. The instrument developed in this thesis, with measures for internal and external components, allows for new elements of organizational flexibility to be tested and provides managers and professionals with a normative model that enables analysis and prediction of the effects of organizational flexibility on firm performance. To conclude, by demonstrating the relationships between various components of organizational flexibility and environmental turbulence, this thesis provides scholars and practitioners with the means to study and/or build more flexible organizations.

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Appendix

Appendix A. Sample Characteristics

Industry	**Percentage**
Agriculture, Forestry, Fishing and Hunting	3%
Mining	5%
Manufacturing	17%
Utilities	3%
Construction	5%
Accommodation and Food Services	1%
Transportation, Retail and Warehousing	11%
Financial Services	10%
Professional Services and Leasing	28%
Government and Social Security	6%
Education	3%
Health Care and Social Assistance	5%
Arts, Entertainment, Recreation and Other Services	2%
Number of employees	
10–20	7%
21–50	13%
51–250	34%
251–1000	18%
> 1000	28%
Total	n = 3259

Nederlandse Samenvatting (Dutch summary)

Toenemende turbulentie vraagt om flexibele organisaties

Onderzoekers hebben aangetoond dat de omgeving waarin bedrijven opereren steeds competitiever wordt (Wiggins & Ruefli 2005) of ten minste sterk fluctueert in de mate van turbulentie (McNamara et al. 2003). Met name het begrip 'hypercompetition' (D'Aveni 1994) heeft veel aandacht gekregen in de management literatuur.

De (wetenschappelijke) literatuur kent een lange traditie van studies naar de flexibiliteit van bedrijven[5], als antwoord op deze toenemende turbulentie en hypercompetitie. De meting van organisatieflexibiliteit als een multidimensionaal concept en het toetsen van stellingen ten aanzien van flexibele ondernemingen is echter moeizaam gebleken, waardoor de verdere ontwikkeling en bevestiging van de theorie over organisatieflexibiliteit beperkt is gebleven (Suarez et al. 2003, Dreyer & Grønhaug 2004).

Het voorliggende proefschrift doet verslag van een grootschalig, empirisch onderzoek onder ruim 1900 bedrijven (en meer dan 3200 respondenten) waarbij de flexibiliteit van de organisaties is gemeten en gerelateerd aan de prestaties van de onderneming.

Centraal in dit onderzoek staan vier onderzoeksvragen:

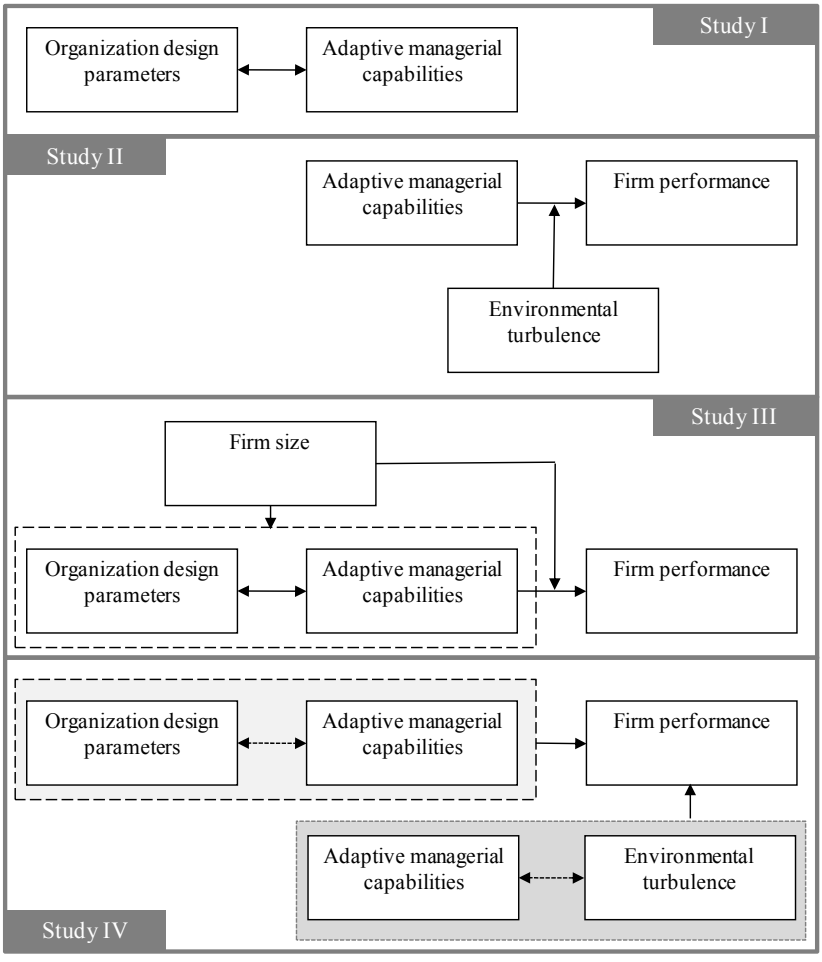
1) Hoe zijn de componenten van organisatieflexibiliteit met elkaar verbonden?
2) Hoe beïnvloedt flexibiliteit de bedrijfsresultaten in turbulente markten?
3) Hoe beïnvloedt bedrijfsgrootte de flexibiliteit van de organisatie en haar

[5] Zie Volberda 1998, Suarez et al. 2003 en Johnson et al. 2003 voor overzichten.

prestaties?

4) Hoe beïnvloeden de krachten richting bedrijfsspecifieke aanpassing en richting uniforme best practices elkaar en de prestaties van de onderneming?

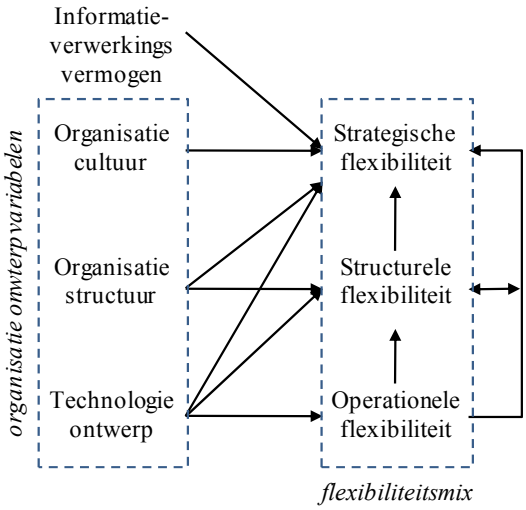
De uitkomsten, weergegeven in een viertal aparte studies, bevestigen een aantal centrale proposities uit de literatuur en bieden nieuwe inzichten in flexibele organisaties en de wisselwerking met de omgeving waarin zij floreren.



Figuur 1 Vier studies naar aspecten van organisatieflexibiliteit.

Niveaus van flexibiliteit en interventies in het organisatieontwerp

Verschillende auteurs benadrukken de complexe aard van het begrip organisatieflexibiliteit (o.a. Ansoff and Brandenburg 1971, Volberda 1996, De Toni and Tonchia 2005). In de eerste studie wordt aangetoond hoe verschillende typen van flexibiliteit (i.c. operationele-, structurele- en strategische flexibiliteit) kunnen worden onderscheiden en hoe deze zijn verbonden met respectievelijk de ontwerpvariabelen technologie, structuur en cultuur en de informatieverzamelingspraktijken. Figuur 2 geeft deze *formatieve hiërarchische structuur* schematisch weer. Hieruit blijkt, bijvoorbeeld, dat voor het ontwikkelen van strategische flexibiliteit interventies nodig zijn in veel, zo niet alle ontwerpvariabelen. Voor het ontwikkelen van operationele flexibiliteit daarentegen zijn 'slechts' interventies in de ondersteunende technologie vereist.



Figuur 2 Organisatieflexibiliteit in een conceptueel raamwerk met variabelen en relaties

Het succes van flexibiliteit en de mate van omgevingsturbulentie

De effectiviteit van flexibele managementvaardigheden wordt verondersteld afhankelijk te zijn van de mate van turbulentie in de omgeving van de onderneming, is *context specifiek* met andere woorden (Eisenhardt and Martin 2000, Newbert 2007, Brouthers et al. 2008). In antwoord op herhaalde oproepen om meer empirisch onderzoek naar de effectiviteit van organisatieflexibiliteit (o.a. Bettis and Hitt 1995, Hitt 1998, Johnson et al. 2003, Suárez et al. 2003), demonstreert de tweede studie hoe het succes van flexibele organisaties afhankelijk is van de mate waarin de omgeving ook daadwerkelijk flexibiliteit vereist. Concreet laten we zien dat het effect van strategische flexibiliteit op de bedrijfsprestaties toeneemt met de mate van onvoorspelbaarheid van externe veranderingen. Daarnaast laten we zien dat in een omgeving die wél voorspelbaar is, operationele flexibiliteit een meer efficiënt alternatief is ten opzichte van strategische flexibiliteit. Andere typen flexibiliteit inbouwen biedt dus niet altijd de meest optimale afstemming met de omgeving: strategische flexibiliteit is geen universeel panacee.

Het effect van bedrijfsgrootte op flexibiliteit en prestaties

Alhoewel veel onderzoekers stellen dat bedrijfsgrootte een kritieke variabele is die het effect van een strategie op de bedrijfsprestaties beïnvloedt (Donaldson 2001, Dobrev and Carroll 2003), geeft de literatuur geen eenduidig antwoord op de vraag of grootte een bron van inertie is, of juist van flexibiliteit (Kraatz and Zajac 2001, Bercovitz and Mitchell 2007). Empirisch bewijs is beperkt of slechts gericht op bepaalde aspecten van flexibiliteit (Dean et al. 1998). In de derde studie beargumenteren we dat alhoewel kleinere bedrijven veelal (1) non-routine technologieën toepassen en (2) meer organische structuren en (3) innovatieve culturen hebben en daarmee een zeer responsieve organisatie hebben, grote ondernemingen daarom niet per definitie minder strategische flexibiliteit kunnen ontwikkelen. Grotere bedrijven hebben veelal een beter

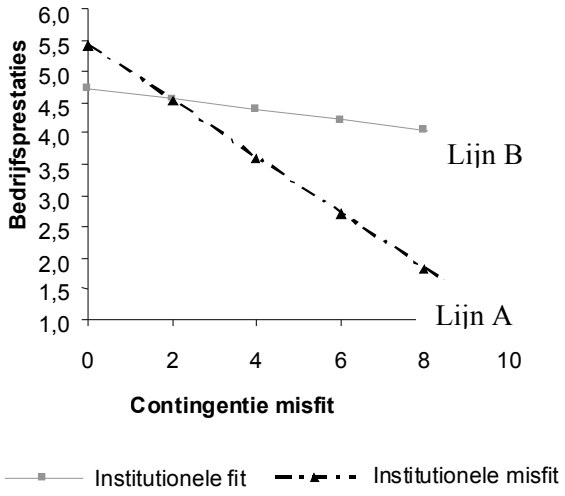
informatieverwerkingsvermogen, een vierde en niet onbelangrijke bron van strategische flexibiliteit waarin zij superieur zijn ten opzichte van kleinere ondernemingen. Onze data ondersteunen deze hypothesen. Voorts tonen we aan dat grotere ondernemingen ook meer kunnen profiteren van strategische flexibiliteit, waarmee het concurrentievoordeel zelfs in hun voordeel kan uitvallen. Dit in tegenstelling tot de gangbare assumptie dat kleinere bedrijven profijt hebben van hun superieure flexibiliteit (Majumdar 2000).

Strategische fit met de taak- en institutionele omgeving

De laatste studie gaat in op de criteria die succesvolle ondernemingen hanteren ten aanzien van de juiste flexibiliteit strategie en organisatie architectuur. Passen zij specifieke organisatie variabelen aan aan specifieke elementen uit hun (unieke) taakomgeving, zoals de contingentie theorie stelt, waardoor er heterogeniteit in de populatie van ondernemingen bestaat (Drazin & Van de Ven 1985, Venkatraman 1989, Donaldson 2001)? Of conformeren bedrijven zich aan de (generieke) institutionele normen en imiteren zij succesvolle bedrijven, zoals de institutionele theorie stelt, en beweegt de populatie zich naar homogeniteit (DiMaggio & Powell 1983, Scott 2001)? We beargumenteren dat beide benaderingen van strategische fit valide en complementair zijn en dat het creëren van de ene soort fit ten koste gaat van de andere soort fit. Met andere woorden, bedrijven die zich aanpassen aan hun unieke omgeving, conformeren zich daarmee minder aan algemene 'best practices' en "universele" normen voor bedrijven. En vice versa: het imiteren van succesvolle bedrijven gaat veelal ten koste van de aansluiting met de eisen uit de directe taakomgeving. Uit onze gegevens blijkt dat beide vormen van strategische fit gerelateerd zijn aan betere bedrijfsprestaties, maar dat contingentiefit beter presteert dan institutionele fit.

De uitkomsten van deze vierde studie zijn in het bijzonder relevant als we aannemen dat een zekere mate van misfit onontkoombaar is (Donaldson 2001), bijvoorbeeld als een bedrijf in een onbekende taak- en institutionele omgeving

opereert zoals het geval is bij internationale expansie, ongerelateerde diversificatie en radicale deregulering. In dit geval wordt de organisatie weergegeven door de lijn A in Figuur 3 (misfit met de lokale institutionele eisen) en bevindt zich rechts op de horizontale as, er is immers tevens sprake van een misfit met de nieuwe taakomgeving. Alhoewel bedrijven geneigd kunnen zijn om eerst de fit met hun taakomgeving te verbeteren, valt te overwegen om eerst de institutionele misfit weg te nemen aangezien dit de negatieve effecten van de misfit met de taakomgeving op de bedrijfsprestaties substantieel zal reduceren (lijn B wordt opgezocht).



Figuur 3 Effecten op bedrijfsprestaties van een misfit met de taakomgeving (bij institutionele fit en -misfit condities)

Wetenschappelijke bijdrage en betekenis voor managers

De implicaties met betrekking tot de theoretische kennis over organisatieflexibiliteit worden samengevat in onderstaande tabel.

Implicaties voor onderzoek naar organisatieflexibiliteit

- Verschillende dimensies van flexibiliteit kunnen worden onderscheiden en gekwantificeerd. Deze dimensies beïnvloeden elkaar op een positieve manier om steeds hogere niveaus van flexibiliteit te ondersteunen.

- De effecten van flexibiliteit worden op bedrijfsniveau beïnvloed door de mate van omgevingsturbulentie. Strategische flexibiliteit is slechts superieur aan operationele flexibiliteit in onvoorspelbare markten,.

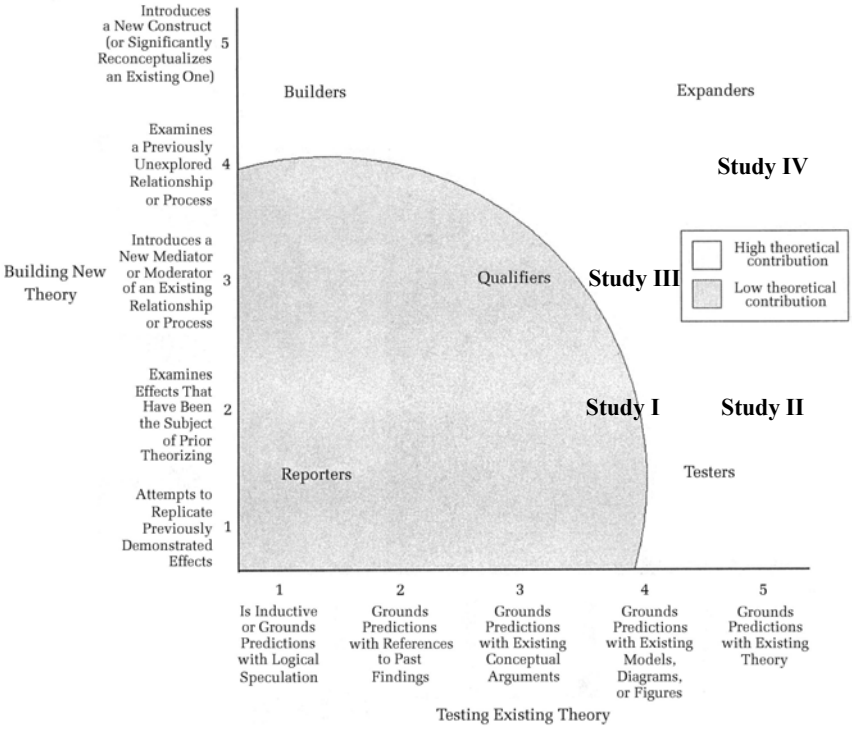
- Alhoewel bedrijfsgrootte gerelateerd is aan inertie in het organisatieontwerp, heeft omvang een positief effect op het informatieverwerkingsvermogen. Grotere ondernemingen profiteren vervolgens meer van de strategische flexibiliteit die hieruit voortkomt.

- Bedrijven kunnen profiteren van de aansluiting op hun directe taak-omgeving en kunnen daarmee afwijken van meer universele normen voor organisaties, zoals 'best practices'. Beide typen van strategische fit beïnvloeden elkaar en de effecten op de bedrijfsresultaten.

Conform de taxonomie van Colquitt en Zapata-Phelan (2007) kan de bijdrage van deze vier studies tweeledig worden beschouwd (zie Figuur 4). De taxonomie beoordeelt empirisch onderzoek ten aanzien van de mate waarin bestaande theorie wordt getest én de mate waarin nieuwe theoretische relaties worden geïntroduceerd. De eerste twee studies voldoen met name aan de criteria voor 'Tester' (toetst bekende relaties) aangezien op basis van bestaande modellen een "nomologisch" netwerk van variabelen en relaties is onderzocht op validiteit en samenhang. Met name bevestigt onze data de centrale assumptie in de literatuur over flexibiliteit dat dynamische management vaardigheden context specifieke effecten hebben op de bedrijfsprestaties (zie Volberda 1996, Eisenhardt & Martin 2000, Helfat et al. 2007, Newbert 2007).

De bijdragen van de derde en vierde studie betreffen de ontwikkeling en test van nieuwe inzichten in de bestaande theorie over organisatieflexibiliteit. We definieerden een nieuw model om de invloed van bedrijfsgrootte op de flexibiliteit van de organisatie te benaderen en specificeerden de relatie tussen twee dominante

benaderingen ten aanzien van strategische fit: contingentiefit (zie Donaldson 2001) en institutionele fit (zie Kondra & Hinings 1998). Dit is een nieuwe definitie van een *systeem fit* (zie Greening & Gray 1994) in de literatuur over strategische fit van organisatieflexibiliteit. De laatste twee studies voegen aldus nieuwe variabelen toe aan bestaande inzichten op basis van bestaande conceptuele argumenten en valideren de gespecificeerde relaties empirisch; in de genoemde taxonomie voldoen zij aldus aan de criteria voor 'Qualifiers' (kwalificeert nieuwe variabelen en relaties) waarmee de algehele theoretische contributie van deze thesis als hoog beschouwd kan worden.



Figuur 4 Theoretische contributie van empirische studies (Colquitt & Zapata-Phelan 2007)

Naast een bijdrage aan de wetenschappelijke kennis heeft dit onderzoek

ook betekenis voor managers. Dit onderzoek laat zien op welke wijze componenten van organisatieflexibiliteit bijdragen aan steeds hogere niveaus van flexibiliteit en informeert managers ten aanzien van de minimaal benodigde scope van interventies in de organisatie. De uitkomsten informeren managers bij de besluitvorming over de optimale samenstelling van de flexibiliteitsmix in meer of minder voorspelbare en dynamische markten. We laten onder meer zien dat, zoals verwacht, in *onvoorspelbare markten* strategische flexibiliteit gerelateerd is aan superieure prestaties. We tonen echter ook aan dat strategische flexibiliteit niet in elke situatie de beste oplossing is en dat in *voorspelbare markten* planmatige organisaties met 'slechts' operationele flexibiliteit superieur kunnen zijn aan strategische flexibele en extreem responsieve organisaties.

Het onderzoek naar de relatie tussen bedrijfsgrootte en componenten van organisatieflexibiliteit wijst op de tegengestelde effecten van bedrijfsgrootte op respectievelijk het organisatieontwerp en het informatieverwerkingsvermogen en laat zien waar kleine en grote ondernemingen strategische flexibiliteit op baseren. Voorts tonen we aan dat grote ondernemingen vis á vis kleinere ondernemingen een concurrentievoordeel kunnen opbouwen; grote ondernemingen kunnen meer profiteren van strategische flexibiliteit dan kleine bedrijven.

De bevindingen suggereren tevens dat managers in hun streven naar strategische fit en bovengemiddelde bedrijfsprestaties praktijken dienen te ontwikkelen die aansluiten bij de eisen van hun *unieke* taakomgeving en tegelijkertijd de organisatie conform meer *generieke*, institutionele normen en 'best practices' dienen in te richten. Beide vormen van strategische fit, contingentiefit respectievelijk institutionele fit, beïnvloeden elkaar negatief: het één gaat ten koste van het ander. Ons onderzoek informeert managers over de effecten van investeringen in beide typen fit in verschillende situaties en biedt daarmee met name houvast in nieuwe, onbekende situaties. In het algemeen zouden managers in het bijzonder aandacht dienen te besteden aan de focus van

het leren in de organisatie; leren van unieke ervaringen in de taakomgeving blijkt superieur aan het imiteren van succesvolle bedrijven, maar moet het laatste niet uitsluiten.

Tot slot, over de onderzoeksmethode en de Quick Scan Flexibiliteit

De resultaten van dit onderzoek zijn gebaseerd op gegevens van 3259 respondenten over 1904 organisaties uit 13 verschillende sectoren, waaronder industrie en dienstverlening, handel, maar ook non-profit organisaties. De gegevens zijn verzameld in het uitgebreide internationale netwerk van de Rotterdam School of Management met een vragenlijst oorspronkelijk ontwikkeld door Prof.dr. Henk Volberda. De vragenlijst interviewt de respondent middels 7-punts Likert schalen (helemaal mee oneens – … – helemaal mee eens) over de verschillende componenten van organisatieflexibiliteit en de turbulentie in de omgeving.

De Quick Scan Flexibiliteit bestaat uit een online enquêtemodule voor de vragenlijst, een algoritme voor de verwerking van de data en een rapportage waarin de achterliggende theorie wordt toegelicht en waarin de resultaten van de respondent worden gepresenteerd en geïnterpreteerd. De QSF wordt intensief toegepast in onderwijs en contractonderzoek en slaat daarmee actief een brug tussen wetenschap en praktijk[6].

[6] Hitt MA, PW Beamish, SE Jackson, JE Mathieu (2007) Building theoretical and empirical bridges across levels: multilevel research in management. Academy of Management Journal 50(6).

Curriculum Vitae

Niels van der Weerdt (Amsterdam, 1972) has been involved in research at the Rotterdam School of Management, Erasmus University since 1997.

Working as a strategy consultant for NetMarketing, a small consulting firm focusing on e-business strategies, he came to see many different kinds of organisations and developed an interest and fascination for organisations and their struggles to survive and prosper in competitive environments. Having done so for a number of years, his drive for top quality management insights led him to return to Erasmus University in 2002.

Since he joined the department of Strategy and Business Environment as full-time assistant professor, Niels has been acting as coordinator of various academic courses. Most prominently, under his supervision the Strategic Business Plan Course has been revamped to become a flagship course of the school.

Searching for synergies in teaching and research, Niels developed the Quick Scan Flexibility (QSF) with collegeau Henk Volberda and had students apply the QSF and analyse the flexibility of thousands of organisations in the Netherlands and abroad. Applying the QSF on such a broad scale has resulted in wide dissemination of managerial knowledge within the business community and a vast database with rich information on the flexibility of a diverse set of organisations.

Several scholarly articles were presented at international conferences over the years and have been submitted to international journals preceding the publication of this thesis.

Apart from his work as an assistant professor, Niels has been involved in the application of academic knowledge in practice through his work as a project leader at the Dutch Center for Social Innovation. Furthermore, he was involved in several contract research and consulting projects.

Niels lives in Rotterdam and has a daughter of five. Besides academia, he has a passion for photography.

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