Market-Based Capabilities, Perceived Quality and Firm Performance

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Amsterdam, april 2006
Mostafa Aâkouk

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Chapter 1

INTRODUCTION

"As the economy changes, theories
and measures must change, too."
Fornell et al. (1996)

1.1 Introduction

The historical roots of the marketing concept are traceable to the early 1950s (Drucker, 1954). However, the field of strategic marketing did not begin to bloom until late 1980s and begin 1990s. In this period various scholars begin to develop a better and more precise understanding of the marketing concept, its antecedents and consequences (Kohli and Jaworski, 1990; Narver and Slater, 1990). Some even suggest that the intellectual foundation for today's strategic marketing starts early 1980s with the writings of Day and Wensley (1983, 1988). During the late 1990s and early 2000s, various critics begin to rebel at the widespread use of present conceptualizations of market orientation.[1] In this thesis, we argue that the present market orientation conceptualizations are becoming outdated (after more than 15 years). We use hereby Weiner's (2000, p. 382) philosophical words, that a marketing:

> "theory, like a cat or a dog, has a life of about 10-12 years, which is the equivalent of around 70-84 years of human existence. Longevity in part depends on the size of the pet (the bigger the theory, the earlier the demise), its level of activity, breed, and so on. At around the age of 10, the theory begins to weaken, does not see things too well, and is unable to adapt to the new circumstances and to the many obstacles in life. It can remember and account for the distant past better than recent events, and it acts with rigidity."

The diminishing attractiveness of the present conceptualizations of the marketing concept lead some researchers to look for or move off into new directions, such as (1) the market-based capabilities perspective, where market orientation only represents one of the components (Day, 1994), and (2) the strategic orientation construct, where market orientation is also incorporated as a dimension (Gatignon and Xuereb, 1997). The first perspective deals with the classification of market-based capabilities, which suggests a balanced perspective of inside-out and outside-in capabilities (e.g., Day 1994; Mizik and Jacobson 2003; Noble, Sinha and Kumar 2002; Slack and Lewis 2003; Srivastava, Fahey and Christensen 2001; Vargo and Lusch 2004; Zwart and Postma, 1998). Although a number of classifications exists, these models

[1] Especially the Nordic Schools (i.e., Gummesson and Grönroos) go rather far in their criticism.

largely incorporate market-driven, relationship-driven and supply-chain capabilities as relevant market-based resources. Another perspective that gains popularity in recent years is the strategic orientation model. The strategic orientation direction incorporates variables like customer orientation, competitor orientation, technology orientation and relational orientation. This perspective integrates the classical strategic management literature with that of market orientation.

Although we do not claim that the classical market orientation movement begins to fully lose its early enthusiasm, energy and adherents, we believe it is a good time to explore, synthesize, integrate and extend the previously mentioned directions. By doing so, we also provide evidence whether firms with (several) strong marketing capabilities are in a better position to satisfy the needs of their customers and shareholders. To investigate the propositions we use a dyadic approach, data generated from both customers of wholesalers and suppliers/wholesalers. Furthermore, we investigate, using several statistical methods, the effectiveness of attempting to develop several marketing capabilities simultaneously.

In short, the primary purpose of this study is theory building, extension of previous research in the field of market orientation and applying several recently proposed statistical methods to further explore the developed frameworks. However, this study is not only useful from the point of view of advancement of science in marketing, but also from the point of view of advancing managerial decision making. The results derived from the developed models and proposed methods form an essential piece of information to improve marketing decisions. This enables (top) managers faced with the problem of how to trade off competing strategic marketing initiatives to further optimize their decision-making process.

1.2 General Framework

In this dissertation, we focus on models related to the marketing concept and further synthesize and extend the literature (in this field) by developing two alternative integrated models of marketing: (1) the market-based capabilities construct, and (2) the strategic marketing capabilities model. These models extend the traditional models by incorporating several marketing resources and provide evidence for the effectiveness of attempting to develop and leverage several (market-based) capabilities simultaneously. We also extend the business-to-business quality literature by developing a quality model which we call WholeSaleQual for assessing customer perceptions of quality in a wholesale environment. Also, linking the market orientation and relationship marketing literature with the services operations management perspective, we extend the 'service-profit chain' framework. In this extended framework, we model the relationship between organizational service capabilities and profitability as a chain of effects. This enables us to fully capture the effect of services marketing capabilities on business performance. In doing so, we use a dyadic approach. We examine marketing resources and business financial performance using managers' reports of firm performance. The market performance data are collected from customers. Linking marketing capabilities to customer responses

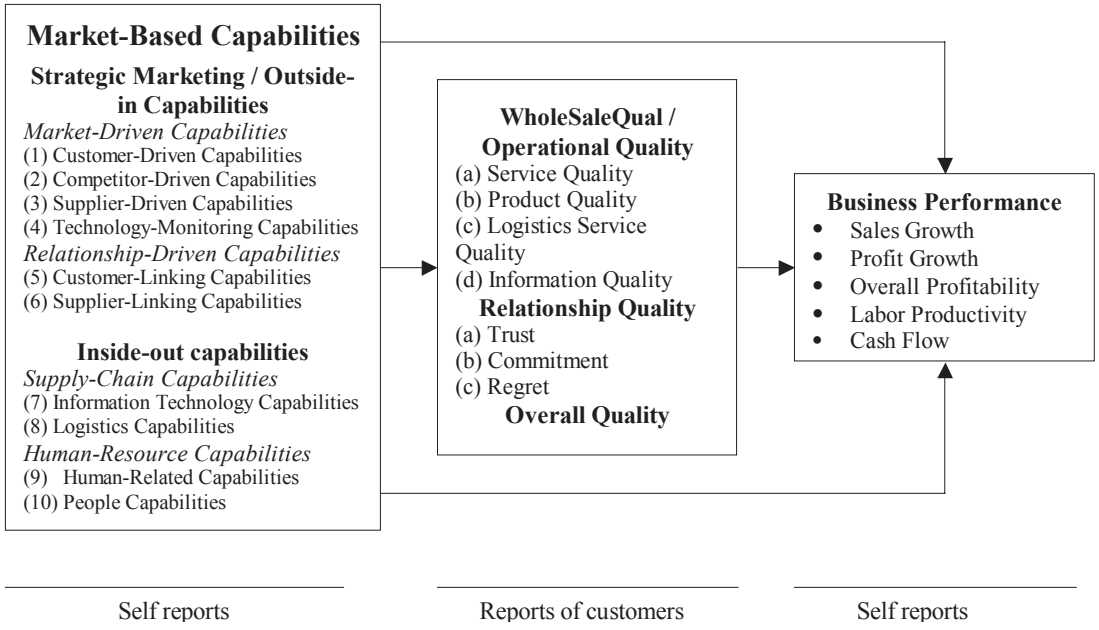


Figure 1.1: General Framework

is essential since marketing comprises a firms' "willingness to recognize and understand the consumers needs and wants, and the willingness to satisfy those needs and wants" (Houston 1986, p. 86). The theoretical model in Figure 1.1 summarizes the studies presented in this dissertation.

1.2.1 Market-Based Capabilities

Chapter 2 and 3 in this dissertation develop a synthesized model of market-based capabilities by integrating the strengths of various studies classifying market-based capabilities. We develop a classification and measurement scales for market-based business capabilities from the configurational-based view. This construct represents a higher-order model with four second-order factors: (1) market-driven, (2) relationship-driven, (3) supply-chain, and (4) human-related capabilities, and is shown in the first block of the framework (Figure 1.1). To a large extent, Day (Day 1994; Day and Wensley 1998), Hunt (Hunt 2000; Hunt and Morgan 1995) and Srivastava and colleagues (Srivastava et al. 1998, 1999; Srivastava et al. 2001) have conceptually developed this view. We combine the outside-in and inside-out perspective, thereby proposing that a market orientation cannot exist when there is no alignment between market-driven capabilities and other relevant capabilities (e.g., Srivastava, Shervani and Fahey 1999). Furthermore, we relate these capabilities to business performance to investigate the relevance of these capabilities to a firm.

1.2.2 Strategic Marketing Capabilities

Chapter 4 proposes a new conceptualization of strategic orientation by developing a multidimensional model, which we call strategic marketing capabilities (see the upper part of the first block in figure 1.1), integrating both the classical market orientation and relationship marketing perspectives. In developing this model we largely build on Day's (1994) and Lusch and Laczniak's (1987) seminal work. In this model, we distinguish six higher-order factors: (1) customer-driven, (2) competitor-driven, (3) supplier-driven, (4) technology-monitoring, (5) customer-relating and (6) supplier-relating capabilities.[2] Chapter 5 investigates whether organizations excel when they understand and respond to their markets more effectively than their rivals do. Chapter 7 determines the impact of strategic marketing capabilities on various dimensions of quality, as perceived by customers. Before determining this relationship, we first develop and validate in paper 6 a so-called WholeSaleQual model for assessing customer perceptions of quality in a wholesale environment. This model incorporates service quality, product quality, logistics service quality and information quality as dimensions (see the upper part of the second block, figure 1.1).

1.2.3 Marketing Capabilities, Perceived Quality and Business Performance

In the final Chapter, we investigate and extend the classical service-profit chain framework (Heskett et al., 1994). The links presented in this chapter cannot be derived very easily from Figure 1.1. To give a general overview, we model the relationship between organizational service capabilities and profitability as a chain of effects. First, the organizational service capabilities influence employee service capabilities. Second, improved employee service capabilities result in positive internal service outcomes (employee satisfaction and value). In turn, internal service outcomes affect service relationships. Fourth, service relationships lead to external service outcomes (service quality). Finally, the increased external service outcomes result in greater profitability.

1.3 Methodology

This study is designed to evaluate the market-based capabilities of business-to-business firms. To effectively investigate the relationships postulated in this study, we choose a single-industry setting. This approach enables us to consider different strategic capabilities and their consequences in the same competitive environment, which allows us to better interpret the findings. Furthermore, our dyadic approach requires the collection of data from business-to-business companies and their customers. As mentioned earlier, we choose for the wholesaling sector.

[2]We use the terms 'linking' and 'relating' interchangeably in this dissertation.

1.3.1 Wholesaling

Wholesaling refers to establishments that do not sell products to a significant degree to ultimate household consumers but sell products primarily to other businesses, such as retailers, merchants, industrial users and commercial users (Coughlan, Anderson, Stern and El-Ansary, 2000, p. 475-476). The purpose is to adjust supply to demand on the basis of time, quantity and quality. We select the electrotechnical wholesale industry as our research setting mainly for the following three reasons: (1) there is little research investigating wholesaling, especially in the quality literature, (2) it is a major industry in the Western Economy, and (3) there is a realistic chance of elimination when this industry does not add value for customers.

Little Research Little research has been conducted in analyzing the wholesale industry (Lusch and Brown, 1996; van Dalen, Koerts and Thurik, 1990; Riemers, 1999). For example, Lusch and Brown (1996) point out that "channels research has concentrated on manufacturer-retailers and franchisors-franchisee linkages, virtually ignoring the wholesaler's role" (p. 26). The same authors argue that relatively little is known about these channel members from both an economic and behavioral perspective.

A Major Industry The (electrotechnical) wholesale is a major industry in the Western Economy (Van Ark, Monnikhof and Mulder, 1999). This industry is both import- and export-oriented. It imports technical knowledge from abroad. Also, the electrotechnical wholesale industry belongs to the subcategory of 'capital goods', which has in many developed countries a high employment and a high number of companies as compared to other wholesale categories.

Chance of elimination Several marketing researchers point out that the wholesaling function will be eliminated if the activities are not performed more efficiently than others in the supply channel (Rosenbloom, 2001; Rosenbloom and Warshaw, 1995). Lusch and Brown (1996) state that "because of unexpected changes, in both supply and demand, the wholesalers, which serve as a buffer between manufacturers and retailers and/or end users, must be flexible and adaptive to changing circumstances" (p. 24). Furthermore, the growing numbers of specialized logistics-oriented companies which further develop and innovate the distribution function (carried out by the wholesaler) and the direct link between manufacturers and retailers, made possible due to information technology, may threaten the position of the electrotechnical wholesale industry.

1.3.2 The Sample

We started with exploratory research to obtain information about the electrotechnical wholesaling market and interviewed some managers. Next, a two-stage plan was used to obtain independent sets of dyads. The first stage involves using the official records of the Dutch Chamber of Commerces database to select potential customers of electrotechnical wholesalers. We sent 2921 questionnaires to the customers of electrotechnical wholesalers in the Netherlands, including a cover letter explaining the study goal and a stamped return envelope to the owner or manager

of each firm (Appendix A.2). Customers are asked to rate the degree to which they are satisfied with the offerings of one of their wholesalers and to give the name of this supplier. The mailing resulted in 490 responses, which is a response rate of 16.8%, and 178 names of different wholesalers (suppliers).

The second stage of the sampling plan involves a mailing survey to the wholesalers. The sampling frame is a list of 843 technical wholesalers in the Netherlands; additional names of electrotechnical wholesalers are taken from the official records of the Dutch Chamber of Commerces database. The method used is a survey among 'key informant' decision makers within electrotechnical wholesale companies. We presume that the manager or owner is the most knowledgeable person concerning market strategy, the firm's relationships with both customers and suppliers, and the internal resources (HRM, Logistics, and Information Technology). We sent questionnaires to these wholesalers, including a cover letter explaining the study goal, and a stamped return envelope to the owner or manager of each firm (Appendix A.1). Of these 843 surveys, 137 were returned, a response rate of 16.3 percent. Of these received survey data, we could match sets of questionnaires from wholesalers and their customers suitable for dyadic analyses.

1.4 Outline of the Dissertation

This dissertation consists of seven chapters that are or will be submitted for publication. As outlined before, the chapters are divided into four sections, each part consisting of one or a number of papers: (1) market-based business capabilities, (2) strategic marketing capabilities, (3) WholeSaleQual construct, and (4) marketing capabilities, perceived quality and business performance.

1.4.1 Market-Based Business Capabilities

In Chapter 2, entitled "The Effect of Market-Based Business Capabilities on Business Performance: Extension of Theory and an Empirical Investigation," we synthesize much of the unrelated discussions and analyze the impact of market-related resources on business performance. These resources include (1) market-driven, (2) relationship-driven, (3) supply chain, and (4) human resource capabilities. Furthermore, we develop and validate a measure of market-based capabilities.

Additional analyses using partial least squares regression are made in Chapter 3, entitled "A Detailed Investigation of the Market-Based Capabilities-Firm Performance Link: A Multivariate Partial Least Squares Regression Analysis." This study extends previous work by simultaneously relating (highly correlated) dimensions of market-based capabilities to several indicators of firm performance using multivariate partial least squares regression.

As mentioned above, Chapter 2 develops the market-based capabilities model by incorporating elements from several literature streams within marketing. Our model adds to the market orientation literature by proposing a broader conceptualization of market orientation and by relating the components of this model to

business performance. Basically, Chapter 3 also relates market-based capabilities to business performance. Since Chapter 3 extends Chapter 2 in various areas it is useful to point out the relative contribution of Chapter 3. By applying partial least squares regression, Chapter 3 provides a more comprehensive analysis of the market-based capabilities construct. This enables us to investigate the contribution of the subdimensions of market-based business capabilities to various indicators of business performance. This, in turn, provides an opportunity to compare our study results with previously conducted and published research. Furthermore, this analysis enables us to better detect the marketing-related drivers of business performance. In short, this study extends the scope of market orientation studies, which have not addressed the general problem of comparing the impact of various market-based business capabilities on several indicators of business performance.

1.4.2 Strategic Marketing Capabilities

The fourth Chapter is entitled "The Strategic Marketing Capabilities Construct: An Integration of the Market-Driven and Relationship Marketing Perspectives." In this chapter we develop a single model of strategic marketing capabilities that indicates a focus on the market (market orientation) and relationships (relationship marketing). This model incorporates six higher-order factors: (1) customer-driven, (2) competitor-driven, (3) supplier-driven, (4) technology-monitoring, (5) customer-relating and (6) supplier-relating capabilities. Utilizing a Bayesian confirmatory factor analysis, we investigate whether the hypothesized strategic marketing capabilities model is a good representation of the variance-covariance matrix. Validation tests, applying a recently proposed information criterion called deviance information criterion and Gelfand and Ghosh's Criterion, using nested and nonnested competing models, are used to further investigate the relative strength of this model.

Chapters 2 and 4 develop two distinct, although related, frameworks. Table 1.1 shows some of the key features that differentiate the model developed in Chapter 4 from that of Chapter 2. As mentioned previously, the market-based business capabilities model incorporates elements from both the marketing and resource-based view literature, whereas the strategic marketing capabilities model primarily incorporates elements from literature streams within marketing (also known as the strategic orientation perspective). In Chapter 2, we determine the effect of various market-based capabilities on business performance, whereas Chapter 4 delivers a more detailed overview of the used statistical methods. Another important difference, besides the proposed (sub)dimensions, applied methods and statistical details, is the proposed factor structure.

In Chapter 5, entitled "The Effect of Strategic Marketing Capabilities on Firm Performance: A Bayesian Linear and Nonlinear Latent Variable Analysis," we extend Chapter 4 by relating the strategic marketing capabilities to firm performance. Besides a linear effect, we also investigate a nonlinear relationship between the strategic marketing capabilities and firm performance. In doing so, we utilize a Bayesian approach to estimate the proposed linear and nonlinear latent variable models.

Chapter 7 extends Chapter 4 and is entitled "Strategic Marketing Capabilities and Perceived Quality: A Dyadic Approach." This study investigates, in accordance with the marketing concept, the effect of strategic marketing capabilities on several indicators of market performance (i.e., operational quality, relationship quality and overall quality). Linking supplier responses to customer responses, we investigate the notion that firms are more likely to satisfy their customers when they possess superior strategic marketing capabilities.

1.4.3 WholeSaleQual

A model to assess quality in a wholesale setting is presented in Chapter 6. It is entitled "Development and Assessment of the WholeSaleQual Construct." In developing this model, several constructs from the quality literature, which are largely investigated independently in past research, are integrated. The purpose of this paper is to (1) describe the development of a multiple-item multidimensional model for measuring quality in a wholesale setting, (2) compare this model to a multilevel quality model, and (3) investigate an operational level model, by estimating the relative importance of the developed operational dimensions (subdimensions of the WholeSaleQual construct), using partial least squares regression (PLSR). Our main thesis is that the PLSR method provides good estimates when implementing an operational level analysis where the presence of highly correlated operational dimensions is expected.

1.4.4 Marketing Capabilities, Perceived Quality and Business Performance

In Chapter 8, entitled "Revisiting the Service-Profit Chain Framework: Extension of Theory and an Empirical Assessment," the service-profit chain framework is extended and put to a test. In this extended framework we propose the following service-profit chain: organizational service capabilities → employee service capabilities → internal service outcomes → service relationships management → external service outcomes → financial performance. To estimate this model, dyadic data are used. Furthermore, since mediation plays a central role, we both apply classical and bootstrap methods to determine the strength of mediation.

1.5 Contributions

With this research, we contribute to emerging literature, which can be classified as 'market-driven management,' 'customer-based marketing' and 'customer relationship management,' as follows. First, we develop an integrated classification of market-based capabilities using concepts from strategic marketing, service management, human resource management, supply chain management and relationship mar- keting. Second, we investigate, using several methods and techniques, which market-based capabilities are particularly relevant for describing and explaining the

creation of sustainable competitive advantage. Third, we present an alternative model of market orientation, which we call strategic marketing capabilities. Furthermore, we investigate the relationship between strategic marketing capabilities and firm performance using latent variable models. Fourth, we apply a Bayesian approach to the proposed linear and nonlinear latent variable models to obtain correct estimates. Fifth, we describe and apply the Gelfand and Ghosh and Deviance Information Criterion to compare the two models (main effects and interaction effects model) under investigation. Sixth, we also identify how particular market-based capabilities contribute to generating and sustaining specific forms of customer value. The seventh contribution concerns the development of the WholeSaleQual construct. Furthermore, we provide an approach and method for translating customer feedback into managerial actions for improving market performance. This analysis enables managers in wholesaling to recognize the quality attributes that need to be improved to stimulate customer satisfaction. Another contribution is our explicit link between operational level analysis and PLSR as a method to implement this approach. Finally, we contribute to the marketing literature by extending the 'service-profit chain' framework by explicitly incorporating the service operations management and relationship marketing perspective into this model. In this extended framework, we model the relationship between organizational service capabilities and profitability as a chain of effects. To estimate this model, we apply bootstrap methods and use dyadic data obtained from the suppliers and their customers.

Chapter 2

The Effect of Market-Based Business Capabilities on Business Performance: Extension of Theory and an Empirical Investigation

Abstract Marketing researchers have been observing for more than two decades that business performance is affected by both outside-in and inside-out resources (often denoted as market-based capabilities). Yet to date there has been no valid measure of market-based capabilities. In line with the configurational model of market-based competition, this study develops an integrated classification of market-based capabilities using concepts from strategic marketing, service management, human resource management, supply chain management and relationship marketing. We propose four dimensions for our market-based capabilities construct: (1) market-driven, (2) relationship-driven, (3) supply chain, and (4) human resource capabilities. This study also argues that the four market-based capabilities are particularly relevant for describing and explaining the creation of sustainable competitive advantage. We examine firm performance using managers' reports of firm performance Results broadly support the proposed market-based capabilities construct. The regression analysis indicates that only supply chain and human resource capabilities are significantly related to business performance. The findings of this study contribute to theory in marketing strategy and have important implications for firms that are developing market-based capabilities. Study limitations and directions for future research are also discussed.

2.1 Introduction

Being 'market-driven' is considered as an essential strategy for success and survival in today's competitive environment (Day 1999). During the last two decades, the primary emphasis focused on the concept of market orientation and its antecedents and consequences. Looking broadly to the marketing strategy literature, it appears that during the past years the 'market-driven' agenda has shifted and reconfigured to include other market-based resources.

Market-based resources are playing an increasing role in the economy, and often it is suggested that they have significant implications for firms' market performances. In general, (marketing) strategy researchers propose three theories that are useful for describing and explaining the process of market-based competition:

(1) the resource-based view (RBV), (2) the marketing-based view (MBV), and (3) the configurational-based view. The RBV theorists argue that a firm's sustainable advantage lies is its resource position (Wernerfelt 1984; Barney 1991). Day and Wensley (2002, p. 85) state that "This is predominantly an inside-out perspective, which starts with the capabilities and assets of the firm before considering the competitive context." The MBV identifies an orientation toward the market as the primary source of advantage (Kohli and Jaworski 1990; Narver and Slater 1990). The primary goal of this outside-in perspective is to create superior value for customers through the processes of market information acquisition, information dissemination, and coordinated action. An inside-out (RBV) or outside-in (MBV) focus alone, however, is insufficient to achieve superior financial performance. Therefore, some marketing strategy researchers suggest a balanced perspective of inside-out and outside-in capabilities (Day 1994; Mizik and Jacobson 2003; Noble, Sinha and Kumar 2002; Slack and Lewis 2003; Srivastava, Fahey and Christensen 2001; Vargo and Lusch 2004). This configurational perspective is more realistic, in that it considers both the firm's heterogeneous bundles of resources (RBV) and the issue of heterogeneous demand (MBV).

In strategic marketing management, several marketing models, linking (marketing) resources to business performance (c.f., Bharadwaj, Varadarajan and Fahy 1993; Day 1994; Day and Wensley 1988; Hunt and Morgan 1996), have been developed by strategic marketing scholars. These researchers take a configurational perspective when addressing the most fundamental question at the heart of organizational survival: how to develop and sustain a competitive advantage? These models are, however, very general and therefore a stream of researchers have concentrated on the classification of these (market-based) resources (see for example, Day 1994; Hooley, Möller and Broderick 1998; Hoekstra, Leeflang and Wittink 1999; Hooley et al. 1999; Noble, Sinha and Kumar 2002; Srivastava, Shervani and Fahey 1998, 1999; Srivastava et al. 2001; Vargo and Lusch 2004). This stream of research identifies resources that are marketing-related and potentially manifest at least some of the desired RBV attributes (i.e., appear to be difficult to imitate, are rare, etc.). However, this stream of research is highly conceptual and gives no strong direction for both academics and practitioners on how to implement this configurational-based model. Therefore, our purpose is to develop a synthesized classification of market-based capabilities. Also, we report an exploratory study in which we develop a valid measure of market-based capabilities. Furthermore, we investigate the degree to which the dimensions of this market-based capabilities model are viable and potentially lucrative business approaches by relating them simultaneously to business performance.

In this chapter, we explore the configurational perspective of market-based competition and its effect on company performance in a single business-to-business industry, the wholesale sector in the Netherlands. This research is part of a larger project that is designed to evaluate the market-based capabilities of business-to-business firms. The purpose is to better advise business-to-business firms in developing their marketing strategies (and activities).

This study extends previous research by: (a) developing a synthesized classifi-

cation of market-based capabilities, (b) developing valid measures of these market-based capabilities, using concepts from strategic marketing, service management, human resource management, supply chain management and relationship marketing, (c) investigating this market-based capabilities construct using factor-analytical methods, and (d) relate the dimensions of this construct simultaneously to business performance. This chapter is organized as follows. First, we briefly review the classifications of market-based capabilities proposed in the literature. Next, we combine the strengths of each classification to develop our classification of market-based business capabilities. Then, we present our conceptual framework and formulate hypotheses. After this, the data collection approach and methods of analysis are described. Finally, we present the results and discuss the consequences of these findings for both marketing science and practice.

2.2 Market-Based Business Concept

As noted earlier, several scholars propose a configurational theory of marketing. To further develop this perspective, several researchers propose classifications incorporating both the marketing-based view and resource-based view. Hereafter, we discuss these classifications found in the literature and next we propose a new classification through combining the strengths of each classification resulting in our market-based capabilities construct.

2.2.1 Market-Based Classifications in the Literature

Several concepts of market-based capabilities have been proposed (Table 2.1). We distinguish the following concepts: (1) the information approach, (2) the cultural approach, (3) the capabilities approach, (4) market-based assets, (5) marketing assets and capabilities, (6) core market-based processes, (7) the operant resource-based perspective, and (8) the resource advantage perspective. This summation is not intended to be exhaustive. We only review the concepts that have gained some acceptance in strategic marketing.

The information approach. In 1990, Kohli and Jaworski articulate a theory of market orientation, which they describe as the implementation of the marketing concept, with the following activities: (1) intelligence generation, (2) intelligence dissemination, and (3) organizationwide responsiveness. This theory has been refined and built upon, and valid measures of the market orientation construct have been developed (e.g., Kohli, Jaworski and Kumar 1993).

The cultural approach. Narver and Slater (1990, p. 21) define a market orientation as an "organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, continuous superior performance for the business." Their research suggests three behavioral components of market orientation: customer orientation, competitor orientation and interfunctional coordination. Narver and Slater (1990) also develop measures for their construct.

1. Information Approach (Kohli and Jaworski 1990)	2. Cultural Approach (Narver and Slater 1990)	3. Capabilities Approach (Day 1994)
Intelligence Generation	Customer Orientation	Market-Sensing Capabilities
Intelligence Dissemination	Competitor Orientation	Customer-Linking Capabilities
Responsiveness	Interfunctional Coordination	Channel-Bonding Capabilities
		Technology Monitoring Capabilities
4. Market-Based Assets (Srivastava et al. 1998)	**5. Marketing Assets and Capabilities (Hooley et al. 1998)**	**6. Core Market-Based Processes (Srivastava et al. 1999)**
Relational Assets	Strategic Marketing Capabilities	Customer Relationship Management
Intellectual Assets	Functional Marketing Capabilities	Supply Chain Management
	Operational Marketing Capabilities	Product Development Management
7. Operant Resources (Vargo and Lusch 2004)		**8. Resource Advantage Perspective (Hunt 2004)**
Market Orientation Processes	Quality Management Processes	Informational Resources
Services Marketing Processes	Supply Management Processes	Relationship Resources
Relationship Marketing Processes	Network Management Processes	Human Resources
Resource Management Processes		Organizational Resources

Table 2.1: Market-Based Classifications in the Literature

The capabilities approach. George Day (1994) proposes an approach, which explicitly emphasizes the concept of capabilities. His vision is that market-driven organizations have superior market-sensing, customer-linking, channel-bonding and technology-monitoring capabilities. He (p. 38) defines capabilities as a set of "complex bundle of skills and accumulated knowledge, exercised through organizational processes, that enable firms to coordinate activities and make use of their assets." He classifies capabilities, depending on the orientation and focus of the defining processes, into inside-out, outside-in and spanning capabilities. Outside-in capabilities refer to the firm's capability to sense and respond to changes taking place in its markets (market-sensing capabilities) and to develop and build relationships with the market (customer-linking capabilities). Inside-out capabilities, by contrast, refer to the firm's internal resources and capabilities such as human resource management, technology development and integrated logistics.

Market-Based Assets. Srivastava et al. (1998) introduce a conceptual framework that links market-based assets to shareholder value. These researchers distinguish two related types of market-based assets: (1) relational market-based assets, and (2) intellectual market-based assets. According to these scholars, relational assets refer to outcomes of the relationship between a firm and key external stakeholders; and intellectual assets are defined as the types of knowledge a firm possesses about its environment. Their main thesis is that market-based assets, such as customer relationships, channel relationships and partner relationships, increase shareholder value by enhancing cash flows, lowering the volatility and/or increasing the residual value of cash flows.

Marketing Assets and Capabilities. Hooley et al. (1998) distinguish market-based capabilities into: (1) strategic, (2) functional, and (3) operational. Strategic capabilities refer to variables related to the management's ability to identify and interpret relevant market information, such as market-sensing and market positioning capabilities. Functional capabilities are related to functions or processes within the firm. These researchers argue that Day's (1994) classification of inside-out, outside-in and spanning capabilities fit their concept of functional capabilities well. Operational capabilities relate to the skills that enable individual managers and employees to function in order to serve the market.

Core Market-Based Business Processes. Srivastava et al. (1999) provide a framework in which firm resources are linked with market-based assets, processes, capabilities and customer value. They contend that a company has three core business processes: (1) customer relationship management, such as generating information and the efficiency and effectiveness of transforming market information into customer solutions, (2) supply chain management, such as identifying and qualifying (potential) vendors and logistics capability, and (3) market-driven product development management. Their central proposition is that market-based core business processes create a solution that enables customers to experience the maximum value and benefit from its use.

Operant Resources. Vargo and Lusch (2004) propose a service-centered view of marketing. In their paper, they emphasize the concept of operant resources, resources that produce effects, especially higher-order capabilities, as the key to obtaining competitive advantage. They actually propose an integrative model incorporating: (1) market orientation, (2) services marketing, (3) relationship marketing, (4) quality management, (5) value and supply chain management, (6) resource management, and (7) network management processes.

Resource Advantage Perspective. Hunt and Morgan (1995) introduce a theory of competition that explicitly recognizes marketing as a resource of advantage (because of imperfect and costly market information). In their discussion of this theory, they argue that market orientation forms a (potential) source of advantage. In a recent article, Hunt (2004) classifies (operant) resources into (a) human (e.g., the skills of individual employees), (b) organizational (e.g., competences), (c) informational (e.g., knowledge about market segments), and (d) relational resources (e.g., relationships with suppliers and customers).

2.2.2 Proposed Classification of Market-Based Capabilities

Building on the previously discussed market-based classifications, we now outline our synthetic classification of market-based capabilities. Thereafter, we discuss very briefly the dimensions of these capabilities.

Classifying Capabilities

In an attempt to develop an integrative classification of market-based business capabilities, we follow Day's (1994) inside-out and outside-in perspective. We

do this mainly because other researchers (e.g., Hooley et al. 1998; Srivastava et al. 1999) have strongly built on this pioneering work. Basically, Hunt's (2004) and Vargo and Lusch's (2004) operant resources may be viewed as a summary and extension of Day's (1994) proposed outside-in and inside-out capabilities model. Although Day (1994) classifies four market-related capabilities, he argues that especially two outside-in capabilities are essential in explaining market-based performance: (1) market-sensing, and (2) relationship-linking capabilities. He defines market-sensing capabilities as the generation of market intelligence, dissemination of this intelligence and organizationwide responsiveness. Actually, this component integrates the previously mentioned information and cultural approaches. Concerning relationship-linking capabilities, such as the ability to cooperate and share information in a collaborative manner with stakeholders, these are also recognized as essential market-based capabilities, especially in services marketing (Srivastava et al. 1998; Webster 1992; Vargo and Lusch 2004). Recently, Vargo and Lusch (2004), even suggest that relationships-driven capabilities, which are necessary in the service-driven economy, form the core of marketing.

Day's (1994) inside-out capabilities, in general, may be divided into two dimensions of market-based capabilities: (1) supply-chain, and (2) human resource capabilities. Concerning supply chain capabilities, these are often recognized in the supply chain management literature as important sources of sustained advantage. Furthermore, both Srivastava et al. (1999) and Vargo and Lusch (2004) classify these capabilities as belonging to the category of market-based capabilities. Consistent with this stream of research, we recognize this capability as essential in delivering value for the market. Besides supply-chain capabilities, Day (1994) also proposes human resources as a dimension of market-based capabilities. Incorporating human resources into the configurational model is also recently proposed by both marketing (e.g., Hunt 2004) and human resources management researchers (Colbert 2004). Hence, we argue that human resources are important market-based capabilities if they are managed with the point of departure of satisfying customer needs (see also Vargo and Lusch 2004).

In summary, our proposed classification is basically an integration of the previously discussed concepts (see Figure 2.1). We distinguish four types of company's rent producing resources, each representing a dimension in our market-based capabilities construct: (1) market-driven, (2) relationship-driven, (3) supply-chain, and (4) human resource capabilities.

Market-Based Capabilities Construct

After introducing our classification of market-based capabilities, we now briefly discuss these capabilities. In line with the broad conceptualizations found in the literature we develop our model.

Market-Driven Capabilities. We define market-driven capabilities as the firm's competencies to create deep and insightful market knowledge, disseminate this knowledge to relevant employees and implement a strategy based on this knowledge. According to this stream of research, a market-driven capability is the ability

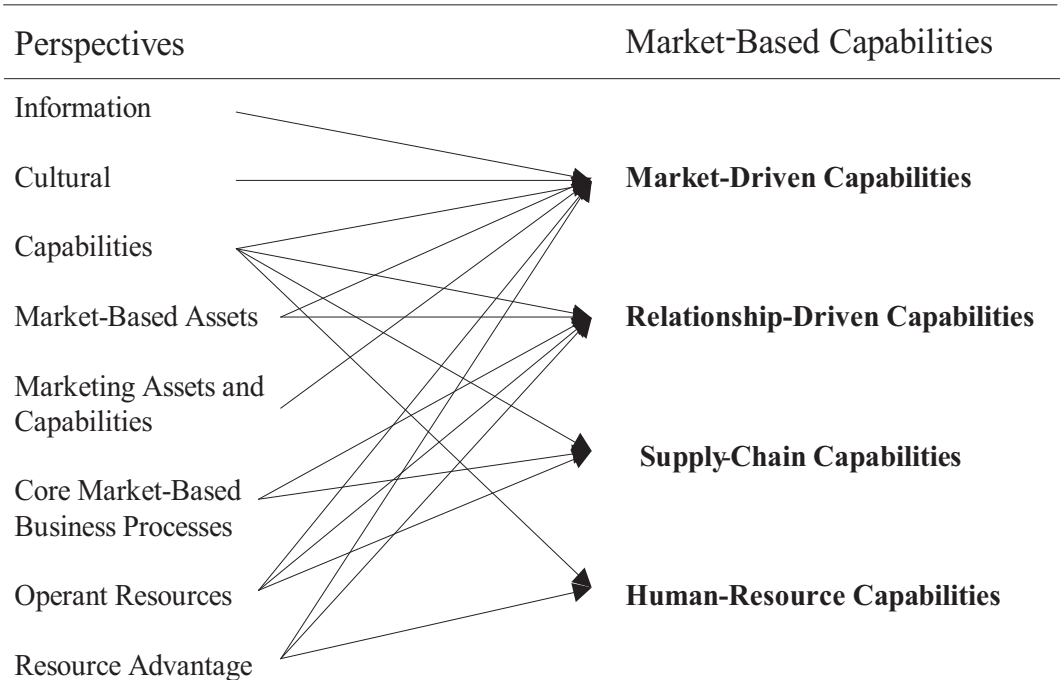


Figure 2.1: Proposed Classification of Market-Based Capabilities

of the firm to learn about customers and (the influence of) competitors to continuously act on trends in present and prospective markets (e.g., Day and Nedungadi's 1994; Moorman 1995; Narver and Slater 1990). Therefore, the following dimensions of market-driven capabilities are proposed: (1) customer-driven and (2) competitor-driven capabilities.

Relationship-Driven Capabilities. Relationship-driven capabilities refer to the firm's capability in building and maintaining relationships with the market. Generally, this is done by sharing relevant information and cooperating collaboratively with stakeholders (i.e., customers and suppliers). Following the relationship marketing literature (see for example, e.g., Butaney and Wortzel 1988; Day 2000; Day and Montgomery 1999) we consider two dimensions of relationship-driven capabilities: (1) customer-linking, and (2) supplier-linking capabilities.

Supply Chain Capabilities. Essentially, supply chain researchers refer to supply-chain capabilities as the firm's capability in linking supply chain members together through physical flows and information flows (Simchi-Levi, Kaminsky and Simich-Levi 2000). This definition implies the following: (1) linking supply chain members through physical flows relate to the firm's 'logistics capabilities,' and (2) information flows relate to the firm's 'information technology'. This is in line with Day's (1994) following components of inside-out processes, which basically summarize the supply-chain capabilities dimension: (1) logistics integration, (2) transformation processes and (3) information technology. Hence, we divide supply chain

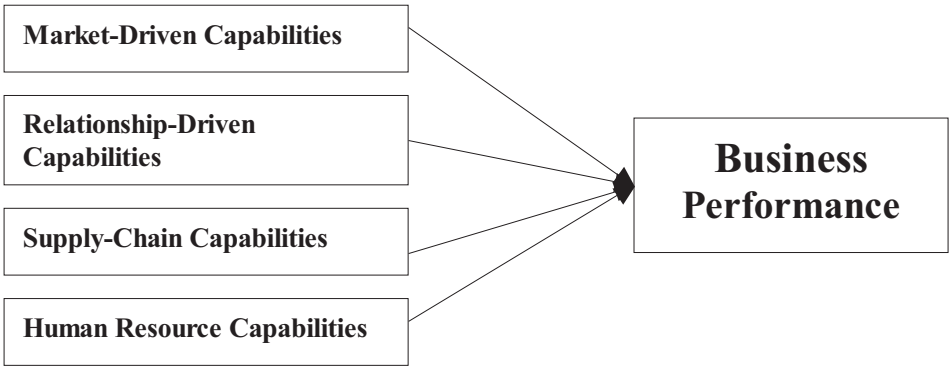


Figure 2.2: Conceptual Framework

capabilities into: (1) logistics capabilities and (2) information-technology capabilities.

Human Resource Capabilities. Human resource capabilities have been neglected in the market-based oriented literature. Only recently the market-based literature began to consider the concept of human resources as a market-based component (Hunt 2000, 2004; Srivastava et al. 2001). As mentioned earlier, we believe, in line with the emerging literature, that human resources are important market-based capabilities (c.f., Day 1994; Hunt 2004; Moorman and Rust 1999). In line with previous work in this field (e.g., Bharadwaj 2000), we argue that human resource capabilities are reflected in (1) the skills of front line employees, and (2) the skills of management to manage these human resources. The former is referred to as 'people capabilities', and the latter as 'human-related capabilities.'

2.3 Conceptual Framework

As mentioned before, we take a configurational perspective, by incorporating both outside-in capabilities and inside-out capabilities, to explain market-based performance (Figure 2.2). Although Day and Wensley (1983, 1988) originally articulate this way of modeling market performance, it is only recently that researchers begin to explicitly defend this integrative interdisciplinary way of describing market-based competition (Gummesson 2004; Hunt 2004; Slack and Lewis 2003; Vagro and Lusch 2004).

Reviewing the literature, research from several domains points to the main effects of market-driven, relationship-driven, supply chain and human resource capabilities on business performance. Concerning market-driven capabilities, many researchers find a positive effect of market orientation on business performance (e.g., Jaworski and Kohli 1993; Kirca, Jayachandran and Bearden, 2005; Narver and Slater 1990). However, no consensus exists indicating that market-driven capabilities have, under all conditions, a significant effect on business performance (Moorman and

Rust 1999). The effect of relationship-driven capabilities on business performance is also frequently studied by marketing scientists. For example, Kalwani and Narayandas' (1995) results indicate that these capabilities have a positive effect on business performance (see also, Frohlich and Westbrook 2001; Granovetter, 1985). The relationship between supply-chain capabilities and business performance is frequently studied by (operations) management scientists (e.g., Cachon and Fisher 2000). Researchers in this field largely suggest the existence of a positive link (e.g., McDonald et al. 2001; Simchi-Levi et al. 2000). Concerning human resource capabilities, several researchers suggest a significant relationship between (strategic) human resource capabilities and business performance (e.g., Huselid 1995; Roth and Jackson 1995). Although no consensus exists with regard to the sign of this relationship, proposing a positive relationship between human resource capabilities and business performance is compelling.

In short, our conceptual model specifies the relationships between the four building blocks of market-based capabilities and business performance. This model is in line with Noble et al.'s (2002) and Treacy and Wiersema's (1993) vision that it is myopic to assume that only one strategic resource or orientation is the only legitimate guiding model for business success.

Hypothesis 1 *The firm's performance is positively affected by (a) market-driven capabilities, (b) relationship-driven capabilities, (c) supply-chain capabilities, and (d) human resource capabilities.*

2.4 Method

2.4.1 Research Setting and Sample

As mentioned before, this study is part of a larger project that is designed to evaluate the market-based capabilities business-to-business firms. The sampling frame is a list of 843 technical wholesalers in the Netherlands. The method used is a survey among 'key informant' decision makers within electrotechnical wholesale companies. We presume that the manager or owner is the most knowledgeable person concerning market strategy, the firm's relationships with both customers and suppliers, and the internal resources (HRM, Logistics, and IT). We sent questionnaires to these wholesalers, including a cover letter explaining the study goal, and a stamped return envelope to the owner or manager of each firm. Of these 843 surveys, 137 are returned, a response rate of 16.3 percent.

2.4.2 Measurement Scales

Scales of the constructs we examine are available in the literature or could be easily derived from previous work. All item constructs are modified to suit the wholesale environment (Coughlan, et al. 2001; Rosenbloom 1999) and are measured on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). The criterion to incorporate an item is based on expert opinions.

Market-Driven Capabilities

We integrate and modify Kohli and Jaworski's (1990) and Narver and Slater's (1990) conceptualizations to develop the market-driven capabilities measure. We measure customer-driven and competitor-driven capabilities using a modified version of Jaworski and Kohli's (1993) scales.

Relationship-Driven Capabilities

We define relationship-driven capabilities as the firm's capability in sharing relevant information and cooperating collaboratively with both customers and suppliers. As mentioned before, we divide relationship-driven capabilities into two components: (1) customer-linking, and (2) supplier-linking capabilities. For these scales, items are gathered from different sources. Both components are second-order factors with each having two first-order factors, namely collaborative information sharing and cooperation. The first dimension of both constructs, information sharing, is derived from Cannon and Homburg's (2001) and Lusch and Brown's (1996) research. Measures for the second dimension, collaborative cooperation, are derived from Buvik and John's (2000) and Rosenzweig, et al.'s (2003) studies.

Supply Chain Capabilities

We specify two building blocks of supply chain capabilities: (1) information-technology capabilities and (2) logistics capabilities. Using the resource-based approach, Bharadwaj (2000) develops the concept of information technology (IT) as an organizational capability encompassing the following firm specific IT resources (1) IT infrastructure, (2) human IT resources, and (3) IT-enabled intangibles. We study two dimensions (IT infrastructure, and human IT resources) and develop measures, based on Bharadwaj's (2000) study, for these first-order factors. Based on the logistics management literature (e.g., Tracey 1998), we consider three dimensions of logistics capabilities: (1) physical supply, (2) order fulfillment, and (3) physical distribution. We derive the 'physical supply scale', inbound transportation, warehousing and inventory control, and 'physical distribution scale', outbound logistics from Tracey's (1998) work. Furthermore, we develop indicators for the order-fulfillment scale using Day's (1994) 'order fulfillment process' model.

Human Resource Capabilities

As mentioned before, we construct human resource capabilities as two components: (1) human-related, and (2) people capabilities. We derive the indicators of human-related capabilities from studies in human resources management (Huselid 1995) and marketing (Hartline and Ferrell 1996; Cravens et al. 1993). People capabilities measures are derived from Roth and Jackson's (1995) study.

Business Performance

Following Lusch and Brown (1996), we measure wholesale business performance on five aspects of efficiency and productivity: sales growth, profit growth, overall profitability, labor productivity and cash flow. The items are measured on a seven-point scale ranging from 1 (significantly worse performance) to 7 (significantly better performance than others in the industry). Lusch and Brown (1996) provide strong arguments for using these items as indicators of wholesale business performance. In their confirmatory factor analysis, they validated this scale.

Control Variables

Two variables are included as control variables as they may reflect alternative explanations of organizational performance. These two variables are: (1) current organizational size, and (2) firm's age. These control variables are self-reported measures.

2.4.3 Methods of Analysis

In this section, we outline our methods of analysis. To investigate the proposed market-based capabilities construct, we first employ exploratory and thereafter confirmatory factor analysis. Thereafter, to estimate the proposed models, we apply multiple hierarchical linear regression analysis. This analysis is briefly described next.

To investigate the proposed relationships between market-based capabilities dimensions and business performance, we use a hierarchical approach of regression analysis. We enter the predictors in the following sequence: (1) covariates, and (2) main effects. Specifically, the following main effect models are estimated: (1) covariates model, which only incorporates the covariates AGE and SIZE (model 1.1), (2) bivariate main effects (model 1.2-1.5),[1] (3) outside-in capabilities model, which incorporates the marketing-based capabilities (model 1.6), (4) inside-out capabilities model, which includes both supply chain and human resource capabilities (model 1.7),[2] and (5) main effects simultaneously (model 1.8).

[1]To benchmark a capability-only model, where each capability in isolation is related to business performance, with a full main effects model, we conduct this analysis. This enables us to investigate the relative strength of previous research, which largely, as noted before, examines a single capability-business performance relationship. For example, Jaworski and Kohli (1993) relate only market orientation to business performance.

[2]The examination of model 1.6 and 1.7 enables us to investigate the relative contribution of either the outside-in and inside-out capabilities to business performance.

2.5 Findings

2.5.1 The Factor Model

The market-based business capabilities model represents a multi-level construct (Figure 2.3). In investigating this hierarchical model, as in market orientation measurement, multicollinearity is an issue that needs to be addressed. For this reason, exploratory factor analysis is used with oblique rotation in order to select suitable items for each component. Only items that load higher than .60 on the hypothesized component and lower than .20 on other components are selected. Using an eigenvalue greater than one, this analysis indicates an eight-factor solution.

The market-based capabilities model (Figure 2.3) is further purified and refined with confirmatory factor analysis until further improvements are not possible (without changing the structure). The Appendix B contains all of the purified measures as well as their factor scores, variance extracted and reliability scores, for both the first- and second-order factors.

Proposed Market-Based Capabilities Construct

The χ^2 for this model is 543.54 (d.f. = 363) and is significant at the .01 level. The value of NNFI, CFI and IFI is .94, .95 and .95, respectively. Furthermore, the value of the RMSEA and SRMR is .06 and .08, respectively. The composite reliability for the first-order factors exceed .70. In all cases, except for the human-related capabilities dimension, the AVE exceeds the recommended cut point .50. The composite reliability for the second-order factors also exceeds the recommended cutoff points; market-driven, relationship-driven, supply-chain and human resource capabilities have a reliability coefficient of .73, .73, .69 and .67, respectively. The AVE for market-driven, relationship-driven, supply-chain and human resource capabilities is .57 , .58, .52 and .50, respectively. Taken together, the results indicate that the hypothesized market-based capabilities model fits the data reasonably good; the solution is proper, no negative variance estimates, low error variances and high loadings and the fit statistics broadly indicate that the model adequately fits the data.

Business Performance

This measurement model produces the following fit statistics: $\chi^2 = 3.40$, d.f. = 2, p = .18; RMSEA = .072; NNFI = .99; CFI = 1.00; IFI = 1.00; SRMR = .021. Here, both the nonsignificant χ^2 as well as other goodness-of-fit measures indicate an almost excellent overall fit of the measurement model to the data. The composite reliability coefficient for the business performance measure exceeds .90. Furthermore, AVE exceeds the value .70.

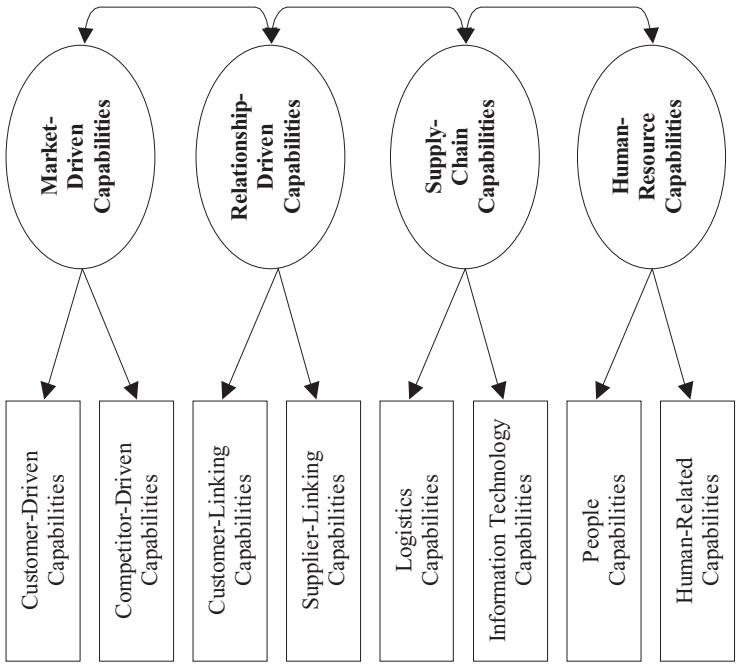


Figure 2.3: Proposed Market-Based Capabilities Construct

2.5.2 The Regression Model

In table 2.2, we provide the means, standard deviation, and a correlation matrix of the variables under study. Inspection of table 2.2 shows that the correlations between the four market-based capabilities are positive and significant. Furthermore, these correlations range from .35 to .60, indicating a strong convergence between them. Also, the correlations between the four market-based capabilities measures and business performance are positive and significant and range between .34 and .43. Using a hierarchical approach by entering the independent variables in a hierarchical sequence, we examine models discussed earlier.

The results from our hierarchical multiple regression analysis are reported in table 2.3 (Model 1.1 to 1.8). In Model 1.1 we regress business performance (BP) on the two control variables (AGE and SIZE). The results indicate a nonsignificant F-value for the model and nonsignificant values for the control variables. Remaining models do not incorporate the control variables, since model 1.1 indicates that their absence have no influence. Models 1.2 to 1.5 investigate the effect of each market-

	Mean	SD	X1	X2	X3	X4	X5	X6	X7
AGE (X1)	1,965	32.2							
SIZE (X2)	51.32	92.1	-.19						
MDC (X3)	4.83	.94	-.11	-.02					
RDC (X4)	5.46	.73	-.05	.05	.60**				
SCC (X5)	5.41	.81	-.09	.13	.31**	.41**			
HRC (X6)	5.61	.65	-.07	-.09	.42**	.59**	.37**		
BP (X7)	5.15	1.07	-.12	-.04	.22**	.37**	.31**	.42**	

** $p < 0.01$
* $p < 0.05$.
$N = 137$
Note: MDC is market-driven capabilities, RDC is relationship-driven capabilities, SCC is supply chain capabilities HRC is human resource capabilities and BP is business performance.

Table 2.2: Descriptive Statistics and Correlations

based capability in isolation to BP. Consistent with theory, each variable has a positive significant effect on BP. The results in table 2.3 (model 1.2-1.5) denote that BP is associated with higher (levels for) market-driven capabilities (MDC) (B = .25, p = .01), relationship-driven capabilities (RDC) (B = .54, p = .00), supply-chain capabilities (SCC) (B = .43, p = .00), and human resource capabilities (HRC) (B = .71, p = .00). In Model 1.6 we examine the effect of outside-in capabilities (MDC and RDC) on BP; the analysis only reveals a significant effect of RDC on business performance (B = .55, p = .00). To investigate the effect of inside-out capabilities, we estimate Model 1.7. The data support this model, indicating that SCC (B = .26, p = .03) and HRC (B = .57, p = .00) significantly and positively influence BP. The findings of the overall model (model 1.8) indicate that BP is only significantly associated with HRC (B = .45, p = .01); SCC have a slightly nonsignificant relationship with BP (B = .24, p = .06). Concerning MDC and RDC, our analysis reveals no significant effect of these marketing-based capabilities on BP (MDC: B = .00, p = .93; RDC: B = .20, p = .27). These outcomes lead to the rejection of hypotheses 1a and 1b and support of hypotheses 1c and 1d.

Table 2.2 reveals a moderate correlation between the market-based business capabilities. Therefore, it is necessary to assess the degree to which these correlations could influence the outcomes. To identify the degree of collinearity between independent variables we use 'variance inflation factor' (VIF) as the diagnosis tool. This measure estimates the degree to which each independent variable is explained by the remaining independent variables, when regressed against these variables. Generally, a common cutoff threshold is a VIF value of around 10. The calculated VIF values are less than 2.5. This indicates the absence of serious multicollinearity problems (Mason and Perreault 1991).[3]

[3]In addition to the main effects model, we estimated an interaction effects model. The results indicate that none of the combinations of market-based capabilities have an effect on the financial performance of the firm.

Dependent Variable: Business Performance								
	Model 1.1	**Model 1.2**	**Model 1.3**	**Model 1.4**	**Model 1.5**	**Model 1.6**	**Model 1.7**	**Model 1.8**
	Coefficient[a] (s.e.)[b]	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
Independent Variables								
Intercept	5.16 (.101)***	3.94 (.478)***	2.15 (.664)***	2.83 (.657)***	1.15 (.766)	2.15 (.667)***	.52 (.872)	.31 (.888)
AGE	-.00 (.003)							
SIZE	.00 (.001)							
MDC		**.25 (.097)****				.00 (.118)		.00 (.123)
RDC			**.54 (.120)*****			**.55 (.155)*****		.19 (.179)
SCC				**.43 (.119)*****			**.26 (.112)****	**.24 (.125)***
HRC					**.71 (.135)*****		**.57 (.151)*****	**.45 (.174)****
F- value	.729	6.727**	20.6***	13.21***	27.68***	10.22***	14.53***	7.617***
Df	112	129	128	120	128	127	118	115
R^2	.01	.05	.14	.10	.18	.14	.20	.21

* p < .10; ** p < .05; *** p < .01.
[a] unstandardized regression coefficient.
[b] standard error.

Table 2.3: Regression Outcomes

2.6 Discussion

Drawing on the emerging configurational perspective, we develop a model incorporating both inside-out and outside-in capabilities. The literature on both market orientation and relationship marketing provides considerable support for the effectiveness of the outside-in perspective, whereas the literature on both supply chain and human resource management provides equally impressive support for the effectiveness of the inside-out perspective. There is, however, little evidence for the effectiveness of attempting both outside-in and inside-out simultaneously. This study addresses the issue of which perspective is most effective. The results described in the previous section highlight some of the unique insights that emerge from this approach. This section discusses the results more in depth. The section provides some possible explanations for these findings and concludes with a summary of the results.

2.6.1 The Market-Based Capabilities Construct

Besides proposing a synthetic classification of market-based capabilities we report an exploratory study in which we develop valid measures of market-based capabilities. The results are very encouraging in that they provide support for our proposed construct. These findings indicate the appropriateness of the recent, highly conceptual, stream of research discussing the concept of market-based capabilities (Peteraf and Bergen 2003). Although it is generally accepted that Day's (1994)

seminal research have significantly contributed to the marketing literature, his main thesis remained unexplored. This study provides additional evidence indicating the strength of a broad conceptualization of the marketing concept.

2.6.2 Inside-Out Capabilities

Resource-based theorists claim that a firm's internal resources are the primary source of sustained advantage (Wernerfelt, 1984).[4] In this study, we examine two dimensions of inside-out capabilities: (1) supply chain, and (2) human resource capabilities. Our findings indicate that these variables have a strong (direct) positive and significant effect on business performance. These results provide support for the importance of inside-out capabilities in the wholesale setting. They indicate that a firm's emphasis and development of strong inside-out market-based capabilities is a value-creating strategy, which is less likely to be simultaneously developed by competing firms. One may argue that the fact that the firms in our dataset are situated firmly in the middle of the supply chain could bias the study in favor of the supply chain capability as a predictor of performance. Previous work rejects this assertion (e.g., Porter, 1996; Treacy and Wiersma, 1994). For example, Cannon and Perreault's (1999, p. 457) results indicate that "some buyer firms do not want or need close ties with all of their suppliers. They are satisfied with the effective performance of suppliers who simply meet their needs without extensive entanglements."

Supply Chain Capabilities

Our results suggest a strong relationship between supply chain capabilities and business performance. These findings are consistent in all estimated models. This suggests the value of developing strong capabilities to efficiently integrate channel members in order to distribute the right quantities to the right locations at the right time. The rationale behind this is that supply-chain capabilities lead to a minimization of systemwide costs (Gaverneni, Kapuscinski and Tayur 1999; Lee, So and Tang 2000; Simchi-Levi, et al. 2000), which, in turn, leads to higher business performance.

Human Resource Capabilities

Human resource capabilities relate to the firm's competence in managing human resources and the competence of human resources to manage the service encounter. Our factor analysis suggests that these two components are indeed part of one underlying factor, human resource capabilities. Our findings indicate that these capabilities indeed ensure the fulfillment of organizational financial goals and support the proposition that an organization has to focus internally on employees as well as externally on the market (e.g., Lings 2004). These results are in line with research in both services marketing (e.g., Roth and Jackson 1995) and human

[4]See for example, Bijmolt and Zwart (1994).

resource management (e.g., Becker and Gerhart 1996; Delaney and Huselid 1996). These findings suggest that human resource capabilities is a source for generating competitive advantage in wholesaling. Concerning the strength of the relationships in our models, our outcomes even indicate that human resource capabilities is the most influential capability. The rationale behind this is that human resource capabilities are not easily imitated by competitors (Becker and Gerhart 1996). Furthermore, these results suggest that a strong combination of the management of human resources and the competence of human resources to manage the service encounter adds value to business-to-business firms.

2.6.3 Outside-In Capabilities

Contrary to our expectations, outside-in capabilities do not explain much variation in business performance. First, we discuss the relationship-driven capabilities-business performance link. Thereafter, we discuss the relationship between market-driven capabilities and business performance.

Relationship-Driven Capabilities

Relationship marketing researchers consider building and maintaining relationships a valuable source of sustained advantage. Initially, our findings confirm the contribution of relationship-driven capabilities to business performance (see model 1.3 and 1.6, table 2.3). Further analysis, however, demonstrates that this relationship is not strong, given the nonsignificant parameter in the full model (model 1.8, table 2.3). A nonsignificant relationship between relationship marketing variables and business performance is not rare (e.g., Lusch and Brown 1996; Uzzi, 1996). For example, Lusch and Brown's (1996) results suggest a negative but nonsignificant relationship between relational behavior and wholesale-distributor performance.

Market-Driven Capabilities

Marketing strategists argue that organizations that adapt to the conditions in the environment will have better performance than less market-driven organizations (Day and Nedungadi 1994). Initially, we find some support for this proposition (model 1.2, table 2.3). Further analysis, however, reveals a nonsignificant association between business performance and market-driven capabilities. When investigating the relationship between market-driven capabilities and business performance in isolation, as is often the case in market orientation studies, our results support a positive relationship (this is in line with the vast majority of published findings, for example, Narver and Slater (1990), Reukert (1992), Jaworski and Kohli (1993)). When controlling for other variables (model 1.6 and 1.8, table 2.3), this relationship becomes nonsignificant. This suggests that previous research has underestimated the relevance of other variables or overestimated the relevance of market orientation when relating market-driven capabilities to business performance. These outcomes are in line with that of Noble, Sinha and Kumar (2002) and Moorman and Rust

(1999). Others even find a negative impact of customer orientation on firm performance (Voss and Voss 2000; Grewal and Tansuhaj 2001). A plausible suggestion is that this relationship may be mediated (Roth and Jackson, 1995) or moderated (Rindfleisch and Moorman, 2003) by other variables. In short, it appears that the relationship between market-driven capabilities and business performance has not yet been fully explained.

Summary

Initially, we find strong support for the outside-in capabilities model. However, when investigating the effect of all market-based capabilities dimensions simultaneously on business performance, the effect of the two outside-in capabilities dimensions on business performance disappears. These outcomes indeed indicate that the management of marketing capabilities is rather difficult and a complex task. The complexity of managing market-based capabilities leads us to belief that the development of these capabilities is a top management concern. This is also in line with former research suggesting the support of top management in developing a market orientation (McNamara 1972; Webster 1988).

2.7 Implications for Marketing

The results obtained in this study have implications for marketing, specifically for marketing theory and marketing practice. Next, we discuss the implications of our study for these areas.

2.7.1 Implications for Marketing Theory

We contribute to marketing theory by putting the configurational perspective of market-based competition to test. In this study, we develop a (synthesized) classification of market-based capabilities, develop measurement scales for this construct, and relate it to business performance.

We develop a classification and measurement scales for market-based business capabilities from the configurational-based view. To a large extent, Day (Day 1994; Day and Wensley 1998), Hunt (Hunt 2000; Hunt and Morgan 1995) and Srivastava and colleagues (Srivastava et al. 1998, 1999; Srivastava et al. 2001) have conceptually developed this view. We combine the outside-in and inside-out perspective, thereby proposing that a market orientation cannot exist when there is no alignment between market-driven capabilities and other relevant capabilities (e.g., Srivastava, Shervani and Fahey 1999). We therewith provide a theoretical framework for making the firm truly market-oriented. Furthermore, we empirically validate the configurational-based view by relating the market-based business capabilities to firm performance. So far, research in the field of market orientation has largely focused on market-driven capabilities, neglecting other relevant outside-in and inside-out capabilities. Previous research in marketing mostly investigates the

model: business performance = f(market-driven capabilities). Overall, this stream of research finds significant relationships. Our study confirms this. However, when taking the configurational-based view as a starting point, market-driven capabilities can no longer be studied in isolation. Both outside-in and inside-out capabilities have to be taken into consideration. In our study we control for relationship-driven capabilities, supply chain capabilities and human resource capabilities. In this case, market-driven capabilities do not predict firm performance. Studying market orientation in isolation from other market-driven capabilities thus gives incomplete and therefore possibly incorrect results.

In summary, the results suggest the value of performing interdisciplinary research to better understand marketing phenomena and outcomes. This opens the door to further look into Vargo and Lusch's (2004) service-centered perspective, and to empirically validate the customer concept (Hoekstra, et al. 1999). These researchers believe that it is time for a new dominant logic for marketing; a paradigm shift that accounts for social and economic processes.

2.7.2 Implications for Marketing Practice

In a management context, several of our findings are germane to the business-to-business firm in achieving higher levels of performance. An implication based on our factor analysis is that wholesalers have to develop several market-based capabilities to excel. Furthermore, a strong collaborative cooperation strategy, with customers as well as suppliers, is evident in winning the heart of these stakeholders. Also, the focus on both customers and suppliers is important and strong relationships have to be built with both; ignoring one of the two stakeholders is incorrect and may have a negative influence on business performance.

Finally, our findings suggest that a wholesale firm has to develop all market-based capabilities to high levels. However, if this strategy is too costly to implement, it is wise to put a great deal of attention on the inside-out capabilities (supply-chain and human resource capabilities); low levels of market-driven and relationship-driven capabilities are then preferable, especially when a low-cost strategy is followed. However, when a market differentiation strategy is implemented we recommend a balanced utilization of the four market-based capabilities, e.g., high levels of supply-chain and human resource capabilities, and mediocre levels of market-driven and relationship-driven capabilities.

2.8 Limitations and Directions for Further Research

2.8.1 Limitations

The findings in this study are encouraging in suggesting the (potential) value of an integrative model of market-based capabilities. However, as with any study, this study has several limitations. A limitation is the national character of our sample; the empirical part of the study focuses on Dutch wholesale companies only. Further research should test the framework in other countries as well. This future

research should consider international aspects of measurement equivalence. Furthermore, although the general framework of market-based capabilities is argued to be relevant in both service and non service settings, it is unclear whether the specific elements are all relevant in other research settings. However, we speculate that our classification could be relatively robust in classifying market-based capabilities in different settings, such as retailing and banking. For example, Roth and Jackson's (1995) study suggest that the four proposed market-based capabilities in this chapter are relevant in a banking setting. To fill in the specific resources it is necessary to use Frei et al.'s (1999) model since these researchers provide a more detailed examination of the supply chain capabilities.

2.8.2 Research Agenda

Several opportunities for further research may be identified. We divide these into: (1) antecedents, (2) moderators, and (3) consequences of market-based capabilities. We also argue in favor of the development of more complex models.

Antecedents

Concerning the antecedents of market-based capabilities, we suggest the following: (a) innovative culture, (b) interdepartmental dynamics, and (c) organizational structure.

Innovative Culture. Studying the impact of innovative culture on market-based capabilities is needed. Deshpandé, Farley and Webster (1993), in their study of Japanese firms, find that 'adhocracy' and 'market' firms outperformed 'clans' and 'hierarchies'. Their results indicate that companies with corporate cultures stressing competitiveness and entrepreneurship outperform those dominated by internal cohesiveness or by rules. Based on this research, we propose that investigating the degree to which innovative culture influences market-based capabilities is a fruitful area of research.

Organizational Structure. An interesting avenue of research is the relationship of an organization structure (formalization and centralization) to market-based capabilities. Past research (Jaworski and Kohli 1993) already relates both formalization and centralization to market orientation. However, the findings suggest mixed results. We propose that both formalization and centralization could impede the development of market-based capabilities.

Interdepartmental Dynamics. Several researchers suggest that interdepartmental dynamics (interfunctional conflict and connectedness) are important antecedents of market orientation (e.g., Day 1994; Kohli and Jaworski 1990; Webster 1988). An interesting question is to what extent and in which direction interfunctional conflict and interfunctional connectedness influence the four market-based capabilities.

Moderators

An interesting avenue of research is to investigate whether the relationship between market-driven capabilities and business performance is moderated by other variables. Based on past research, we suggest a moderator role for both 'industry environment' and 'strategy' on the market-based capabilities-business performance relationship.

Industry Environment. Contingency theory suggests that 'industry (competitive) environment' could moderate the relationship between market-based capabilities and business performance (Kohli and Jaworski 1990; McKee, Varadarajan and Pride 1989); however, some strategic marketing literature indicates that this interaction effect is very weak (Jaworski and Kohli 1993; Slater and Narver 1994). Because our classification differs from Narver and Slater's (1990) conceptualization of market orientation, further research on this issue is necessary.

Organization Strategy. Another very interesting avenue of research is the effect of strategy type on the market-based capabilities-business performance relationship. The question becomes: can we find evidence that supports the moderating effects of business strategy type on the strength of the relationship between market-based capabilities and business performance as is found in the market orientation context (Matsuno and Mentzer 2000)?

Consequences

The study of possible consequences of market-based capabilities is yet another avenue for interesting research. We suggest four particularly interesting consequences of market-based capabilities: (1) customer perceptions, e.g. customer value and satisfaction, (2) positional advantage, (3) innovativeness, and (4) customer equity.

Customer Perceptions. Concerning customer perceptions, such as service quality, customer satisfaction and customer value, as a possible consequence of market-based capabilities, both marketing (e.g., Day and Wensley 1988; Sigauw, Simpson and Baker 1998; Srivastava et al. 1998) and operations management (e.g., Roth and Jackson 1995; Soteriou and Chase 2000; Soteriou and Zenios 1999) literature suggest the existence of a positive relationship. For example, Srivastava et al. (2001, p. 796) call for future research in this field by stating that "both the RBV and marketing researchers must commit to carefully and systematically identifying and documenting how particular market-based assets and capabilities contribute to generating and sustaining specific forms of customer value." Recently, Peteraf and Bergen (2003, p. 1039) suggest that competition is primarily driven by similarities in resource functionality and argue that "Firms compete not on the basis of similar resources, but on the basis of whether their resources can be employed to meet similar customer needs."

Positional Advantage. Positional advantage (lower costs and/or higher value) may mediate the relationship between market-based capabilities and business performance (Day and Wensley 1988). For example, Morgan, Kaleka and Katsikeas (2004)

results indicate that positional advantage mediates the relationship between available capabilities (informational, relationship building, and product development) and business performance.

Innovativeness. A very interesting consequence is innovativeness. Research indicates a direct relationship of market orientation and innovativeness (Deshpandé, Farley and Webster 1993; Han, Kim and Srivastava 1998). However, is this relationship also present when controlling for other variables, e.g. relationship-driven, supply-chain and human resource capabilities?

Customer Equity. The shift from product-centered thinking to customer-centered thinking has raised attention for the concept of customer equity, i.e. the value of the firm's current and potential customers. A market-based perspective justifies the view that "a firm's strategic opportunities might best be viewed in terms of the firm's opportunities to improve the drivers of its customer equity" (Rust, Lemon and Zeithaml 2004, p. 110). In this respect, studying the relationship between market-based capabilities and customer equity may be very promising.

2.8.3 Integrative and Interdisciplinary Approach of Model Building

The configurational perspective makes an integrative approach of model building necessary. Based on our findings, we call for further research incorporating interdisciplinary research and more integrative marketing models of a higher level of abstraction. Particularly, we stimulate research investigating the market-based capabilities construct as a higher-order factor model, where market-based capabilities may represent the higher-order factor. Here, we agree with Gummesson (2004, p. 21), who comments on Vagro and Lusch's (2004) paper, and argues that "The more marketers dare to recognize the complexity and ambiguity of marketing phenomena in this theory, the more useful it will be."

2.9 Conclusion

Recently, some literature, although highly conceptual, has emerged discussing the advantage of relating the resource-based view to marketing, especially to the concept of market orientation. The main thesis is that a configurational approach is more likely to provide a stronger basis for (the development of) competitive advantage. Our study provides support for this configurational perspective. Furthermore, based on our findings, we conclude that an integrative and interdisciplinary approach could lead to a better understanding of market-based competition and distinctiveness of market-driven organizations. Although advances in practice and theory have contributed to enhanced knowledge of the rent-producing market-based resources, the integration of these disciplines is in its beginning and far from mature. Therefore, we believe that further research has to become wide in incorporating variables from related disciplines. We hope that we have contributed to this, and hope that our study will serve as a motivator for those integrating several streams of research in marketing to investigate market-based competition.

Chapter 3

A Detailed Investigation of the Market-Based Capabilities-Firm Performance Link: A Multivariate Partial Least Squares Regression Analysis

Abstract This study seeks to investigate the relationship between market-based capabilities and firm performance in the Dutch wholesale industry. It extends previous work by providing a more detailed investigation of the relationships. To predict the proposed links multivariate partial least squares regression is applied. The findings suggest that superiority of a wholesale company in terms of five performance measures (sales growth, profit growth, overall profitability, labor profitability and cash flows) can be explained by a set of eight market-based capabilities (customer-driven, competitor-driven, customer-linking, supplier-linking, information-technology, logistics, human-related and people capabilities). These results provide further support for the market-based capabilities framework, as proposed and developed in the previous chapter. Furthermore, partial least squares regression proves to be a valuable method in analyzing the relationships, whereas ordinary least squares regression largely fails to present relevant and valuable management information. Our approach, analytical method and findings have some implications for management in the wholesale industry.

3.1 Introduction

In the previous chapter, a new instrument is developed, called the market-based business capabilities model, that links the resource-based view to the marketing-based view. In this study, four types of company's rent producing (market-based) resources are derived: (1) market-driven capabilities, (2) relationship-driven capabilities, (3) supply-chain capabilities, and (4) human-resource capabilities. Relating these market-based capabilities simultaneously to firm performance, no support is found for the hypothesis that marketing-related capabilities (marketing-driven and relationship-driven capabilities) significantly predict firm performance. These two variables, in isolation, however, have a strong effect on firm performance. Although this study provides some new insights, the previously mentioned results limit its managerial relevance, especially for marketing managers. To overcome this, we extend our study by relating the components of the four market-based capabilities, which are in general highly collinear, to (several indicators of) a firm's financial performance.

Concerning the links in our theoretical framework, ample literature on both

marketing and management operations provides impressive support for the presence of significant relationships. There is, however, little evidence for the effectiveness of developing both outside-in and inside-out capabilities simultaneously. Therefore, the study's general proposition is that a firm performance, in terms of five qualitative financial performance measures (sales growth, profit growth, overall profitability, labor profitability and cash flows), can be explained by a set of eight market-based capabilities (customer-driven, competitor-driven, customer-linking, supplier-linking, information-technology, logistics, human-related and people capabilities). In doing so, we utilize a rather sophisticated method in investigating these links: multivariate partial least squares regression.[1]

Multivariate partial least squares regression facilitates the identification of the effect of key variables on several dependent variables. This method can handle many noisy, collinear and even incomplete variables in both $\mathbf{X}$ and $\mathbf{Y}$ (Wold, Sjöström and Eriksson, 2001). Utilizing partial least squares regression has many advantages (see for a detailed discussion, Martens and Martens (2001)). First, partial least squares regression aims to improve the predictive efficiency of the regression model by finding score vectors for $\mathbf{X}$ that are more likely to correlate to the columns of $\mathbf{Y}$. Second, models with highly correlated independent variables can be treated well with this method. Third, multivariate PLS decomposes both $\mathbf{X}$- and $\mathbf{Y}$-variables, which makes it possible to use a large number of independent and dependent variables. Fourth, partial least squares regression de-emphasizes the less important variables by giving them a small loading compared to important variables. Fifth, this algorithm is very useful in the case of many explanatory variables and comparatively little sample data (Garthwaite, 1994; Höskuldsson, 1988). Sixth, it is suggested that multivariate PLSR is particularly useful when the $\mathbf{Y}$ variables are known to be strongly intercorrelated with each other; actually, the intercorrelation structure is used by multivariate PLSR as a stabilizing factor (Martens and Naes, 1989).

This chapter is organized as follows. In the next section, we briefly review some literature suggesting the relationship between several market-based dimensions and firm performance. We then describe very briefly the theory behind PLSR, especially multivariate PLSR. Multivariate PLS regression results are then presented and further discussed. Finally, we conclude by discussing the implications of the obtained findings, the limitations of the study and identify future research directions.

3.2 Conceptual Framework

Looking broadly to the (strategic) marketing literature, it appears that during the past years there has been some debate on the question: is marketing a set of values (culture) or a capability? Although this is an ongoing debate, it has discouraged marketing researchers from fully integrating the resource-based view

[1]Previous research, in general, uses ordinary least squares regression or structural equation modeling in relating market-based variables to firm performance. These methods, however, are not appropriate when high collinearity between independent variables is present. Furthermore, these methods cannot estimate a model containing highly collinear and noisy dependent or latent variables ($\mathbf{Y}$) and independent variables ($\mathbf{X}$).

into marketing. However, recently, some literature, although highly conceptual (e.g., Srivastava et al., 2001) has emerged discussing the advantage of relating the resource-based view to marketing, especially to the concept of market orientation. Their main thesis is that an integrative approach is more likely to provide a stronger base for (the development of) competitive advantage. An additional reason to investigate an integrative concept of marketing relates to the mixed results of recent empirical studies relating market orientation (as a set of values) to business performance (e.g. Moorman and Rust, 1999; Noble, Sinha and Kumar, 2002). Furthermore, there is some literature indicating that a market orientation is not always the only viable strategic orientation (e.g., Heskett et al., 1994; Noble et al., 2002; Treacy and Wiersema, 1995).

In chapter 2, we develop and validate a model which links the marketing-based view to the resource-based view of competitive advantage. Chapter 3 aims to further investigate the basic question asked by marketing and resource-based researchers: do market-based capabilities account for variation in firm performance? As mentioned before, we extend the previous chapter by taking a rather disaggregated approach by relating the dimensions of the four market-based capabilities (customer-driven, competitor-driven, customer-linking, supplier-linking, information-technology, logistics, human-related and people capabilities) to several indicators of firm performance (sales growth, profit growth, overall profitability, labor profitability, and cash flows). This operational-level analysis is a preferable approach if the purpose of the study is to identify necessary organizational changes (e.g., Chase and Bowen, 1991; Rust, Zahorik and Keiningham, 1995; Soteriou and Chase, 1998, 2000; Soteriou and Zenios, 1999). Basically, models of sustainable competitive advantage (e.g., Day and Wensley, 1988; Bharadwaj, Varadarajan and Fahy, 1993; Hunt and Morgan, 1995; Srivastava et al., 2001) implicitly recognize this level as the appropriate level of analysis. These models sum a large number of strategic and operational variables, which are often highly related, as having an impact on a firm's (positional) advantage. In short, this analysis helps management in making trade-offs (and allocating resources) in order to create a unique and valuable position in the market place.

Concerning the links in our theoretical framework, ample literature on both marketing and management operations provides impressive support for the presence of significant relationships. Concerning customer-driven and competitor-driven capabilities, Narver and Slater (1990) among others, suggest that firms excel when they understand and respond to their customers and competitors more effectively than their rivals do. These and subsequent studies in general find support for their proposition (e.g., Cano, Carrillat and Jaramillo, 2004; Kirca, Jayachandran and Bearden, 2005).

The value of relationship-driven capabilities to firm performance is frequently studied (e.g., Kalwani and Narayandas, 1995; Uzzi, 1996; Uzzi and Lancaster, 2003). For example, Rosenzweig et al. (2003) argue that highly integrated supply chains have the potential to lower the net costs of conducting business and the total delivered costs to customers (p. 439). According to these researchers, this is done by: (1) working closely with firms over time, so that wholesalers have more opportunities for correcting any transaction inequities, (2) sharing interfirm information

that reduces information asymmetry, and (3) using noncontractual, self-enforcing safeguards which are less costly than more traditional legal contracts. Empirically, Rosenzweig et al. (2003) demonstrate that high relationship-driven capabilities (i.e., interorganizational information sharing and cooperation) directly influence superior product quality, delivery reliability, process flexibility, and cost leadership. Kalwani and Narayandas (1995) suggest that manufacturers who adopt a relational view are more able to retain and improve their profitability than manufacturers who adopt a transactional approach. Frohlich and Westbrook (2001) find evidence that the widest degree of arc of integration with both suppliers and customer has the strongest association with performance improvement.

Concerning supply-chain capability, its relationship to business performance is frequently suggested by operations management scientists. The impact of information technology capabilities (ITC) on business performance is frequently studied in various settings (for a review of the literature, see Brynjolfsson and Hitt, 2000; Bharadwaj, 2000). The evidence from these studies seems to be mixed. However, ample research indicates a positive contribution of ITC to firm performance (Bharadwaj, Bharadwaj and Konsynnski, 1999; Mata, Fuerst and Barney, 1995). Concerning logistics capabilities, several studies suggest that a distinctive logistics capability is a source of sustainable competitive advantage and superior performance (Lynch, Keller and Ozment, 2000; Olavarrieta and Ellinger, 1997).

The impact of human resource management on firm performance is frequently suggested in the literature (e.g., Huselid 1995; Huselid et al. 1997; Richard and Johnson 2001). Although no consensus exists concerning the sign and effect, ample research suggests a direct and positive relationship between human resource management and firm performance (see for a review, Wright and Boswell, 2002). The relationship between people capabilities and firm performance is generally proposed, although this stream of research largely suggests a mediating role for customer perceptions, i.e., service quality and trust (Hartline, Maxham and McKee, 2000; Roth and Jackson, 1995). For example, Roth and Jackson (1995) argue that "individual knowledge affects service quality by diminishing organizational uncertainty and improving the firm's ability to adapt to new conditions" (p. 1724). These researchers confirm the proposition that people capabilities affect service quality and business performance.

In summary, we relate the components of the four market-based capabilities to several indicators of firm performance and propose that these components, taken simultaneously, have an effect on each indicator of firm performance.

3.3 Methods of Analysis

In this study, we take an operational level modeling approach by relating a set of eight market-based capabilities to several performance measures. Ordinary least squares regression (OLS) is a widely used method to establish these kinds of relationships. This algorithm predicts well under certain assumptions. However, in operational level modeling we frequently encounter many noisy and collinear

independent variables, which are used to predict a dependent variable. In this case OLS may not predict well, because this method only works well as long as the number of $\mathbf{X}$ variables is fairly small and fairly uncorrelated, i.e. $\mathbf{X}$ has full rank (Greene, 1997). If this is not the case ($\mathbf{X}$ has no full rank) the inverse of $\mathbf{X}$ does not exist. In response to these problems, several methods have been proposed to deal with this problem, e.g., principal components regression (PCR) (Jolliffe, 1986), partial least squares regression (PLSR) (Wold, Martens and Wold, 1983), Sliced Inverse Regression (SIR) (Duan and Li, 1991; Li), ridge regression (Hoerl and Kennard, 1970) and equity estimators (Krishnamurthi and Rangaswamy, 1987). Naik and Tsai (2000), in a recent study, show that PLSR is more efficient and provides more accurate estimates than SIR when the link function is nonlinear.[2] Of these methods only PLSR, which is originally introduced in econometrics and further developed in the field of chemometrics, uses multiple dependent variables ($\mathbf{Y}$) and handles small sample sizes and high collinearity well. PLSR aims to improve the predictive efficiency of the regression model by finding score vectors for $\mathbf{X}$ that are more likely to correlate to the columns of $\mathbf{Y}$. In short, this algorithm has many advantages when dealing with collinear data.

3.3.1 Partial Least Squares Regression

In the literature, PLSR is divided into: (1) univariate PLSR, often denoted as PLS1, and (2) multivariate PLSR, generally referred to as PLS2. To understand PLS2 it is necessary to first describe the more simple PLS1 algorithm.

PLS1

Assume that we have N observations with K X-variables denoted by x_k ($k =$ 1, 2, ..., K) and an y-variable. In general, PLSR modeling is based on two steps (Martens and Martens, 2001). First, the K input variables are compressed in $\mathbf{X}$ to derive latent variables $\mathbf{T} = [\mathbf{t}_a, a = 1, 2, ..., A]$

$$\mathbf{T} = \mathbf{W}(\mathbf{X}) \tag{3.1}$$

where $\mathbf{W}(.)$ represents a linear function; each score vector $\mathbf{t}_a$ is defined as a linear combination of the $\mathbf{X}$ variables. The PLS components are considered to be orthogonal. Furthermore, function $\mathbf{W}(\mathbf{X})$ is defined so that the first few PCs are as $\mathbf{Y}$-relevant as possible. Step two models both $\mathbf{X}$ and $\mathbf{Y}$ in terms of $\mathbf{T}$

$$\mathbf{X} = \mathbf{T}\mathbf{P}^T + \mathbf{E} \tag{3.2}$$
$$\mathbf{Y} = \mathbf{T}\mathbf{Q}^T + \mathbf{F} \tag{3.3}$$

[2] In general, PLSR proves to be a powerful tool for data analysis when two blocks ($\mathbf{X}$ and $\mathbf{Y}$ block) are related but the exact form of that relationship is not necessarily known.

where $\mathbf{P}$ is a matrix of PLS $\mathbf{X}$ loadings, $\mathbf{Q}$ is a matrix of PLS $\mathbf{Y}$ weights and both $\mathbf{E}$ and $\mathbf{F}$ represent noise. The loadings ($\mathbf{P}$ and $\mathbf{Q}$) are determined by least squares fit

$$\mathbf{P}^T = (\mathbf{T}^T\mathbf{T})^{-1}\mathbf{T}^T\mathbf{X} \tag{3.4}$$
$$\mathbf{Q}^T = (\mathbf{T}^T\mathbf{T})^{-1}\mathbf{T}^T\mathbf{Y} \tag{3.5}$$

Finally, the obtained model may be expressed as a linear regression model

$$\mathbf{Y} = \beta\mathbf{X} + \mathbf{F} \tag{3.6}$$

where $\mathbf{F}$ represents the measurement error. For a model with A PCs, the matrix of regression coefficients (β) is defined as

$$\beta = \mathbf{W}(\mathbf{P}^T\mathbf{W})^{-1}\mathbf{Q}^T \tag{3.7}$$

As can be seen, the coefficients β are estimated as a function of $\mathbf{W}$, as well as a function of $\mathbf{X}$ and $\mathbf{Y}$ loadings $\mathbf{P}^T$ and $\mathbf{Q}^T$, respectively.

PLS2

Previously, we described the univariate case. In the multivariate case, the algorithm is slightly different and more complex (see for a detailed discussion, Garthwaite, 1994; Höskuldsson, 1988; Wold, Sjöström and Eriksson, 2001). In contrast to PLS1, PLS2 makes a decomposition of $\mathbf{Y}$. Assume that we have N observations with K X-variables denoted by x_k (k = 1, 2, ..., K) and J Y-variables, y_j (j = 1, 2, ..., J). Hence, we have two matrices $\mathbf{X}$ and $\mathbf{Y}$ of dimension (N x K) and (N x J), respectively. As before, the first step is to find a few variables, called X-scores and denoted by $\mathbf{T}_a$ (a = 1,2,...,A). These X-scores are orthogonal and are estimated as linear combinations of $\mathbf{X}$, with the coefficients $\mathbf{W^*}_a$ (a = 1,2, ...,A)

$$\mathbf{T} = \mathbf{XW^*} \tag{3.8}$$

Similar to PLS1, we form a model for $\mathbf{X}$, where the $\mathbf{t}$'s are good summaries of $\mathbf{X}$ and the X-residuals $\mathbf{E}$ are small. This may be expressed as

$$\mathbf{X} = \mathbf{TP}^T + \mathbf{E} \tag{3.9}$$

Then, unlike PLS1, we form a similar model for $\mathbf{Y}$. In this case, the corresponding Y-scores, denoted by $\mathbf{U}_a$ are multiplied by $\mathbf{Q}$, which represent good summaries of $\mathbf{Y}$, so that the noise ($\mathbf{F}$) is small

$$\mathbf{Y} = \mathbf{U}\mathbf{Q}^T + \mathbf{F} \tag{3.10}$$

A second property is that $\mathbf{T}$ serves as a predictor of $\mathbf{Y}$

$$\mathbf{Y} = \mathbf{T}\mathbf{Q}^T + \mathbf{G} \tag{3.11}$$

where $\mathbf{G}$ summarizes the deviation between the observed and modeled responses. Integrating equation (3.8) into (3.11) we obtain a model that may be expressed as a linear regression model

$$\mathbf{Y} = \mathbf{W}^*\mathbf{Q}^T\mathbf{X} + \mathbf{G} = \beta\mathbf{X} + \mathbf{G} \tag{3.12}$$

Assuming an optimal model complexity, where the residuals are relatively small, the regression coefficient β, may be written as

$$\beta = \mathbf{W}^*\mathbf{Q}^T \tag{3.13}$$

For PLSR, matrix $\mathbf{W}^*$ in equation (3.13) may be written as

$$\mathbf{W}^* = \mathbf{W}(\mathbf{P}^T\mathbf{W})^{-1} \tag{3.14}$$

In summary, the expression for the regression coefficient β is the same in PLS2 as in the PLS1 algorithm

$$\beta = \mathbf{W}(\mathbf{P}^T\mathbf{W})^{-1}\mathbf{Q}^T \tag{3.15}$$

3.3.2 Uncertainty Limits

In recent years, considerable effort has been invested in calculating confidence intervals for the regression coefficients and predictions for PLSR (e.g., Denham, 1997; Faber and Kowalski, 1997; Serneels, Lemberge and Ven Espen, 2004). However, this stream of research is still in its infancy and evidence is needed to fully assess the utility of the proposed methodologies. Recently, a rather pragmatical method has been introduced by Martens and Martens (2000) to calculate uncertainty limits

of the PLSR parameters. Since the PLSR parameters are linear combinations of the data and hence might be closely normally distributed, they propose to use the variation in the parameters of the submodels, which is obtained during cross validation, to derive standard deviations. This is then followed by applying the t-distribution to derive confidence intervals. The estimates of the reliability range of the regression coefficient vector (β) may be expressed as $\beta \ \pm 2\ s(\beta)$. The standard uncertainty, $s(\beta)$, is obtained by summarizing the partial perturbations between the full model and the cross-validation segments, β - β_m over the M segments (see for a detailed discussion, Martens and Martens, 2001). In PLS2, the regression coefficient vector is shown for each Y-variable, with the corresponding jack-knife estimate of reliability ranges $\beta_A \ \pm 2\ s(\beta_A)$. Before proceeding, a cautionary remark must be made. Martens and Martens' (2001) derived reliability estimates are conditioned only on the available data, without any distributional assumptions. Hence, the jack-knife t-test might only be used as a rough identification of useless variables.

3.3.3 PLSR and OLS

Since we benchmark the PLSR outcomes with that of ordinary least squares (OLS), it is interesting to describe the case where these two methods give identical results. Furthermore, as the OLS method is generally known by marketing researchers and the PLSR method not, this could serve as a reference point in better understanding the outcomes. When the number of PCs equals the number of **X** variables, PLSR and OLS give identical results (Martens and Martens, 1985). For illustrative purposes we utilize the description given by Helland to formalize the relationship. Formally, the PLS regression coefficients, based on n PC, is given by (Helland, 1988)

$$\beta_{PLS} = \mathbf{K}_n(\mathbf{K}_n^T\mathbf{X}^T\mathbf{X}\mathbf{K}_n)^{-1}\mathbf{K}_n^T\mathbf{X}^T\mathbf{y} \tag{3.16}$$

where $\mathbf{K}_n = (\mathbf{s}, \mathbf{S}\mathbf{s}, ..., \mathbf{S}^{k-1}\mathbf{s})$. Moreover, define the Krylov subspace $\mathcal{K}_n(\mathbf{S},\mathbf{s})$ to be $\mathcal{K}_n(\mathbf{S},\mathbf{s}) = \text{span } \mathbf{K}_n$. In the case where n equals the number of X-variables, denoted by p ($n = p$), in equation (3.16), β_{PLS} is identical to β_{OLS}. In this case the classical variable selection method, based on significance testing can be utilized for β_{PLS}.

3.4 Model Variables

Details on the measurements used in this model are given in the previous chapter. Here, we very briefly discuss the model variables (see Appendix B).

3.4.1 Independent Variables

Reviewing the strategic marketing literature, chapter two develops a model of market-based capabilities incorporating four dimensions, each having several subdimensions, which results in a total of eight components. In this study, we incorporate

the eight components as dimensions of the market-based capabilities construct and relate them simultaneously to several indicators of firm performance. The rationale behind this modeling strategy is that all these subdimensions are closely related and appear to measure the extent to which an organization is market-oriented.

3.4.2 Dependent Variables

We measure wholesale firm performance on five aspects of efficiency and productivity: sales growth, profit growth, overall profitability, labor productivity and cash flow. These are all measured on a seven-point Likert scale, where 1 = "strongly disagree" and 7 = "strongly agree." These measures are based on those of Lusch and Brown (1996).

3.5 Findings

In this section, we outline the outcomes generated by multivariate partial least squares regression (PLS2). As in the previous chapter, we have 137 datapoints. To derive the outcomes, the data are analyzed in the $Unscrambler^{TM}$, version 9.1. We note that the approximately normally distributed (independent) variables and our sample size form a strength in this study. Naik and Tsai (2000, p. 770) demonstrate that if the independent variables are multivariate normally distributed and the sample size is large, then the relative sizes of the regression coefficients are correctly estimated by PLSR; this is even in the case of a non-linear and unknown link function. To investigate the strength of our proposed method we also estimate the same relationships using standard OLS regression.

Before presenting the regression outcomes, a brief look at the correlation matrix (see Table 3.1) suggests that most variables are significantly correlated. The correlation among the independent variables is moderate, whereas the correlation among the dependent variables is high. Also, the correlation between the independent and dependent variables is low to moderate.

3.5.1 PLS2

PLS2 regression is run with the eight market-based capabilities components as $\mathbf{X}$-matrix and the five firm performance indicators as the $\mathbf{Y}$-matrix. This analysis is run with full cross-validation and variable selection by jack-knifing. To investigate and detect the optimal number of PCs, we analyze the Root Mean Square Error of Prediction (RMSEP) statistic. The optimal model complexity is indicated when the RMSEP value reaches its minimum. This measure represents the average difference between predicted ($\hat{y}$) and measured response values (y), and may be expressed as

$$\mathbf{RMSEP} = \sqrt{\frac{1}{N}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2} \tag{3.17}$$

	SD	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
CUSTDC (X1)	1.02	-												
COMDC (X2)	1.24	.43	-											
CLC (X3)	.82	.40	.57	-										
SLC (X4)	1.03	.40	.42	.42	-									
LOGC (X5)	.79	.34	.17	.28	.34	-								
ITC (X6)	1.27	.17	.35	.22	.27	.21	-							
HRC (X7)	.87	.22	.35	.41	.40	.22	.20	-						
PC (X8)	.70	.39	.27	.44	.25	.39	.16	.36	-					
SG (X9)	1.25	.23	.18	.19	.12	.13	.18	.28	.32	-				
PG (X10)	1.29	.15	.12	.16	.18	.13	.15	.34	.20	.73	-			
OP (X11)	1.26	.17	.13	.16	.20	.15	.23	.26	.21	.64	.86	-		
LP (X12)	1.11	.12	.21	.26	.21	.15	.23	.40	.34	.64	.60	.61	-	
CF (X13)	1.24	.16	.18	.22	.27	.25	.26	.32	.28	.50	.68	.73	.59	-

note: SG is sales growth, PG is profit growth, OP is overall profitability, LP is labor productivity, CF is cash flow, CUSTDC is customer-driven, COMDC is competitor-driven, CLC is customer-linking, SLC is supplier-linking, ITC is information technology, LOGC is logistics, HRC is human-related and PC is people capabilities.

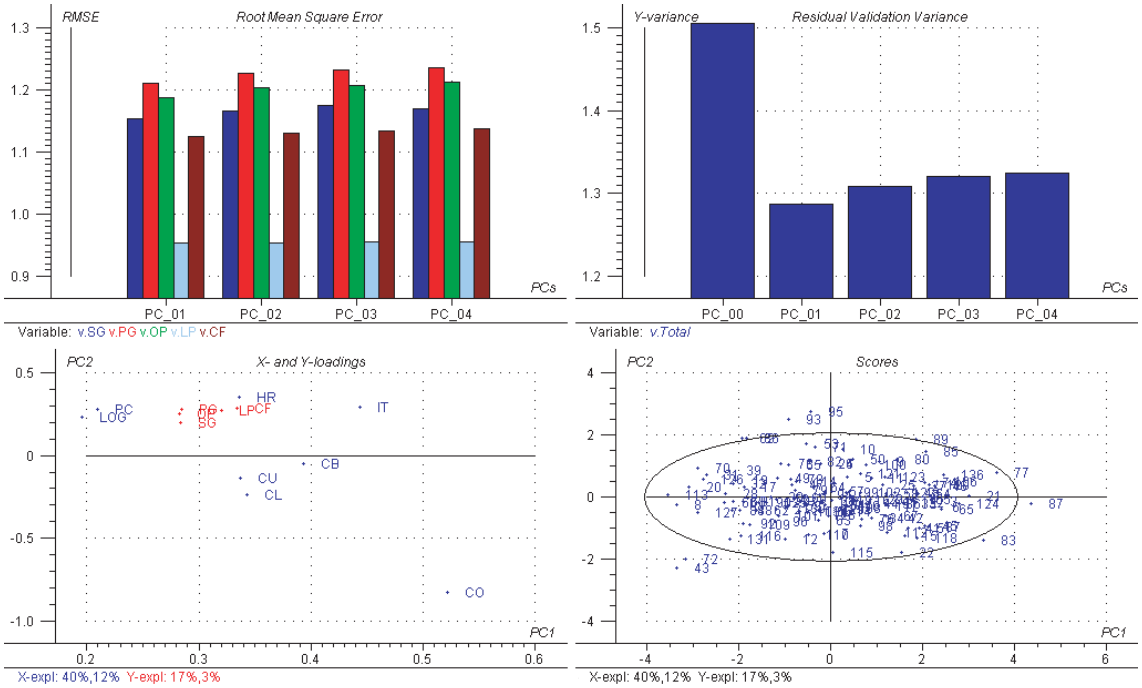
Table 3.1: Descriptive Statistics and Correlations

Before discussing the proposed relationships in detail, we first present some aggregate PLS output, which is shown in figure 3.1. To detect the optimal number of principal components (PCs), we utilize RMSEP. The outcomes are displayed in the upper-left plot of figure 3.1. This plot suggests one latent variable to be the optimal model rank for interpretation for all the independent variables. The plot 'Residual Validation Variance' in this figure suggests, in the aggregate, one PC to be the correct complexity of the model; note that PC_00 is the average point in the data set and has to be higher than the different models (PC_01 - PC_11). Looking at the X- and Y-loadings plot, it shows that one PC explains 40% of the variance in $\mathbf{X}$. Furthermore, this single PC explains 17% of the variation in $\mathbf{Y}$. In short, the RMSE plot indicates that, in all cases, the best PLS model requires one PC. Since PLSR is rather sensitive to outliers we also compute the Hotelling T^2 Ellipse. The 95 percent confidence ellipse shown in the lower right plot of figure 3.1 is based on the Hotelling T^2 statistic. Observations well outside the Hotelling Ellipse are outliers. In our case the number of outliers is limited. This leads us to assume that they may not have an effect on the obtained results.[3]

Market-Based Capabilities and Sales Growth

The regression outcomes describing the relationship between market-based capabilities and sales growth are outlined in the upper left plot of figure 3.2. The error bars in this plot show estimates of the reliability range of $\hat{b}$, expressed as $\hat{b} \pm 2\ \hat{s}(\hat{b})$, where $\hat{s}(\hat{b})$ is estimated by cross-validation of the model parameters (jack-knifing). As can be seen from this plot, the regression outcomes show little uncertainty limits. Furthermore, they do not cross the zero line, indicating a significant effect of all variables on the dependent variable. Hence, all market-based capabilities components positively predict sales growth. In summary, customer-driven ($\beta = .09$),

[3]As in the previous chapter, we estimated an interaction effects model. The results indicate that none of the combinations (of several components of market-based capabilities) have a strong effect on the financial performance of the firm.



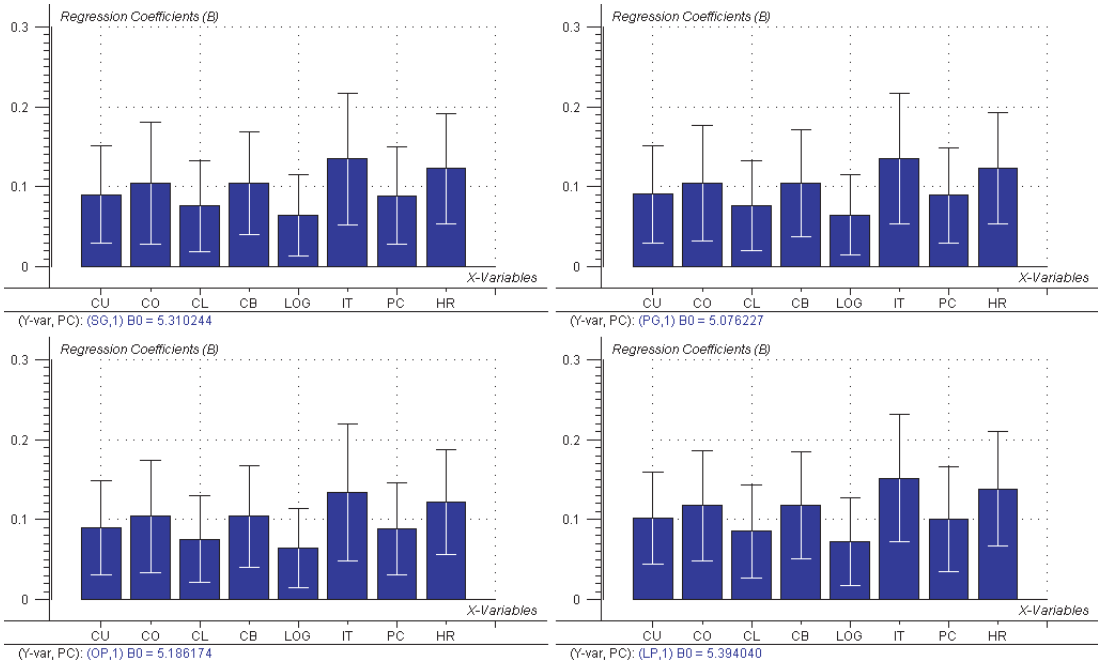
note: SG is sales growth, PG is profit growth, OP is overall profitability, LP is labor productivity, CF is cash flow, CU is customer-driven, CO is competitor-driven, CL is customer-linking, CB is supplier-linking, IT is information technology, LOG is logistics, HR is human-resource and PC is people capabilities.

Figure 3.1: General PLS2 outcomes

competitor-driven ($\beta = .10$), customer-linking ($\beta = .08$), supplier-linking ($\beta = .10$), information-technology ($\beta = .14$), logistics ($\beta = .06$), human-related ($\beta = .12$) and people capabilities ($\beta = .09$) have significant positive effects on sales growth.

Market-Based Capabilities and Profit Growth

The outcomes of the market-based capabilities-profit growth link are shown in the upper right part of figure 3.2. As can be seen from this plot, the regression outcomes suggesting the causal relationship between market-based capabilities and profit growth indicate that all relationships are positive. Furthermore, the error bars do not contain the value zero, indicating significance. Summarizing the plot, customer-driven ($\beta = .09$), competitor-driven ($\beta = .10$), customer-linking ($\beta = .08$), supplier-linking ($\beta = .10$), information-technology ($\beta = .14$), logistics ($\beta = .06$), human-related ($\beta = .12$) and people capabilities ($\beta = .09$) positively predict profit growth.



note: SG is sales growth, PG is profit growth, OP is overall profitability, LP is labor productivity, CU is customer-driven, CO is competitor-driven, CL is customer-linking, CB is supplier-linking, IT is information technology, LOG is logistics, HR is human-related and PC is people capabilities.

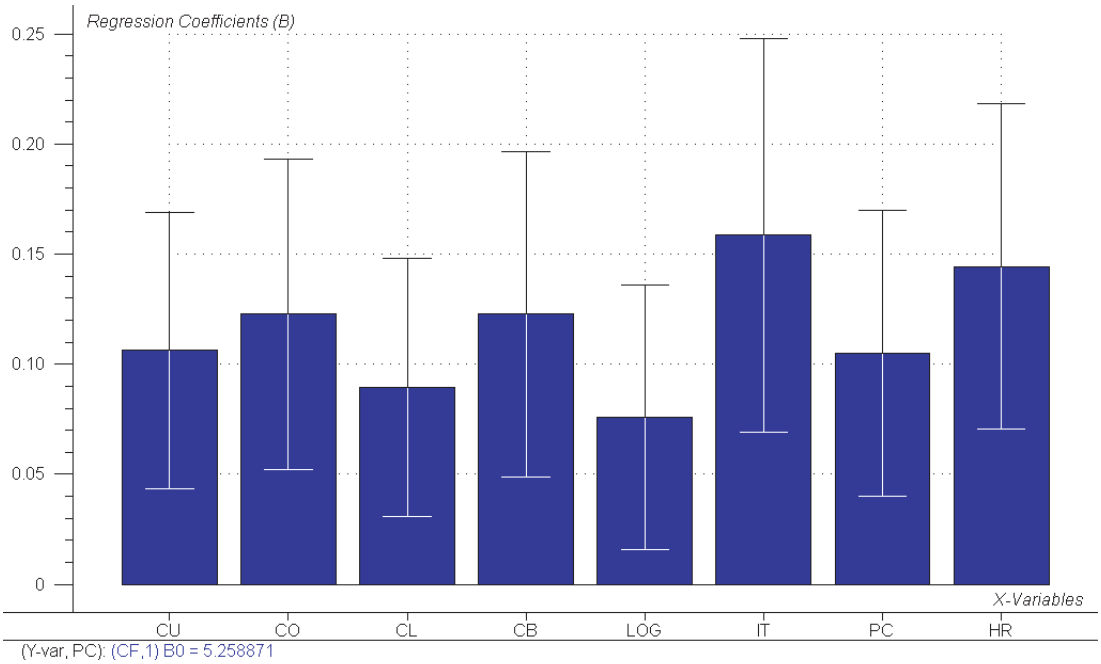
Figure 3.2: PLS regression coefficients: the effect of market-based capabilities on sales growth, profit growth, overall profitability and labor productivity

Market-Based Capabilities and Overall Profitability

The lower-left part of figure 3.2 shows the regression outcomes of the market-based capabilities-overall profitability relationship. All coefficients have their jack-knife distributions above zero thus considered statistically significant. Overall profitability is predicted by customer-driven ($\beta = .09$), competitor-driven ($\beta = .10$), customer-linking ($\beta = .08$), supplier-linking ($\beta = .10$), information-technology ($\beta = .13$), logistics ($\beta = .06$), human-related ($\beta = .12$) and people capabilities ($\beta = .09$).

Market-Based Capabilities and Labor Productivity

The regression outcomes with the estimated reliability describing the relationship between market-based capabilities and labor productivity are displayed in the lower right plot of figure 3.2. Summarizing the regression coefficients of this one factor PLSR model, customer-driven ($\beta = .10$), competitor-driven ($\beta = .12$), customer-linking ($\beta = .09$), supplier-linking ($\beta = .12$), information-technology ($\beta = .15$), logistics ($\beta = .07$), human-related ($\beta = .14$) and people capabilities ($\beta = .10$) are significantly related to labor productivity.



note: CF is cash flow, CU is customer-driven, CO is competitor-driven, CL is customer-linking, CB is supplier-linking, IT is information technology, LOG is logistics, HR is human-related and PC is people capabilities.

Figure 3.3: PLS regression coefficients: market-based capabilities-cash flow link

Market-Based Capabilities and Cash Flow

Figure 3.3 summarizes the estimated relationship between the market-based capabilities and cash flow. All coefficients have their jack-knife distributions above zero thus considered statistically significant. Furthermore, this plot reveals positive relationships. In summary, cash flow is predicted by customer-driven ($\beta = .11$), competitor-driven ($\beta = .12$), customer-linking ($\beta = .09$), supplier-linking ($\beta = .12$), information-technology ($\beta = .16$), logistics ($\beta = .08$), human-related ($\beta = .14$) and people capabilities ($\beta = .11$).

3.5.2 Ordinary Least Squares Regression

To further demonstrate the strength of PLSR in our case, we estimate an ordinary least squares regression (OLSR) model. Since some components of market-based capabilities are highly correlated, we anticipate poor performance for OLSR. The results of these analyses are shown in table 3.2. In general, the outcomes of this method are not satisfactory. Although all market-based capabilities dimensions are moderately correlated with the five indicators of firm performance, we could only detect a few significant regression coefficients. Furthermore, this method reveals some negative regression coefficients, while these variables are positive correlated with the corresponding dependent variable.

Since our findings indicate a one factor model as the optimal model complexity, we estimate for each dependent variable a model incorporating one independent

	Dependent Variable				
	SG	**PG**	**OP**	**LP**	**CF**
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
Independent Variables					
Intercept	5.36**	5.30**	5.42**	5.51**	5.55**
Customer-Driven Capabilities	.08	.09	.06	-.10	-.17
Competitor-Driven Capabilities	.10	-.06	.08	-.17	-.09
Customer-Linking Capabilities	.39	.04	-.34	.35	-.04
Supplier-Linking Capabilities	-.25	-.15	.09	.06	.25
Logistics Capabilities	-.45	-.38	-.39	-.56*	-.42
Information Technology Capabilities	.20	.19	.17	.22	.16
Human-Related Capabilities	.23	.22	.46	.43	.68
People Capabilities	.50	.65*	.35	.46*	.07
R^2	.30	.23	.26	.46	.24

* p < .05; ** p < .01.

[a] unstandardized regression coefficient.

[b] s.e. refers to standard error.

Table 3.2: OLSR outcomes

variable, a composite variable called market-based capabilities; hence, dependent variable = f(Market-Based Capabilities). The results confirm our PLSR findings. Market-based capabilities have a positive significant influence on sales growth (β = .62, p $\leq$ .00 and R^2 = .10), profit growth (β = .58, p $\leq$ .00 and R^2 = .08), overall profitability (β = .60, p $\leq$ .00 and R^2 = .09), labor productivity (β = .66, p $\leq$ .00 and R^2 = .13) and cash flow (β = .75, p $\leq$ .00 and R^2 = .14).

3.6 Discussion

The outcomes of this study provide support for the configurational-based view, which seeks to integrate the two dominant views in strategic marketing: the market-based view (MBV) and the resource-based view (RBV). The configurational-based view considers both the firm's heterogeneous bundles of resources (RBV) and the issue of heterogeneous demand (MBV), and is therefore more realistic. Utilizing a configurational-based perspective, the previous chapter develops a model of market-based capabilities. Our analysis provides additional support for this model and framework. In all cases, we find one PC indicating that the eight market-based capabilities are part of one underlying dimension. These findings also support Day's (1994) thesis that both marketing or outside-in capabilities and operations or inside-out capabilities are crucial for the development of market-based competition. Integrating both the inside-out and outside-in views is also recently considered to be a potentially fruitful avenue for research (Ho and Tang, 2004; Vargo and Lusch, 2004). Following a configurational-based perspective has two major implications for the field. First, marketing and (operations) management scientists have to cooperate to develop more realistic, and possibly more complex, models. Since the two

streams seem to emphasize different problems, this will be a challenge. Furthermore, analyzing frameworks that enables competing marketing and management strategy options to be traded off on the basis of financial and nonfinancial indicators is rather complex. Also, obtaining the model input may become a very challenging task.

The results described in the previous section highlight some of the unique insights that emerge from this way of modeling (using soft methods). Although our analysis is rather explorative in nature, it demonstrates that marketing-based capabilities (customer-driven, competitor-driven, supplier-driven, technology-monitoring, customer-linking and supplier-linking capabilities) indeed positively predict business performance. These results confirm previous research (Narver and Slater, 1990; Kalwani and Narayandas, 1995). However, these findings are not in line with some previous results (Christensen and Bower, 1996; Voss and Voss, 2000) that indicate that customer-driven capabilities are not related to business performance. Our study indicates that other market-driven and market-based capabilities are indeed more evident to business performance than customer orientation. This suggests that although customer-driven capabilities lead to positive performance outcomes, other market-based capabilities have a stronger effect.

Comparing the outcomes in this chapter with that of chapter 2 we see that in both studies human-related capabilities show the highest correlation with various indicators of business performance. A differentiating factor of this study is that it provides more detailed outcomes. For example, our analysis suggests that although human-related capabilities are strongly related to business performance, information technology capabilities have the greatest impact.

We have presented an algorithm/method to conduct operational level modeling, multivariate partial least squares regression. This method provides the marketing manager with a tool to develop models that appropriately reflect the given data and theory. An advantage of our analytical method is the ability to relate a high number of (collinear, noisy and possibly even incomplete) independent variables with a (high) number of (collinear and noisy) dependent variables. This may open the door for (marketing) researchers seeking to relate a large number of (highly) related business processes, competencies, capabilities or resources to some outcome performance. For example, in Srivastava et al.'s (1999) framework, marketing processes are considered to be essential in delivering superior market performance. However, marketing processes are many and highly interrelated and standard methods, based on ordinary least squares, are not sufficient in this case.

Another advantage of PLSR is the number of distracted components and the obtained simplicity of the (optimal) model. This method can fit the data at hand with fewer components than PCR (Frank and Friedman, 1993) resulting in more parsimonious models. This is also found in this study. The PLSR analysis confirms the proposition that the market-based capabilities construct is measured by one underlying latent factor. The arguments for the relatively better fit of PLSR (above PCR) is provided by Frank and Friedman (1993). Another advantage of PLSR is its simplicity. The basic idea behind this method is simple to understand and very appealing, especially for practitioners.

A major drawback of the PLSR method is its vague statistical behavior. This

makes it difficult to perform usual inferential tasks related to modeling, such as assessing uncertainty in coefficient estimates. Therefore, Martens and Martens (2000) conclude with a cautious remark: "since the perturbations are expected to be primarily of nonrandom character, such statistical summaries were considered to be of limited value, and fully misleading if presumed to yield probabilistic "95% confidence regions."" However, PLSR is generally used when many independent variables and high (multi)collinearity among these variables exist. In this case, as argued by Höskuldsson (2003), the traditional approach to selecting variables, based on significance testing, has some basic defects (this is also shown in this study). Therefore, although future research deriving confidence intervals for the PLSR parameters is needed, the pragmatic method, based on jack-knifing, proposed by Martens and Martens (2000) and used in this study, seems to be a strong alternative variable selection method.

Further research is needed relating the market-based capabilities model to other plausible outcomes, such as service quality and customer satisfaction. For example, Quinn, Doorley and Paquette (1990) suggest that "a maintainable advantage usually derives from outstanding human skills, logistics capabilities, knowledge bases, or other service strengths that competitors cannot reproduce and that lead to greater demonstrable value for the customer" (p. 60). Srivastava et al. (2001, p. 796) call for future research by stating that "both the RBV and marketing researchers must commit to carefully and systematically identifying and documenting how particular market-based assets and capabilities contribute to generating and sustaining specific forms of customer value."

3.7 Conclusions

As this study indicates, ordinary least squares regression methods, based on ordinary least squares, do not give the management a strong method to derive (operational) improvements, since the relevant capabilities in a business, such as marketing, supply chain activities and information technology, are frequently highly interconnected, or even depend on each other. However, as demonstrated by this study, PLSR provides management with a strong and simple tool to detect the degree to which different, highly correlated variables have an effect on several operational indicators of firm performance. Although our analytical method seems to perform well in this case, future research is needed to further determine whether this method is also valuable in other cases.

Chapter 4

The Strategic Marketing Capabilities Construct: An Integration of the Market-Driven and Relationship Marketing Perspectives

Abstract Researchers in marketing management tend to adopt one of two approaches to examining competitive advantage: a focus on the market (market orientation) or a focus on relationships (relationship marketing). The authors suggest that combining these approaches to examine competitive advantage will yield better insights. Therefore, they synthesize these views by developing the 'strategic marketing capabilities' construct with the following dimensions: (1) customer-driven capabilities, (2) competitor-driven capabilities, (3) supplier-driven capabilities, (4) technology-monitoring capabilities, (5) customer-relating capabilities and (6) supplier-relating capabilities. This construct is tested with data from 137 electrotechnical wholesalers in the Netherlands utilizing a Bayesian approach to confirmatory factor analysis. The results indicate that the hypothesized strategic marketing capabilities model is a good representation of the variance-covariance matrix. Validation tests, applying a recently proposed information criterion called deviance information criterion and Gelfand and Ghosh's criterion, using nested and nonnested competing models, are supportive for the proposed factor structure. The implications of these findings are discussed.

4.1 Introduction

Recently, marketing researchers begin to question the classical concept of market orientation (e.g., Achrol and Kotler 1999; Noble, Sinha and Kumar 2002; Parvatiyar and Sheth 2000; Vargo and Lusch 2004). It is suggested that this concept, that is developed in the late eighties, does not incorporate the complexity of today's environment. Achrol and Kotler (1999) even argue that "The very nature of network organizations, the kinds of theories useful to its understanding, and the potential impact of the organization of consumption all suggest that a paradigm shift of marketing may not be far over the horizon" (p. 162).

Several scholars (e.g., Achrol and Kotler 1999; Day and Montgomery 1999; Hoekstra, Leeflang and Wittink 1999; Webster 1992) suggest that recent developments in both marketing theory and marketing practice make the integration of both the old marketing thoughts and relationship marketing necessary. The main reason behind this emerging stream of research is that the present conceptualizations

of market orientation (Kohli and Jaworski 1990; Narver and Slater 1990) hardly deals with the fundamental question: how do firms relate to their markets? Therefore, this stream of research suggests that the concept of market relatedness could be integrated with that of market orientation (Hunt and Lambe 2000; Vargo and Lusch 2004). In this context, Rust (2004) state that "Marketing is entering a new era, and mainstream marketing in the new era will closely resemble the business-to-business/service/relationship marketing of today" (p. 24). Some even suggest that relating to the market is the core of marketing (Grönroos 2000; Gummesson 2004). For example, Webster (1992) begins his thesis by stating that "A new conception of marketing will focus on managing strategic partnerships and positioning the firm between vendors and customers in the value chain with the aim of delivering superior value to customers. Customer relationships will be seen as the key strategic resource of the business (p. 1)". Others prefer a less narrow general model of marketing. For example, Sheth and Parvatiyar (2000) suggest that "an alternative paradigm of marketing is needed, a paradigm that can account for the continuous nature of relationships among marketing actors" (p. 140). To address these issues, the authors draw on the market orientation and relationship marketing literature to further develop and refine the theory of market orientation.

In this study, we develop an integrated construct of market focus, which we call strategic marketing capabilities, by incorporating both market orientation (or market-driven capabilities) and relationship marketing (or market-relating capabilities) into one construct.[1] The idea of incorporating the management and marketing of market relationships into the marketing concept is not new. Day and Wensley (1983) and Lusch and Laczniak (1987) already suggest 'market relationships' as being part of the marketing concept. However, the empirical development of an integrated theory of market orientation is lacking. The emerging literature is largely conceptual and empirical research is still scarce. With this research, we try to fill this gap by drawing on and integrating different theoretical perspectives, empirical research and marketing practice to develop a concept of strategic marketing capabilities. This hierarchical construct represents the integration of market-driven capabilities and market-relating capabilities, and contains the following second-order factors: (1) customer-driven capabilities, (2) competitor-driven capabilities, (3) supplier-driven capabilities, (4) technology-monitoring capabilities, (5) customer-relating capabilities and (6) supplier-relating capabilities. Building on the classical concept of market orientation (Kohli and Jaworski 1990) and relationship marketing (e.g., Buvik and John 2000) we propose subdimensions (first-order factors) for the previously mentioned dimensions of strategic marketing capabilities. Furthermore, we include several competing models for comparison. Since our sample

[1]There exist, in general, two views on todays marketing paradigm: (1) the American school, and (2) the Nordic school. The American school (among others Kohli and Jaworski 1990; Narver and Slater 1990) views market orientation as the implementation of the marketing concept, which holds the current marketing paradigm. On the other side, researchers such as Grönroos (1994, 2000) and Gummesson (1998) see relationship marketing as central to marketing. In this study, we argue that these views are complementary in nature and develop a model that incorporates these two perspectives.

size is rather limited and the models are not nested in all cases a Bayesian approach is developed to analyze the models. Also, we apply a recent statistic, called deviance information criterion, to compare both the nested and nonnested ((non)hierarchical) factor models. Another contribution of this study is the use of Gelfand and Ghosh's criterion (GGC) in comparing and choosing the best fitted model.

This chapter is organized as follows. In the next section, we discuss the concept of market orientation and introduce an integrated model we refer to as the strategic marketing capabilities construct. After that, methodological issues are described in detail. Finally, we test our construct, using data generated from customers of electrotechnical wholesalers in the Netherlands and discuss the outcomes.

4.2 Market Orientation

As already mentioned, there is some debate in the marketing literature concerning the domain of market orientation. The following views can be distinguished: market orientation as (1) activities (Kohli and Jaworski 1990), (2) a culture (Narver and Slater 1990), and (3) capabilities (Day 1994; Hooley, Broderick and Möller 1998). Next, we review the first two views, which represent the classical concept of market orientation. Then we outline the third view by discussing some models incorporating both the classical concept of market orientation and relationship marketing. This provides a rationale for our proposed model.

4.2.1 Classical Market Orientation

Several concepts of market orientation have appeared in the literature (e.g., Deshpandé et al. 1993; Kohli and Jaworski 1990; Narver and Slater 1990; Pelham and Wilson 1996; Reukert 1992). These concepts fall into two streams: (1) market orientation as a set of activities, and (2) market orientation as an organizational culture.

Market orientation as a set of activities

Market orientation as a set of activities refers to the firm's ability to generate market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organizationwide responsiveness to it (Kohli and Jaworski 1990, p. 6). Another definition is that of Deshpandé and Farley (1998). They define market orientation as "the set of cross-functional processes and activities directed at creating and satisfying customers through continuous needs-assessment" (p. 213). A related view of market orientation is that of Reukert (1992). He defines market orientation as "the degree to which the business unit obtains and uses information from customers, develops a strategy which will meet customer needs, and implements that strategy by being responsive to customer's needs and wants" (p. 228). This perspective suggests a market orientation as a firm's capability in satisfying customer's needs and wants.

Market orientation as an organizational culture

Market orientation as a business culture is proposed by Narver and Slater (1990). They define market orientation as "the organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, continuous superior performance for the business" (p. 21). They infer three behavioral components of market orientation: customer orientation, competitor orientation and interfunctional coordination. Like the previous one, this view has also gained broad acceptance in the marketing literature.

Comments on the classical concept of market orientation

The work of Kohli and Jaworski (1990) and Narver and Slater (1990) is seen as very fundamental to marketing. However, marketing researchers are questioning the comprehensiveness of present conceptualizations of market orientation (e.g., Noble, Sinha and Kumar 2002; Sheth and Parvatiyar 2000; Vargo and Lusch 2004). As noted before, present conceptualizations of market orientation are mainly criticized because they do not incorporate the extent to which a company is able to relate to the market. An emergent stream of research argues that building and maintaining relationships, besides information generation, dissemination and responsiveness, is an essential marketing capability that enables a firm to produce an offering well tailored to a market segment's specific tastes and preferences (e.g., Grönroos 2000; Gummesson 2004; Vargo and Lusch 2004; Webster 1992). In this respect, Hunt and Lambe (2000) argue that "A key orientation that is missing in the present conceptualization of MO [market orientation] is a firm's partnering orientation" (p. 28). Furthermore, the approach used by Narver and Slater (1990), despite their strong arguments, is actually ambiguous. First, the definition of 'culture' gives a lot of problems; different definitions of organizational culture have been suggested in the literature (e.g. Barney 1986; Denison and Mishra 1995; Deshpandé and Webster 1989; Hofstede, Neuijen, Ohayv and Sanders 1990). Denison and Mishra (1995) argue that limited consensus exists regarding a general theory of organizational culture. Therefore, Kennedy, Goolsby and Arnould (2003) suggest that the cultural approach of market orientation is difficult to investigate. Second, Homburg and Pflesser (2000, p. 449) suggest that the cultural perspective has had a stronger impact on the definition than on the conceptualization and the development of measures of market orientation. This is the reason why Deshpandé and Farley (1998) conclude that market orientation is not a culture, but more "a set of activities". Cadogan et al. (2001, p. 263) state that "although terminology may differ, the consensus appears to be that a market orientation consists of activities associated with the gathering and dissemination of market intelligence and the appropriate analysis and response to that intelligence."

4.2.2 Integrative View of Market Orientation

Recently, marketing scholars have recognized the shortcomings of the present conceptualizations of marketing orientation and proposed alternative conceptualizations; this by combining market orientation and relationship marketing into an extended concept of marketing (see for example, Day 1994; Hooley et al. 1998; Hooley et al. 1999; Hoekstra, Leeflang and Wittink 1999; Srivastava, Shervani and Fahey 1998, 1999; Vagro and Lusch 2004). Cravens (1998), for example, sums building and developing relationships with customers and channel members as a characteristic of market-driven strategies. Relationship marketing refers to the development, enhancement and when necessary termination of relationships with customers (and other parties), so that the objectives regarding economic and other variables of all parties are met (Grönroos 2000, p. 235). In this study, we deal with this emerging stream of research, which we refer to as an 'integrative view of market orientation'. In this extended view of market orientation, the classical work of Day (1994) and Lusch and Laczniak (1987) represents the core. Although these marketing researchers start from different perspectives, they both integrate market drivenness and relatedness in developing their concept of marketing.[2]

Lusch and Luczniak (1987), building on the work of Pfeffer and Salancik (1978), Anderson (1982), Day and Wensley (1983) and Zeithaml and Zeithaml (1984), develop (as they call it) an extended marketing concept by integrating two constructs: (1) the marketing concept, and (2) the stakeholder concept. The marketing concept represents the classical model and the implementation of this concept is referred to as "market orientation." The stakeholder concept refers to the management and development of relationships with the organization's multiple stakeholders. Although they call it the 'stakeholder concept,' this dimension is strongly related to building and maintaining relationships (especially when considering their definition and measurement). Factor analytic methods indicate that these two concepts (market orientation and relationship orientation) indeed are representative of a single underlying philosophical business orientation. Their study suggests that integrating and investigating an integrated model of the marketing concept may lead to a better understanding of the implementation of this (marketing) concept.

Day (1994) takes a different perspective when developing his view of market orientation. Day argues that market-driven organizations have superior market-sensing, customer-linking and channel-bonding capabilities. Furthermore, he classifies these marketing capabilities into: (1) market-sensing capabilities, (2) customer-linking capabilities, (3) channel-bonding capabilities, and (4) technology-monitoring capabilities. After his novel work, other marketing researchers attempt to refine this concept and relate it to financial performance (e.g., Hooley et al. 1998; Srivastava et al. 1998). For example, Hooley et al.'s (1998) model of strategic marketing capabilities, which incorporates market and relationship dimensions, is closely related to Day's marketing capabilities. Basically, this stream, although highly conceptual,

[2]Additionally, we could also report the strategic orientation perspective. Since we believe that the strategic orientation direction largely build on Day's (1994) seminal work, we refer the interested reader to Gatignon and Xuereb's (1997) article.

further refines Day's (1994) concept of strategic marketing capabilities and explicitly defend it's relevance in developing market-based advantage.

In summary, this stream of research suggest that market-driven organizations emphasize and develop both market-driven and market-relating capabilities. Next, we introduce a model we call the strategic marketing capabilities construct, which encompasses both market-driven and market-relating capabilities.

4.2.3 An Integrated Model: Strategic Marketing Capabilities

We define strategic marketing capabilities as the firm's capability to sense and relate to the market. Concrete, firms with strong strategic marketing capabilities (1) acquire, develop and use market information to serve their market and (2) perform key customer and channel connecting processes. In developing our multilevel multidimensional strategic marketing capabilities construct, we largely build on Day's (1994) perspective. The reasons are: (1) Kohli and Jaworski's (1990) and Hooley et al.'s (1998) concepts are partially integrated in the approach of Day, (2) unlike Kohli and Jaworski's (1990) concept, it deals explicitly with relationship marketing aspects, and (3) there is a growing consensus that a market orientation is a capability (e.g., Day 1994; Grewal and Tansuhaj 2001; Hunt and Morgan 1995).

Figure 4.1 shows the hierarchical structure of our proposed strategic marketing capabilities construct. As can be seen, the construct includes the following six dimensions: (1) customer-driven capabilities, (2) competitor-driven capabilities, (3) supplier-driven capabilities, (4) technology-monitoring capabilities, (5) customer-relating capabilities and (6) supplier-relating capabilities. Furthermore, all subdimensions have two or three indicators. Using Day's (1994) classification, the first four components are a part of market-driven capabilities and customer-relating and supplier-relating capabilities are a part of market-relating capabilities.

Market-Driven Capabilities

Market-Driven Capabilities refer to "how well the organization is equipped to continuously sense changes in its market and to anticipate the responses to marketing actions" (Day, 1994, p. 49). Generally, the marketing literature puts a strong emphasis on customers and competitors (Day, 1994; Kohli and Jaworski, 1990; Narver and Slater, 1990). This stream of research splits market-driven capabilities into: (1) customer-driven capabilities, (2) competitor-driven capabilities. Growing numbers of studies, however, indicate that other stakeholders, such as suppliers, especially in a business-to-business context, are also important (e.g., Day and Montgomery, 1999; Greenley and Foxall, 1998; Langerak, 2001; Matsuno and Mentzer, 2000; Slater and Narver, 1995; Wind and Mahajan, 1997). Following these researchers, we believe that supplier-driven capabilities are part of a market-driven capabilities concept. Day (1994) has introduced and recently Srinivasan, Lilien and Rangaswamy (2002) have operationalized the technology-monitoring capabilities construct. In line with Day (1994), we believe that this marketing capability is essential for market-driven organizations. Also, the importance of this variable is also emphasized in the market

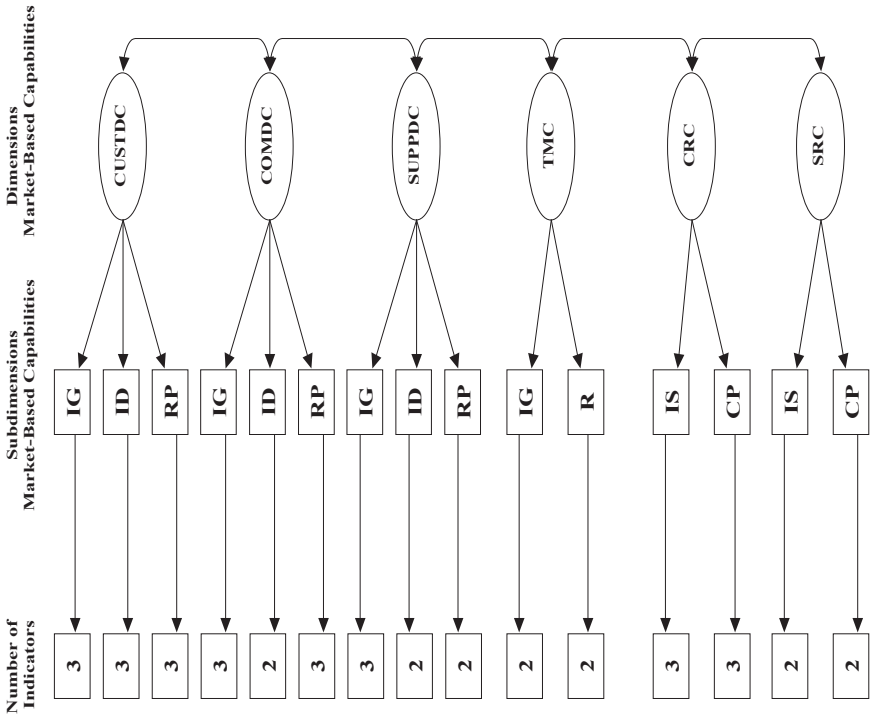


Figure 4.1: Proposed Factor Structure for the Strategic Marketing Construct. CUSTDC is customer-driven capabilities, COMDC is competitor-driven capabilities, SUPPDC is supplier-driven capabilities, TMC is technology-monitoring capabilities, CRC is customer-relating capabilities, SRC is supplier-relating capabilities, IG is intelligence generation, ID is intelligence dissemination, RP is responsiveness, R is research and development, IS information sharing and CP is cooperative collaboration.

orientation literature (e.g., Gatignon and Xuereb, 1997; Jaworski and Kohli, 1993). The benefit of high technology-monitoring capabilities is the ability to uncover unmet needs within existing or new market segments. Further, Srinivasan et al. (2002) have established the distinctiveness of the technology monitoring capability model from related constructs, such as organizational innovativeness, technological orientation and market orientation.

In summary, market-driven capabilities have the following dimensions: (a) customer-driven capabilities, (b) competitor-driven capabilities, (c) supplier-driven capabilities, and (d) technology-monitoring capabilities. The first three dimensions reveal the firm's capabilities to generate intelligence, disseminate this intelligence and implement a response based on the acquired market information (i.e., the subdimensions). The fourth dimension incorporates two subdimensions: (1) intelligence generation, and (2) research and development.

Market-Relating Capabilities

'Getting close to the customer' is a key ingredient in an organization's attempt to provide quality and value for the customer (e.g. Kohli and Jaworski 1990; Narver and Slater 1990). Gruen et al. (2000) argue that a complementary but often overlooked task involves "getting the customer closer to the organization" (p. 39). Getting the customer closer, or market-relating, can be done by distributing relevant information to the customer about the organization's processes, personnel, and so forth (Buvik and John 2000; Day 1994; Gavirneni, Kapuscinski and Tayur 1999; Macneil 1980; Rosenzweig, Roth and Dean 2003) and by collaborative cooperation with the customer (Day, 1994; Håkansson 1982; Rozenzweig et al. 2003). Kelley and Thibaut (1978), for example, suggest that information sharing stimulates exchange and leads to better understanding of the outcomes of mutual behaviors (see also for example, Macneil 1980; Morgan and Hunt 1994; Williamson 1985). Concerning collaborative cooperation, both the political economy model (Stern and Reve 1980) and the Nordic interaction framework (Håkansson 1982) suggest a key role for cooperation in relational exchange. Hence, these two dimensions of market-relating capabilities are generally accepted as relevant relationship marketing dimensions.

Day (1994) proposes a model that incorporates the potential of relationships with suppliers and other channel members. Other researchers also emphasize the relevance of relating to both customers and suppliers or channel members (e.g., Butaney and Wortzel 1988; Day 2000; Day and Montgomery 1999; Langerak 2001; Sigauw, Simpson and Baker 1998). Therefore, we distinguish two dimensions of market-relating capabilities: (1) customer-relating capabilities, and (2) supplier-relating capabilities.

4.2.4 Competing Models

To examine the degree to which our proposed factor structure (six second-order and fifteen first-order factors) is a better representation of the data or covariance matrix than other (possible) models, we compare our model to both several competing models (CM). Our proposition is that the factor structure previously discussed for our strategic marketing capabilities construct outperforms the competing models. We investigate the following theoretically plausible competing models (CM) of strategic marketing capabilities:

CM I: one-factor model. This model suggests that the covariation among indicators can be accounted for by a single factor. Hence, this indicates that all indicators belong to one construct.

CM II: two-factor model. In this model, we propose that the covariation among the items can be accounted for by a two-factor model; the first factor consisting of market-driven capabilities indicators and the second factor representing market-relating capabilities indicators.

CM III: six first-order factors. Though we conceptualize our model as consisting of six second-order factors, with fifteen first-order factors, one can argue that a six first-order factor model, by referring to market orientation studies, may fit the

covariation matrix better. This model investigates this proposition.

CM IV: fifteen first-order factor model. Our proposed model consists of fifteen first-order and several second-order factors. With calculating this competing model, we get a first impression about the appropriateness of the factor structure proposed for the strategic marketing capabilities model. Since our original proposed model incorporates fifteen first-order factors, we anticipate a better fit for this model compared with the previous competing models.

CM V: six first-order factors, one second-order factor. This model suggests that the covariation among indicators can be accounted for by a single second-order factor and six first-order factors.

CM VI: six first-order factors, two second-order factors. In this model, we propose that the covariation among the items can be accounted for by a two second-factor model, the first second-order factor consists the dimensions customer-driven capabilities, competitor-driven capabilities, supplier-driven capabilities and technology-monitoring capabilities. The second second-order factor has two first-order factors, customer-relating capabilities and supplier-relating capabilities.

CM VII: fifteen first-order factors, one second-order factor. This model suggests that the covariation among indicators can be accounted for by a single second-order factor and fifteen first-order factors.

CM VIII: fifteen first-order factors, two second-order factors. This model's factor structure differs from our proposed one in that it has two second-order factors. The first second-order factor, market-driven capabilities, incorporates the dimensions customer-driven capabilities, competitor-driven capabilities, supplier-driven capabilities and technology-monitoring capabilities while the second higher-order factor, market-relating capabilities, consists of the components customer-relating capabilities and supplier-relating capabilities. Since this model is close to our proposed factor structure, we anticipate a better fit for this model compared to the other competing models. When this is true it provides additional support for our proposed factor structure.

4.3 Method

4.3.1 Measurement

This section explains the operationalization of the construct dimensions. Measures of the constructs we examine are available in the literature. All constructs under study are modified to suit the wholesale environment (Coughlan, Anderson, Stern and El-Ansary 2001; Roosenbloom 1999) and are measured on a seven-point Likert scale (see Appendix C).

The Market-Driven Capabilities Components

Several authors have examined Jaworski and Kohli's (1993) scale (Bhuian, 1998; Cadogan, Diamantopoulos and de Mortanges, 1999; Deshpandé and Farley, 1998; Matsuno and Mentzer, 2000; Oczkowski and Farrell, 1998). The results in-

dicate low reliability for the three first-order factor model. As a solution, several studies have integrated and modified Kohli and Jaworski's (1990) and Narver and Slater's (1990) conceptualization to develop a stronger measure (Deshpandé and Farley, 1998; Langerak, 2001; Pelham, 2000). In this study, we follow this perspective. We integrate and modify Kohli and Jaworski's(1990) and Narver and Slater's (1990) conceptualizations and measure market-driven capabilities as the firm's skills to (1) gather and (2) disseminate market information from customers, competitors and suppliers, and (3) implement a response based on this (market) information. In measuring technology monitoring capabilities, we partially use the 'technology-sensing capabilities' scale, validated by Srinivasan et al. (2002). The technology-monitoring capabilities scale has two first-order factors: (1) intelligence generation, and (2) research and development.

The Market-Relating Capabilities Components

For the customer-relating and supplier-relating capabilities scales, measures are gathered from different sources (Doney and Cannon 1997; Lusch and Brown 1996; Rozensweig et al. 2003). These two scales have the following first-order factors: (1) collaborative information sharing, and (2) collaborative cooperation. Indicators for the information sharing scales are derived from Buvik and John's (2000), Doney and Cannon's (1997) and Lusch and Brown's (1996) studies. The items belonging to the second subdimension, collaborative cooperation, are derived from Buvik and John's (2000) and Rosenzweig et al.'s (2003) studies.

4.4 Analytical Methods

Confirmatory factor analysis is used to estimate a model composed of fifteen first-order (the subdimensions) and six second-order, latent factors (the dimensions) (figure 4.1). The appropriate way to analyze this measurement model is to apply hierarchical confirmatory factor analysis. To further examine the strength of this model, we compare it to eight competing models. Several complexities, such as the small sample size and number of parameters to be estimated, led us to utilize a Bayesian approach to confirmatory factor analysis.

4.4.1 Factor Analysis

Standard confirmatory factor analysis

Following LISREL notation, the first-order linear confirmatory factor analysis model can be presented as (Jöreskog and Sörbom 1996)

$$x = \Lambda\xi + \delta \tag{4.1}$$

where x represents a vector of q x *1* observed variables, Λ is a q x n factor loadings matrix that relates n factors to q observed variables, ξ is a vector of n x *1* latent variables, δ is a q x *1* vector of measurement error and measure specificity. It is assumed that the x's are independent, ξ is independently distributed as $\mathcal{N}[0, \Phi]$, δ is independently distributed as $\mathcal{N}[0, \Psi_\delta]$, where Ψ_δ is diagonal and δ and ξ are uncorrelated.

Hierarchical confirmatory factor analysis

In this study, we develop a hierarchical model of strategic marketing capabilities. Previous research demonstrates the strength of this factor structure (see for example, Matsuno, Mentzer and Özsomer 2002). To analyze this hierarchical model, we apply hierarchical confirmatory factor analysis. This hierarchical factor structure accounts for the lower-order factors. The lower-order (first-order) may be expressed as

$$y = \Lambda\eta + \varepsilon \tag{4.2}$$

where y represents the vector of observed variables, Λ is a factor loadings matrix, η refers to a vector of latent variables and ε is a vector of measurement error. The higher order (second-order) structure may be presented as

$$\eta = \Gamma\xi + \zeta \tag{4.3}$$

where Γ is a m x n matrix, where m represents the number of endogenous (ηs) factors and n represents the number of exogenous (ξs) factors, and ζ refers to measurement error. The observed variance-covariance matrix can be presented as

$$\Sigma = \Gamma(\Lambda\Phi\Lambda' + \Psi)\Gamma + \Theta\epsilon \tag{4.4}$$

where, $\Theta\epsilon$ is a diagonal matrix of second-order residual variances, Ψ is a diagonal covariance matrix (with elements ψ). This equation can be reduced to a first-order factor model by forcing Γ to be an identity matrix and Ψ to be a null matrix.

4.4.2 Bayesian Analysis

Since we encountered several problems when implementing the proposed factor structure for our strategic marketing capabilities model utilizing the frequentist approach, such as unstable estimates due to sample size and Heywood cases, we therefore apply a Bayesian perspective for model estimation. The advantage of applying the Bayesian approach in the case of large numbers of parameters relative

to the sample size is frequently reported in the literature (e.g., Efron and Morris, 1971; 1972). Therefore, several researchers prefer the Bayesian approach in (complex) confirmatory factor analysis (Arminger and Mutén 1998; Lee and Song 2004; Scheines, Hoijtink and Boomsma 1999; Stern and Jeon 2004).

Let θ be the parameters and Σ the observed covariance matrix. In Bayesian inference, in contrast to the frequentist approach, the parameters in θ are considered to be random. The Bayesian framework allows the incorporation of prior information by specifying a prior distribution for the model parameters. The posterior density of θ given the sample covariance matrix Σ is defined as (Gelman, Carlin, Stern and Rubin, 2004; Lee, 1981)

$$\pi(\theta|\Sigma) = \frac{\pi(\Sigma|\theta)\pi(\theta)}{\int \pi(\Sigma|\theta)\pi(\theta)\, d\theta} \propto \pi(\Sigma|\theta)\pi(\theta) \tag{4.5}$$

where π denotes a probability density function and $\propto$ stands for 'is proportional to.' In a Bayesian approach, we need to analyze the posterior distribution. Posterior distributions over the parameters of a confirmatory factor analysis can be approximated to arbitrary precision with the Gibbs sampler (Gelfand and Smith 1990; Geman and Geman 1984). First, this method is utilized to generate a sequence of random observations from the joint posterior distribution. Then, the solution is obtained by means of generated observations.

To derive the conditional distributions, we need to specify the prior distributions for the random parameters. In this study we use conjugate prior distributions, which have been found to be flexible and convenient (Lindley and Smith 1972). The conjugate priors for the Λ's and Γ's are given in terms of the normal distribution. The precision matrix follows a Gamma distribution. The prior for the covariance matrix is given in terms of the inverse Wishart distribution. For a detailed discussion of different forms of prior distribution and the iteration scheme of the Gibbs sampler we refer to Lee (1981) and Song and Lee (2001, 2002).

Applying Markov Chain Monte Carlo (MCMC) methods, such as the Gibbs sampler, has many advantages in the present context. Foremost, we do not have to rely on asymptotic inference. Basically, several studies indicate that sample size matters for the behavior of confirmatory factor analysis estimators (Bearden, Sharma and Teel 1982; Boomsma 1985; Chou, Bentler and Satorra 1991; Hoogland and Boomsma 1998) and it is generally concluded that maximum likelihood is not robust for small sample sizes. Therefore, several scientists recommend the use of MCMC methods in the case of small sample size (Arminger and Mutén 1998; Scheines, Hoijtink and Boomsma 1999; Lee and Song 2004). For example, Scheines et al. (1999) argue that standard errors calculated from MCMC output are more reliable for small samples or when there are other sources of non-normality.

A second advantage of the Bayesian approach is that it offers the flexibility to incorporate prior knowledge. For example, we can constrain the parameters to be positive or negative. Also, inequality restrictions can be implemented in the sampling procedure. These restrictions can be set on the parameter estimates, estimated standard errors and interval estimates (Scheines et al. 1999).

4.4.3 Model Choice

Bayesian methods have been efficient in estimating parameters of (complex) factor models. A fundamental task in confirmatory factor analysis is model choice. Several criteria have been proposed in the literature for model comparison in the field of structural equation modeling. One can use posterior predictive p-values (Meng, 1994; Rubin, 1984) to evaluate the likelihood ratio goodness-of-fit statistic. However, this value only indicates the discrepancy between the posited model and the observed data. Therefore, Song and Lee (2002) among others argue that the posterior predictive p-value may not be suitable to compare different models. Raftery (1993) outlines a Bayesian approach to model selection for structural equation models. Both Bayes factors (Kass and Raftery 1995) and Bayesian information criterion (Schwarz, 1978) are also recommended and applied by Lee and colleagues (Lee and Song 2001; Song and Lee 2001, 2002). However, the Bayes factor and its approximations have been seriously criticized as formal model comparison tools (see for example, Gelman and Rubin 1995; Spiegelhalter and Smith 1982; Zhu and Carlin 2000). A major drawback of the Bayes factor is that it is not well defined in the case of improper priors. Gelman and Rubin (1995) even comment that in the models with improper prior distributions, which are generally used in model estimation, the Bayes factor is undefined. Even the case where priors are highly informative it can become a computationally intensive task to calculate Bayes factors when the dimension of the parameter space is large.

In our case, the number of unknown parameters is large and we do not posses complete information about the parameters, which makes the use of the Bayes factor and its approximations very difficult. A recent simple criterion for model selection, which is robust to the type (and change) of prior distributions, is the deviance information criterion (Spiegelhalter, Best, Carlin and van der Linde 2002). Recently, Berg, Meyer and Yu (2004) demonstrate that this criterion has strong discriminating power, even when the dimension of the parameter space is large. Although this criterion seems to have good properties, it can also give a negative value for the effective number of parameters in a model. Another statistic to extract the best model is the socalled Gelfand and Ghosh's (1998) criterion (GGC). In a simulation study, Wang and Ghosh (2004) show that GGC performs well in suggesting the correct model. In short, we follow Kuha's (2004) reasoning that useful information for model selection can be obtained from several criteria and apply both DIC and GGC.

Deviance Information Criterion

Recently, Spiegelhalter et al. (2002) propose a relatively simple and pragmatic method for model assessment and comparison. Following Dempster's (1997) perspective for model choice in the Bayesian framework, these scientists develop a procedure based on the posterior distribution of the log-likelihood. An advantage of this procedure, as outlined by Zhu and Carlin (2000) is that it can be calculated for each model considered without analytical adaptation, complicated loss functions or

any matrix inversion. Using an information theoretical argument, Spiegelhalter et al. (2002) derive a measure P_D for the effective number of parameters in a model as the difference between the posterior mean of the deviance ($\bar{\theta}$) and the deviance at the posterior mean of the parameters of interest

$$P_D = \overline{D(\theta)} - D(\bar{\theta}) \tag{4.6}$$

where $D(\theta)$ indicate a generalization of the Akaike information criterion (AIC) based on the posterior distribution of the deviance statistic

$$D(\theta) = -2Log\left\{p(\Sigma|\theta)\right\} + 2Log\left\{f(\Sigma)\right\} \tag{4.7}$$

where $p(\Sigma|\theta)$ is the likelihood function for the observed covariance matrix Σ given the parameter vector θ, and $f(\Sigma)$ is a standardizing function of the data. Rewriting equation (4.6) results in a classical 'plug-in' measure of fit plus a measure of complexity

$$\overline{D(\theta)} = D(\bar{\theta}) + P_D \tag{4.8}$$

Finally, the deviance information criterion (DIC) may be expressed as[3]

$$DIC = D(\bar{\theta}) + 2P_D \tag{4.9}$$
$$DIC = \bar{D} + P_D \tag{4.10}$$

where the fit of a model is summarized by the posterior expectation

$$\bar{D} = E_{\theta|\Sigma}[D(\theta)] \tag{4.11}$$

and the complexity of a model is captured by the statistic P_D. Smaller values of DIC indicate a better fitting model. See Spiegelhalter et al. (2002) for a more elaborate discussion on the features and implementation of this method.

Gelfand and Ghosh's Criteria

Gelfand and Ghosh (1998) propose a decision-theoretic model selection criterion based on the posterior predictive loss approach. The criterion developed by Gelfand and Ghosh (1998) (GGC) derives its strength from its simplicity. Besides

[3]Note that in the absence of any prior, DIC equals the well-known AIC.

its simplicity, the GGC has some other attractive properties. For example, it can be used to compare different nested and nonnested models. Also, it has an appealing interpretation as the sum of predictive variances and goodness-of-fit terms. Next, we briefly discuss this criterion (for a detailed discussion, see Gelfand and Ghosh 1998; for a simple discussion of the GGC statistic, see Ghosh and Norris (2005)).

Define Σ as the observed covariance matrix and Σ_{pred} as the predicted covariance matrix generated from the following posterior predictive distribution

$$\pi(\Sigma_{pred}|\Sigma) = \int \pi(\Sigma_{pred}|\theta)\pi(\theta|\Sigma)d\theta \tag{4.12}$$

where $\pi(\Sigma_{pred}|\theta))$ denotes the likelihood function evaluated at Σ_{pred}, and $\pi(\theta|\Sigma)$ is the posterior distribution of parameter θ given the observed covariance matrix. The next step is to define a loss function that measures the discrepancy between the observed covariance matrix and the predicted covariance matrix. An often used loss function (see also, Ghosh and Norris 2005) is the mean square predicted error (MSPE), which may be expressed as

$$\frac{1}{n}\sum_{i=1}^{n}(\Sigma_{pred} - \Sigma)^2 \tag{4.13}$$

Using this statistic as the loss function, the GGC is defined as GGC = E(MSPE $|\Sigma$).

4.5 Findings

For the analyses described in this article, the Gibbs sampler is run. All computations are performed using WinBUGS, freely available software for Bayesian inference Using Gibbs Sampling (Spiegelhalter, Thomas, Best and Lunn 2004). For the hierarchical model, we truncate the eta's, the parameters that relate the second-order factors to their corresponding lower-order factors, above zero.

Since we use the Gibbs sampler, careful monitoring of burn-in and convergence is required. The convergence of the Gibbs sampler is monitored by the 'estimated potential scale reduction' (EPSR) value as described by Gelman and Rubin (1992). In general, the model parameters converge in less than 20.000 iterations; the EPSR values are less than 1.2 in all cases. Furthermore, the Monte Carlo sampling errors are fairly low for all parameters. Therefore, the Gibbs sampler is run for 50.000 iterations. The first 20.000 iterations are the burn-in samples. Inferences are based on the last 30.000 iterations.

4.5.1 Measurement Model Analysis

Hierarchical confirmatory factor analysis is used to estimate a model composed of fifteen first-order and six second-order, latent factors. This fully disaggregated

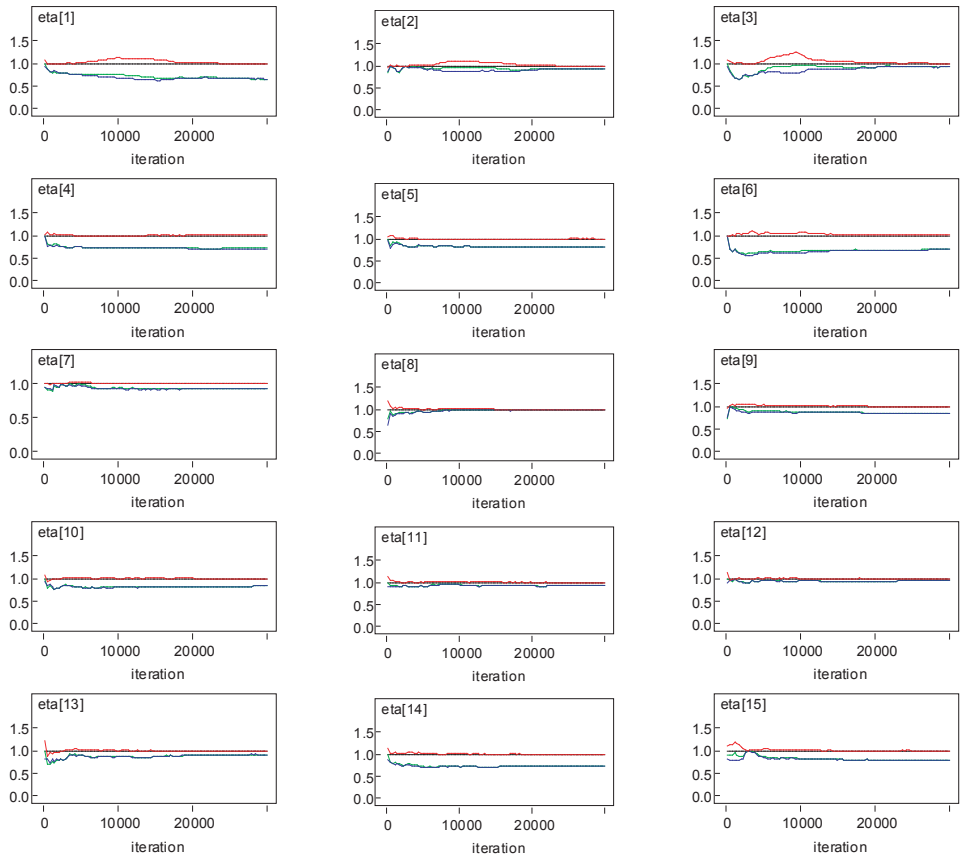
Dimension							
	Subdimension		**mean**	**sd**	**2.5%**	**median**	**97.5%**
CUSTDC	cusdc_ig	eta	0.204	0.102	0.025	0.200	0.413
	cusdc_id	eta	0.283	0.093	0.080	0.286	0.456
	custdc_resp	eta	0.273	0.109	0.044	0.277	0.479
COMDC	comdc_ig	eta	0.309	0.070	0.165	0.310	0.444
	comdc_id	eta	0.422	0.083	0.243	0.425	0.574
	comdc_resp	eta	0.465	0.084	0.298	0.467	0.620
SUPPDC	suppdc_ig	eta	0.368	0.132	0.072	0.383	0.591
	suppdc_id	eta	0.332	0.138	0.045	0.340	0.596
	suppdc_resp	eta	0.230	0.124	0.017	0.223	0.485
TMC	tmc_ig	eta	0.555	0.088	0.380	0.556	0.723
	tmc_rd	eta	0.687	0.093	0.486	0.693	0.854
CRC	crc_is	eta	0.273	0.110	0.043	0.281	0.467
	crc_coop	eta	0.249	0.117	0.033	0.248	0.482
SRC	src_is	eta	0.391	0.118	0.106	0.402	0.594
	src_coop	eta	0.395	0.131	0.098	0.410	0.612
	Items		**mean**	**sd**		**mean**	**sd**
CUSTDC	custdc_ig	lambda	1.000		precision	0.745	0.131
	custdc_ig	lambda	1.066	0.300	precision	0.658	0.123
	custdc_ig	lambda	1.019	0.304	precision	0.686	0.126
	custdc_id	lambda	1.000		precision	0.732	0.108
	custdc_id	lambda	1.221	0.229	precision	0.500	0.104
	custdc_id	lambda	0.777	0.186	precision	0.792	0.108
	custdc_resp	lambda	1.000		precision	0.659	0.110
	custdc_resp	lambda	1.034	0.228	precision	0.601	0.108
	custdc_resp	lambda	0.896	0.203	precision	0.698	0.106
COMDC	comdc_ig	lambda	1.000		precision	0.745	0.100
	comdc_ig	lambda	1.355	0.157	precision	0.253	0.053
	comdc_ig	lambda	1.254	0.148	precision	0.357	0.059
	comdc_id	lambda	1.000		precision	0.296	0.060
	comdc_id	lambda	0.909	0.096	precision	0.381	0.066
	comdc_resp	lambda	1.000		precision	0.391	0.072
	comdc_resp	lambda	0.923	0.114	precision	0.440	0.071
	comdc_resp	lambda	1.051	0.114	precision	0.279	0.060
SUPPDC	suppdc_ig	lambda	1.000		precision	0.353	0.057
	suppdc_ig	lambda	1.116	0.100	precision	0.203	0.050
	suppdc_ig	lambda	1.017	0.099	precision	0.345	0.057
	suppdc_id	lambda	1.000		precision	0.435	0.086
	suppdc_id	lambda	0.961	0.146	precision	0.526	0.093
	suppdc_resp	lambda	1.000		precision	0.499	0.089
	suppdc_resp	lambda	1.023	0.161	precision	0.537	0.097
TMC	tmc_ig	lambda	1.000		precision	0.253	0.052
	tmc_ig	lambda	1.127	0.098	precision	0.060	0.051
	tmc_re	lambda	1.000		precision	0.011	0.021
	tmc_re	lambda	0.853	0.051	precision	0.278	0.039
CRC	crc_is	lambda	1.000		precision	0.588	0.085
	crc_is	lambda	1.236	0.161	precision	0.329	0.072
	crc_is	lambda	1.138	0.157	precision	0.429	0.076
	crc_coop	lambda	1.000		precision	0.450	0.078
	crc_coop	lambda	1.049	0.136	precision	0.394	0.076
	crc_coop	lambda	0.640	0.134	precision	0.772	0.104
SRC	src_is	lambda	1.000		precision	0.404	0.076
	src_is	lambda	1.033	0.131	precision	0.370	0.076
	src_coop	lambda	1.000		precision	0.447	0.072
	src_coop	lambda	1.335	0.145	precision	0.041	0.068

Note: ig is intelligence generation, id is intelligence dissemination, resp is responsiveness, re is research and evelopment, is refers to information sharing, and coop is cooperation.

Table 4.1: Parameter Estimates

measurement model with all observed variables allows us to test the convergent and discriminant validity. Note that one loading for each factor is fixed to unity in order to identify the model and to set a metric or scale for the factors (Marsch and Hocevar 1985).

A fundamental notion in confirmatory factor analysis is the assessment of fit. Scheines et al. (1999) suggest the use of posterior predictive p-values (Gelman, Meng and Stern, 1996; Rubin, 1984) to evaluate the likelihood ratio goodness-of-fit statistic. Model fit is assessed by comparing the observed $T(\Sigma)$ to the distribution of $T(\Sigma^{rep})$, where Σ^{rep} denotes replicated values of Σ. A summary of this comparison is given by the posterior predictive p-value, the probability that $T(\Sigma^{rep}) \geq T(\Sigma)|\Sigma)$. Small p-values indicate implausibility of the data under the model (Berkhof, van Mechelen and Hoijtink 2000). In other words, small p-values suggest a lack of fit of the model to the data. The proposed model adequately represents the data since



eta[1] is custdc_ig, eta[2] is custdc_id, eta[3] is custdc_resp, eta[4] is comdc_ig, eta[5] is comdc_id, eta[6] is comdc_resp, eta[7] is suppdc_ig, eta[8] is suppdc_id, eta[9] is suppdc_resp, eta[10] is tmc_ig, eta[11] is tmc_r, eta[12] is crc_is, eta[13] is crc_cp, eta[14] is src_is, eta[15] is src_cp.

Figure 4.2: The estimated potential scale reduction (EPSR) value

a check criterion, which compares a replicated mean error sum of squares with the observed one, of .07 is obtained. By this standard, the model fits the data.

The results are shown in table 4.1. To avoid clutter, only the posterior mean and standard deviations of the eta's, lambda and precision over the 30.000 samples are given. For the eta's, we also give the 95 percent coverage and the average of the median. In general, the unstandardized coefficients and standard deviations are considered satisfactory; the posterior mean of the parameters in practically all cases are at least twice as great as the posterior standard deviations and therefore considered significant. The most fundamental part of our model are the eta's, the parameters that relate the second-order factors to their corresponding lower-order factors. For the eta's we plot the sample path of the Markov Chain Monte Carlo algorithm in figure 4.2. The plots show that the eta's are already converged before 20.000 iterations. Furthermore, the posterior distributions for these parameters are in general symmetric (the frequency estimates are approximately normal). Noteworthy is that the standard deviations of the customer-relating capabilities dimensions are relatively high. In general, the previously outlined results provide support for

Model	deviance	DIC
Proposed factor structure	**12330**	**13450**
CM I: one-factor model	15240	15450
CM II: two-factor model	14750	15040
CM III: six-factor model	13020	13710
CM IV: fifteen first-order factor model	12460	13480
CM V: CM III plus one second-order factor	13020	13720
CM VI: CM III plus two second-order factor	13010	13720
CM VII:CM IV plus one second-order factor	12440	13470
CM VIII: CM IV plus two second-order factor	12390	13120

Table 4.2: Model Comparison: Deviance Information Criterion

our proposed model. To further investigate the strength of this model we compare it to several other previously discussed competing models.

4.5.2 Model Comparison and Choice

Besides the proposed factor structure for our strategic marketing capabilities construct, eight theoretically plausible competing models are fitted to the 38 selected indicators to determine the model that most appropriately represents the covariance matrix. To determine the best fitting model, we use both the deviance information criterion and Gelfand and Ghosh's criterion.

Concerning the deviance information criterion, the deviance value converged rapidly in less than 1.000 iterations. The results of the proposed model and the competing models are provided in table 4.2. Non of the competing models show better deviance statistics than our proposed model. Concerning the deviance information criterion (DIC), only competing model VIII, the fifteen first-order and two second-order factor model, shows relatively a better fit than our proposed model. The reason for this is the effective number of parameters in model VIII. This number is smaller for model VIII than for the originally proposed factor structure. Furthermore, table 4.2 shows that the simple (nonhierarchical) factor structures have the highest value for DIC.

To further analyze the relative strength of our proposed factor structure, we calculate Gelfand and Ghosh's criterion (GGC). Noteworthy is that this value converged immediately. By comparing the results of each model, as shown in table 4.3, we see that the GGC value, via mean of MSPE, prefers the factor structure origi-

Model	MSPE				
	mean	sd	2.5%	median	97.5%
Proposed factor structure	**1.556**	**0.040**	**1.48**	**1.556**	**1.637**
One-factor model	3.023	0.102	2.835	3.019	3.233
Two-factor model	2.335	0.051	2.237	2.335	2.438
Six-factor model (SFM)	1.718	0.041	1.64	1.718	1.799
SFM + one second-order factor	1.717	0.041	1.638	1.716	1.796
SFM + two second-order factor	1.715	0.040	1.638	1.715	1.796
Fifteen-factor model (FFM)	1.585	0.041	1.507	1.585	1.666
FFM + one second-order factor	1.577	0.040	1.5	1.577	1.658
FFM + two second-order factor	1.573	0.040	1.496	1.572	1.654

Table 4.3: Model Comparison: Gelfand and Ghosh Criteria

nally proposed for our strategic marketing capabilities model. The simple models show relatively high values for MSPE. The MSPE value for both model VII and VIII is close to that of the proposed model, which indicates that complex models of strategic marketing capabilities are formally more appropriate than simple ones.

In summary, both the DIC and MSPE statistics demonstrate that the proposed factor structure for our strategic marketing construct represents the variance-covariance matrix relatively best. The two criteria (deviance and MSPE) demonstrate good convergence properties in our case. In short, these results validate our proposed model.

4.6 Discussion

The marketing concept has its origin in the 1950s and some scholars argue that now is the time to define a more sophisticated concept. Webster (1994) argues that most of the assumptions of the marketing concept are no longer appropriate in today's highly competitive markets. An accepted recent perspective is that relationship marketing is also fundamental in serving customers and generating market-based advantage (e.g., Achrol and Kotler 1999; Day and Montgomery 1999; Webster 1992). A recent attempt to integrate the classical market orientation with the relationship marketing perspective, although implicitly, is Srivastava, Shervani and Fahey's (1998) concept of market-based assets. Srivastava et al. (2001) divide market-based assets in two related types: relational and intellectual. A more classical work is that of Lusch and Luczniak (1987) and Day (1994). These studies, however, do not consider explicitly and justify the integration of both market orientation and relationship marketing. Building on the previous work, we develop a model, called the strategic marketing capabilities construct, integrating both the market orientation and the relationship marketing direction. On the basis of prior research, we develop a hierarchical classification of strategic marketing capabilities. To estimate this model appropriately we utilize a Bayesian framework. Furthermore,

we investigate two model comparison procedures in our case, the deviance information criterion and Gelfand and Ghosh criteria. The findings support the emerging perspective integrating both the market orientation and relationship marketing literature. The results described in the previous section highlight some of the unique insights that emerge from this integrative research approach.

4.6.1 Strategic Marketing Capabilities

Our findings are in line with our proposition. In this study, the DIC statistic supports our proposed factor structure for the strategic marketing capabilities model. However, one of the competing models indicates a better fit to the covariance matrix than our proposed model. Despite this, we choose our proposed model as the most appropriate model. First, the Gelfand and Ghosh's criterion shows the best fit for the proposed factor structure; actually, GGC is a more formal approach to model choice than Spielhalter et al.'s (2002) procedure. Second, taking a pragmatic perspective, following Gelman and Rubin (1995, p. 171), who state that "we believe selection to be relatively unimportant compared to the task of constructing realistic models that agree with both theory and data. In summary, we would prefer to fit a complicated model, using Bayesian methods–but not BIC–and then summarize it appropriately to answer the substantive questions of interest." we believe that our model is more meaningful. In other words, our second justification for choosing the proposed model is based on the GGC statistic and the meaningfulness of the results.

Since our primary goal is to develop an integrated model incorporating both market orientation and relationship relating components and to investigate whether the proposed factor structure (and hence the proposed model) adequately fits the data, we do not conduct a purification stage by eliminating the least aligned indicators. Further refinements of the strategic marketing capabilities construct are essential to make the model agree better with the observed data. By saying this, we encourage researchers to further refine the dimensions of the strategic marketing capabilities construct. Several points of improvement may be identified. For example, the standard deviations of the customer-relating capabilities dimensions are relatively high. This suggests that the customer-relating capabilities factor does not fit (into) the model as others do. Other dimensions that need some additional care are the customer-driven capabilities dimensions.

The strategic marketing capabilities construct developed in this study represents a significant step forward in the evolution of the marketing concept. It provides an instrument for assessing the degree to which a firm is capable in sensing and relating to the market. Our results may have implications for the business-to-business industry. Perhaps the main implication of this study is that it identifies the importance of both the development of a market-sensing and market-relating strategy, especially for wholesalers. This suggests that management or marketing employees have to consider these two perspectives when developing a marketing strategy.

4.6.2 Bayesian Confirmatory Factor Analysis

A major disadvantage of classical methods used in estimating confirmatory factor analytical models, such as maximum likelihood, generalized least squares and weighted least squares, is their use of the asymptotic theory. Therefore, proper statistical inferences are only made when the sample size is (very) large. In the case of a rather small sample size, as in our case, it is frequently reported that the behavior of maximum likelihood, generalized least squares and weighted least squares is not robust for obtaining proper parameter estimates. A strong alternative, especially in the case of small sample sizes, is the Bayesian framework (see for example the findings of Lee and Song 2004). The advantage of the Bayesian framework in model estimation and testing is generally known (see for a detailed discussion, Rossi and Allenby 2003). In the Bayesian approach Markov Chain Monte Carlo samples are taken from the true posterior regardless of the sample size (Scheines et al. 1999). As a consequence, the standard errors calculated from Markov Chain Monte Carlo samples are more reliable. In this study, we could easily calculate even the rather complex six second-order and fifteen first-order factor model. The parameters, in general, show good convergence properties. Utilizing the classical methods in estimating and testing confirmatory factor analysis, we would not have been able to estimate the proposed and the competing models. The case of more parameters than sample size occurs and these (classical) methods then collapse. Based on this, we recommend researchers to utilize the Bayesian approach in estimating and testing a confirmatory factor analytical method, especially in the case of small sample sizes and complex factor structures. However, we acknowledge that the classical methods, because of the available software, are more simple to use than their Bayesian counterpart. Therefore, we encourage the development of user-friendly Bayesian analysis software for applied researchers to estimate (complex) factor analytical models.

4.6.3 Model Choice

In confirmatory factor analysis, model selection is a fundamental activity. In this study we use two criteria: (1) deviance information criterion (DIC), and (2) Gelfand and Ghosh Criterion (GGC). To the author's knowledge, these criterions have not been (fully) examined in the case of confirmatory factor analysis. Results from this study indicate that these procedures can be usefully applied to empirical studies.

In general, the DIC procedure shows good properties in our case. It points out that the less likely models have the highest score. To empirically derive conclusions based on this criterion, it is fundamental to investigate whether the signs of the DIC values are positive (in all cases). A major problem of this statistic is the negative value generated for the number of effective parameters. We have explicitly monitored this problem, especially in the case of hierarchical factor structures. As our analysis indicate, this problem did not occur. Furthermore, the deviance value converged rapidly in less than 1.000 iterations. Based on the previous, we believe that the DIC procedure is suitable in both hierarchical and nonhierarchical confirmatory

factor analysis. In saying this, we acknowledge that further research is needed to determine whether DIC offers a strong framework for comparison and evaluation in the case of (non)hierarchical confirmatory factor analysis.

In this study, Gelfand and Ghosh criterion (GGC) is applied to compare different models. GGC appears to have good properties; the MSPE shows quick and strong convergence in all cases. Despite this, we believe that further research examining more carefully the performance of GGC suggesting the correct factor analytical model is needed. Also, these studies may apply and compare other loss functions besides squared error loss.

4.7 Limitations

The findings in this study are encouraging in suggesting the (potential) value of an integrated model of marketing. However, there are some limitations to our work. A limitation is the national character of our sample. This study needs to be extended to an international context. By doing so one needs to consider international aspects of measurement equivalence.

Also a limitation is the investigation of only one single industry, wholesaling. This study uses a sample of Dutch wholesalers and the findings cannot be completely generalized to other settings and countries. Although we believe that our construct is especially suitable in a business-to-business environment, research examining other settings could further enhance our knowledge about the composition of strategic marketing capabilities. We speculate that our model is rather generic for the services setting. However, from a manufacturer perspective other strategic marketing capabilities could also be identified (see for example, Miller and Roth 1994). Hence, further research should be conducted to develop measures of strategic marketing capabilities suitable for a whole range of industries. Hence, further research is needed examining the strategic marketing capabilities construct in other settings.

4.8 Future Research Directions

Further research is needed, in part because of the limitations of our study. In terms of possible future research directions, several fruitful areas can be offered. Further research aimed at better understanding possible antecedents of strategic marketing capabilities may be a very promising avenue of research. An interesting avenue of research would be the investigation of organizational factors (i.e., formalization and centralization), human resources factors (i.e., recruitment, behavioral-based evaluation and reward, empowerment and training) and firm strategy (Frambach, Prabhu, Verhallen, 2003) as antecedents of strategic marketing capabilities. Furthermore, culture may play a role as an independent variable. We speculate that firms with cultures that are relatively responsive (market culture) and flexible (adhocracy culture) have stronger strategic marketing capabilities than consensual (clan culture) and bureaucratic (hierarchical) cultures.

Further research is needed investigating the effect of strategic marketing capabilities on firm performance. Do these capabilities affect business financial performance? Is this a linear effect? Is this relationship mediated by other variables, such as customer satisfaction and innovativeness? Is this relationship moderated by other variables?

Another possible fruitful direction is to investigate the moderating effect of strategy type on the (our proposed) strategic marketing capabilities-business performance relationship (see for studies relating the effects of strategy type on the market orientation-performance relationship, Matsuno and Mentzer 2000; McKee, Varadarajan and Pride 1989).

The study of possible mediators of the strategic marketing capabilities-customer satisfaction link is yet another avenue for interesting research. For example, is the strategic marketing capabilities-customer satisfaction relationship mediated by other variables? Han, Kim and Srivastava's (1998) findings indicate that the customer orientation-performance link is mediated by innovativeness. Therefore, we speculate that the relationship between strategic marketing capabilities and customer satisfaction could be mediated by innovativeness. However, is this relationship partially mediated or fully mediated by innovativeness? Further research is needed to clarify these issues.

4.9 Conclusions

The goal of this study is to provide a first step in developing an integrated model of marketing. Our results suggest that the proposed model has good psychometric properties. This leads us to conclude that an integrated model of marketing enhances our understanding of marketing. Taking the importance of an integrated model of marketing, we suggest that future research including this view and further developing and refining this model is necessary. We hope that we have contributed to this perspective.

Chapter 5

The Effect of Strategic Marketing Capabilities on Firm Performance: A Bayesian Linear and Nonlinear Latent Variable Analysis

Abstract In the previous chapter, an integrated model of marketing, linking the relationship marketing perspective to the market orientation direction, is proposed. In this chapter, we develop a conceptual framework to assess the value of a firm's strategic marketing capabilities. The framework proposes that strategic marketing capabilities contribute to the financial performance of the firm. Besides a linear effect, we also investigate a nonlinear relationship using latent variable modeling. In doing so, we utilize a Bayesian approach to estimate the proposed linear and nonlinear latent variable models. Results support the notion that firms possessing strategic marketing capabilities are more likely to generate higher firm performance. The findings also demonstrate the contingent nature of the influence of strategic marketing capabilities on firm performance. Surprisingly, results show that two combinations of strategic marketing capabilities have negative effects on the financial performance of the firm. The findings of this study contribute to theory in marketing strategy and have important implications for firms.

5.1 Introduction

Although the assertion that marketing capabilities influence a firm's financial performance is often recognized, researchers tend to adopt one of two approaches to examining competitive advantage: a focus on the market (market orientation) or a focus on relationships (relationship marketing). Although these influences on performance have been examined in isolation, they have not explicitly been investigated in an integrated framework.

In the previous chapter we develop an integrated model, denoted the strategic marketing capabilities construct, incorporating both market-driven and market-relating components. The rationale to integrate these two perspectives is given by several strategic marketing scholars (e.g., Day, 1994; Day and Wensley, 1988; Peteraf and Bergen, 2003; Srivastava, Shervani and Fahey 1998, 1999). Applying factor analytical methods, support is found for this model. The development of this model enables us to examine the following question, which is evident for business practitioners seeking to develop and leverage marketing capabilities: what is the actual effect of strategic marketing capabilities on firm performance? Furthermore,

the identification of which combination of strategic marketing capabilities should be leveraged remains largely unexplored in the marketing literature.

Since the strategic marketing capabilities construct represents a hierarchical factor model, structural equation modeling is the preferred approach to assess the contribution of strategic marketing capabilities to the financial performance of the firm. Building on prior research, we propose two models: (1) a main effects model, and (2) an interaction effects model. Estimating a main effects model using latent variable modeling is *straightforward*. Concerning models with interaction terms of latent variables several approaches have been proposed in the literature. In general, the product indicator method (Kenny and Judd, 1984) is used to analyze models with interaction terms of latent variables. However, psychometric research indicates several methodological problems when implementing interactions in latent variable models using traditional methods (Jöreskog and Yang, 1996). Recently, Lee et al. (2004) demonstrate that the Bayesian approach is in general better than the product indicator approach in determining interaction effects. Since recent statistical literature suggests the superiority of the Bayesian latent variable modeling in deriving the correct estimates (see for example, Arminger and Muthen, 1998; Lee et al., 2004), we use Arminger and Muthen's (1998) approach in estimating the linear and nonlinear latent variable model. Furthermore, we discuss and apply Gelfand and Ghosh's (1998) decision-theoretic model selection criterion, which is based on the posterior predictive loss approach.

With this study we aim to make the following contributions. First, we investigate the relationship between strategic marketing capabilities and firm performance. Furthermore, we use a Bayesian approach to the proposed latent variable models to obtain correct estimates. Also, we describe and apply the Gelfand and Ghosh criterion, to compare the two models (main effects and interaction effects model) under investigation.

This chapter is organized as follows. In the next section, we discuss our conceptual framework and hypotheses. After that, methodological issues are described in detail. Finally, we test our framework in the electrotechnical wholesale sector in the Netherlands using both linear and nonlinear latent variable models and discuss the outcomes.

5.2 Conceptual Framework and Hypothesis

In the previous chapter we integrate the 'relational view of competitive advantage' to a 'market-driven view of competitive advantage' (see for the latter, Dyer and Singh (1998)) and propose and validate the strategic marketing capabilities construct. In this chapter we develop a conceptual framework to assess the contribution of strategic marketing capabilities to a firm's financial performance. In accordance with the marketing concept (Drucker, 1954; Narver and Slater, 1990)), the conceptual framework links the strategic marketing capabilities directly to firm performance. Furthermore, in line with Day's (1994) thesis, we estimate a model suggesting interaction between the market-driven and market-relating capabilities

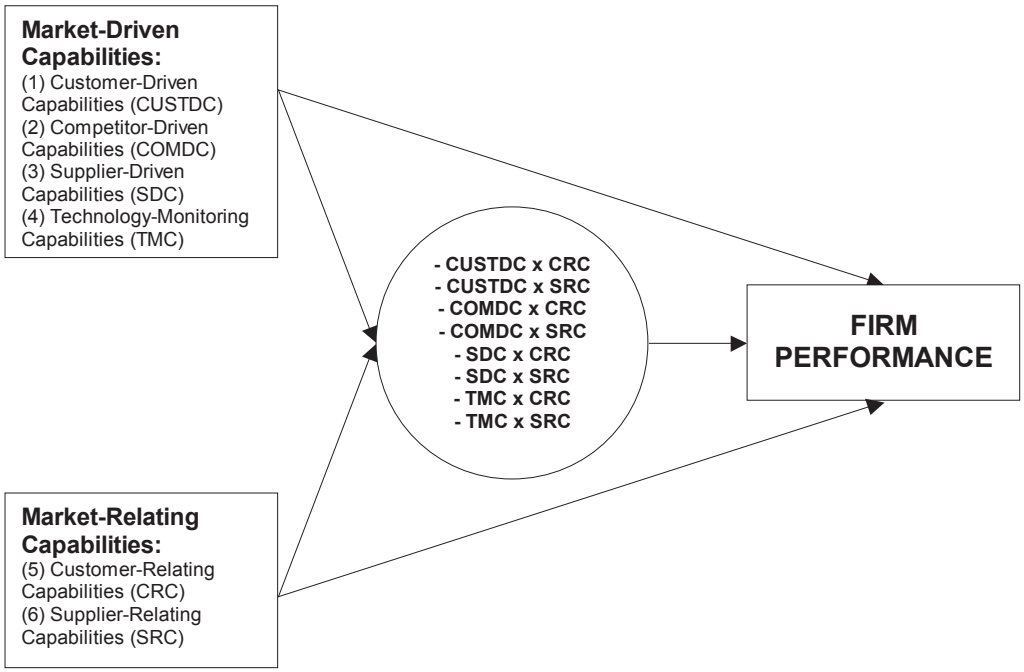


Figure 5.1: Conceptual Framework

in determining firm performance. Figure 5.1 depicts the proposed framework. First, we begin by reviewing the literature suggesting a main effect of strategic marketing capabilities on business performance. Thereafter, we deal with some literature proposing a synergistic effect of various strategic marketing capabilities on firm performance.

5.2.1 Strategic Marketing Capabilities and Financial Performance: The Case of a Linear Relationship

Early work in the field of the marketing concept largely suggests a 'profit orientation' as part of the marketing concept (McNamara, 1972). Recently, profitability is seen as a consequence of market-oriented behavior, rather than a component of this concept (Kohli and Jaworski, 1990). Felton (1959) states that the basic purpose of the marketing concept is to produce "maximum long-range corporate profits" (p. 55).

Superior firm performance as a consequence of market orientation, is widely supported in the literature (e.g., Cano, Carrillat and Jaramillo, 2004; Narver and Slater, 1990; Pelham and Wilson, 1996; Reukert, 1992; Deshpande and Farley, 1998; Deshpande et al., 1993). For example, Slater and Narver (1994) find significant influences of market orientation on new product success, sales growth and return on investment. Furthermore, two recent meta analyses (Cano et al., 2004; Kirca, Jayachandran and Bearden, 2005) demonstrate that market-based behavior has a

positive impact on firm performance.

Increasingly, suppliers derive value from being part of one or more organizational networks. As firms increasingly become the node in an interconnected web of formal and informal relationships, their capacity to generate, integrate and leverage knowledge extends considerably beyond the resources they own and control. Findings about the financial benefits of relational ties, both with suppliers and customers, are impressive (Heide and John, 1992; Johnson and Selnes, 2004; Gulati, 1998; Kalwani and Narayandas, 1995; Lee, So Tang 2000; Selnes and Sallis, 2003). For example, Gavirneni, Kapuscinski and Tayur (1999) study the influence of partial and complete information sharing in a supplier-retailer setting, and also compare these to a base case of no information. Their experimental results show that the optimal policy in a model with additional information performs better than the optimal policy in a model with restricted information.

In summary, our first hypothesis specifies the relationships between the six building blocks of strategic marketing capabilities and firm performance. This model is in line with Noble et al.'s (2002) perspective that it is myopic to assume that only one strategic resource or orientation is the only legitimate guiding model for firm success. Therefore,

hypothesis 1 the higher the firm's (a) customer-driven capabilities, (b) competitor-driven capabilities, (c) supplier-driven capabilities, (d) technology-monitoring capabilities, (e) customer-relating capabilities, and (f) supplier-relating capabilities, the higher the financial performance of the firm.

5.2.2 Strategic Marketing Capabilities and Firm Performance: The Case of a Nonlinear Relationship

Although a direct main effect between various components of strategic marketing capabilities and firm performance is frequently suggested and examined, research investigating a nonlinear effect (in the parameters) is relatively scarce. Thus relatively little is known about the existence and sign of an interaction effect between the dimensions of strategic marketing capabilities and firm performance. A fundamental question is whether the impact of market-driven capabilities on firm performance is enhanced by market-relating capabilities. Investigating the interaction between market-driven and market-relating components is important. First, some recent literature in strategic marketing explicitly defend a contingency approach in investigating marketing models (Day and Van den Bulte, 2002; Rindfleisch and Moorman, 2003; Slotegraaf, Moorman and Inman 2003). Second, examining possible moderators for market-based behavior is frequently recommended (Baker and Sinkula, 1999). An additional reason to investigate an interaction effects model relates to the mixed results of empirical studies relating market orientation (as a set of values) to firm performance (e.g. Moorman and Rust, 1999; Noble, Sinha and Kumar, 2002).

In summary, we model the interactions among several dimensions of strategic marketing capabilities and relate them to firm performance. In modeling the inter-

actions, we only consider two-way interactions. Although higher-order interactions may have a significant effect on the dependent variables, we do not explore these effects because of our rather small sample size and the complexity of a higher-order model. So, we hypothesize that

hypothesis 2 the firm's performance is positively affected by the interaction between (a) customer-driven capabilities (CUSTDC) and customer-relating capabilities (CRC), (b) CUSTDC and supplier-relating capabilities (SRC), (c) competitor-driven capabilities (COMDC) and CRC, (d) COMDC and SRC, (e) supplier-driven capabilities (SDC) and CRC, (f) SDC and SCR, (g) technology-monitoring capabilities (TMC) and CRC and TMC and SRC.

5.3 Method

5.3.1 Samples and Measurement

The sampling frame is a list of 843 technical wholesalers in the Netherlands. As described in chapter 2, we sent questionnaires to these wholesalers, including a cover letter, explaining the study goal and a stamped return envelope to the owner or manager of each firm. Of these 843 surveys, 137 are returned.

Details on the strategic marketing capabilities construct are given in chapter 4. Briefly, the measures for the first three factors in this model, customer-driven, competitor-driven and supplier-driven capabilities are derived from studies in market orientation (Kohli and Jaworski, 1990; Langerak, 2001; Narver and Slater, 1990). Items for the technology-monitoring capabilities scale are derived from Srinivasan et al.'s (2002) study. Concerning customer-relating and supplier-relating capabilities, we use several sources to infer our items (Buvik and John, 2000; Doney and Cannon, 1997; Lusch and Brown, 1996). In this study, we further purify the construct introduced in the previous chapter (see Appendix D)

We measure wholesale firm performance on five aspects of efficiency and productivity: sales growth, profit growth, overall profitability, labor productivity and cash flow. These are all measured on a seven-point Likert scale, where 1 = "strongly disagree" and 7 = "strongly agree."

5.3.2 Structural Equation Modeling

The structural equation modeling approach involves two conceptually distinct models. First, a measurement model that relates measured variables to unmeasured variables, often denoted as latent factors, is specified. Second, a latent variable model that relates latent factors to each other is specified and estimated.

Confirmatory Factor Analysis

Since the latent variables are exogenous or endogenous to the model, the literature often makes a distinction between: (1) a measurement model for the exogenous

variables, and (2) measurement model for the endogenous variables. The exogenous variables model may be expressed as

$$x = \Lambda_x \xi + \delta \tag{5.1}$$

where x represents a vector of q x *1* observed variables; Λ is a q x n factor loadings matrix, that relates n factors to q observed variables; ξ is a vector of n x *1* latent variables; δ is a q x *1* vector of measurement error in x. The measurement model for the endogenous variables may be presented as

$$y = \Lambda_y \eta + \varepsilon \tag{5.2}$$

where y represents a vector of q x *1* observed variables; Λ is a q x n factor loadings matrix, that relates n factors to q observed variables; η is a vector of n x *1* latent variables; ε is a q x *1* vector of measurement error in y.

The Linear Latent Variable Model

A structural model for latent variables is focused on studying the relationship among latent variables, η and ξ and may be expressed as

$$\eta = \mathbf{B}\eta + \Gamma\xi + \zeta \tag{5.3}$$

where the $\mathbf{B}$ matrix indicates the relationship between latent variables in η, the matrix Γ describes the influence of ξ on η and the ζ vector is the unexplained part of η. Several assumptions underly this model.[1] In the next equations, it will be shown that equation 5.3 can be rewritten to a linear regression model. Having the structural model

$$\eta - \mathbf{B}\eta = \Gamma\xi + \zeta \tag{5.4}$$

and assuming that the inverse of matrix $(\mathbf{I} - \mathbf{B})$ exists, we obtain a linear model

$$\begin{aligned}(\mathbf{I} - \mathbf{B})\eta(\mathbf{I} - \mathbf{B})^{-1} &= (\mathbf{I} - \mathbf{B})^{-1}\Gamma\xi + (\mathbf{I} - \mathbf{B})^{-1}\zeta \\ \eta &= (\mathbf{I} - \mathbf{B})^{-1}\Gamma\xi + (\mathbf{I} - \mathbf{B})^{-1}\zeta = \Pi\xi + \zeta^*\end{aligned} \tag{5.5}$$

[1] We refer to Bollen (1989) for further details about these statistical assumptions.

where $\Pi = (\mathbf{I} - \mathbf{B})^{-1}\Gamma$ and $\zeta^* = (\mathbf{I} - \mathbf{B})^{-1}\zeta$. This reduced structural model may be seen as a multivariate regression equation[2] of latent variables η on ξ, where Π represents the coefficient. Taking the factor models into account, the variance-covariance matrix, defined as Σ, becomes

$$\Sigma = Y(\theta) \tag{5.6}$$

where θ are the parameters to be estimated; usually the parameters Ω, Φ, Ψ, Λ_x, Θ_δ, Λ_y and Θ_ε.

The Nonlinear Latent Variable Model

We introduce a nonlinear version of the SEM model. In doing so, we largely follow Arminger and Muthén's (1998) approach. Let ξ be a vector of random variables that is multivariate normal with $\xi \sim N(0,\Phi)$. Let $\beta = f(\xi)$ a deterministic function of ξ, which is known. A linear regression model connects η with β

$$\eta = \Omega\beta + \zeta \tag{5.7}$$

where $\zeta \sim \mathcal{N}(0, \Psi)$ is a disturbance term, Ω is a matrix of regression coefficients of η on β. Note that this model is linear in the parameters, but nonlinear in the components of ξ. The variables ξ and η are connected to observed variables x and y with the measurement models

$$x = \Lambda_x\xi + \delta, \quad \delta \sim \mathcal{N}(0, \Theta_\delta) \tag{5.8}$$
$$y = \Lambda_y\eta + \varepsilon, \quad \varepsilon \sim \mathcal{N}(0, \Theta_\varepsilon) \tag{5.9}$$

A special case of this model is a model that allows for interactions of latent variables ξ with a univariate dependent variable

$$\beta_i = (\xi_{i1}, ..., \xi_{im}, \xi_{i1}\xi_{i2}, ..., \xi_{i,m-1}\xi_{im}) \tag{5.10}$$
$$\eta_i = \Omega\beta_i + \zeta_i, \quad \zeta \sim \mathcal{N}(0, \psi) \tag{5.11}$$
$$y_i = \eta_i \tag{5.12}$$

[2]Note that there is no intercept.

5.3.3 Bayesian Analysis

The usual way to estimate the parameters $\theta = \{\Omega, \Phi, \Psi, \Lambda_x, \Theta_\delta, \Lambda_y, \Theta_\varepsilon\}$ has been the classical frequentist approach. A popular method to compute an approximation of the posterior distribution over the parameters of SEM is maximum likelihood (ML). Under very mild conditions, this estimation methods give unbiased estimates. However, in several cases, such as small sample size and nonlinearity, this estimation method is often not optimal. Furthermore, in general, the product indicator method (Kenny and Judd, 1984) is used to analyze models with interaction terms of latent variables. However, psychometric research indicates several methodological problems when implementing interactions in latent variable models using traditional methods (Jöreskog and Yang, 1996).

Since methodological complexities arise when implementing a nonlinear latent variable model utilizing the frequentist approach (in combination with the product indicator method), Arminger and Muthén (1998) propose to use a Bayesian approach for model estimation. Recently, in a comparative study, Lee, Song and Poon (2004) show that the Bayesian approach is in general better that the product indicator approach. Applying Markov Chain Monte Carlo (MCMC) methods, such as the Gibbs sampler, have many advantages in the present context. Foremost, we do not have to rely on asymptotic inference. Basically, several studies indicate that sample size matters for the behavior of structural equation modeling estimators (Bearden, Sharma and Teel, 1982; Boomsma, 1985; Chou, Bentler and Satorra, 1991; Hoogland and Boomsma, 1998) and it is generally concluded that maximum likelihood is not robust for small sample sizes.[3] Therefore, several scientists recommend the use of MCMC methods in the case of small sample size (Arminger and Muthén, 1998; Scheines, Hoijtink and Boomsma, 1999; Lee, 1981). For example, Scheines et al. (1999) demonstrate that standard errors calculated from MCMC output are more reliable for small samples or when there are other sources of non-normality. A second advantage of a Bayesian analysis is that it offers the flexibility to incorporate prior managerial knowledge. For example, we can constrain the parameters to be positive or negative. Also, inequality restrictions can be implemented in the sampling procedure. These restrictions can be set on the parameter estimates, estimated standard errors and interval estimates (Scheines et al., 1999).

In Bayesian inference, in contrast to the frequentist inference, the parameters in θ are considered to be random. The Bayesian approach combines prior information about model parameters with information contained in the data to arrive at the posterior distribution. The posterior density of θ given the covariance matrix Σ is defined as (Scheines et al., 1999)

$$p(\theta|\Sigma) = \frac{p(\Sigma|\theta)p(\theta)}{\int p(\Sigma|\theta)p(\theta)\,d\theta} \tag{5.13}$$

[3]Note that the assumptions of multivariate normality and a correctly specified model is made. Frequently, the assumption of normality is not satisfied leading to (possibly) improper solutions.

where the denominator represents the marginal likelihood (a normalizing constant). The calculation of the marginal likelihood is however very challenging. Therefore, MCMC methods are generally used to generate draws from the joint posterior distribution

$$p(\theta|\Sigma) \propto p(\Sigma|\theta)p(\theta) \tag{5.14}$$

Gibbs Sampling

In a Bayesian approach, we need to analyze the posterior distribution. Posterior distributions can be approximated to arbitrary precision with the Gibbs sampler (Gelfand and Smith, 1990; Geman and Geman, 1984). First, this method is utilized to generate a sequence of random observations from the joint posterior distribution. Then, the solution is obtained by means of generated observations. The posterior distribution for the linear models is trivial and can be approximated with the Gibbs sampler. However, the posterior distribution for a nonlinear latent variable model is quite complex. Arminger and Muthén (1999) have shown that utilizing the Gibbs sampler in this case is rather complicated since no closed mathematical form of the distribution of the latent variables exists. A plausible solution is to use the Metropolis-Hastings algorithm (Hastings 1970; Metropolis et al. 1953)).

Prior Distributions

To derive the conditional distributions, we need to specify the prior distributions for the random parameters. As noted before, the random variable η, ξ, ε and ζ are multivariate normal with $\eta \sim N(0,\, \phi)$, $\xi \sim N(0, \Psi)$, $\varepsilon \sim N(0, \Theta_\varepsilon)$ and $\zeta \sim N(0, \Theta_\zeta)$. In this study we use conjugate prior distributions, which have been found to be flexible and convenient (Lindley and Smith, 1972). The conjugate prior for the covariance matrix Ψ is given in terms of the inverse Wishart distribution

$$\Psi \sim \mathcal{W}^{-1}(d_\Phi \Omega_\Phi, d_\Phi) \tag{5.15}$$

where $d\Omega$ is a precision matrix and d refers to degrees of freedom; for a detailed discussion of the Wishart distribution, see Anderson (1984). The conjugate covariance matrix Φ is given by

$$\Phi \sim \mathcal{W}^{-1}(d_\Phi \Omega_\Phi, d_\Phi) \tag{5.16}$$

The conjugate priors for the variances of the error term, Θ_ε and Θ_δ, follow inverse Gamma distributions

$$\Theta_\varepsilon \sim \mathcal{IG}(a_\varepsilon, b_\varepsilon) \tag{5.17}$$
$$\Theta_\delta \sim \mathcal{IG}(a_\delta, b_\delta) \tag{5.18}$$

5.3.4 Model Choice

Model choice is a fundamental activity in structural equation modeling. In order to assess the model performance, several types of model selection criteria have been proposed, such as the Bayes factor (Kass and Raftery 1995), Bayesian information criterion (Schwarz 1978), Gelfand and Ghosh criterion (Gelfand and Ghosh 1998) and the deviance information criterion (Spiegelhalter, Best, Carlin and van der Linde 2002). In a structural equation modeling context, only the Bayes factor has been explicitly investigated and recommended as the appropriate model choice procedure (Raftery 1993); the Bayes factor and Bayesian information criterion is also recommended and applied by Lee and colleagues (Lee and Song, 2001; Song and Lee, 2001; Song and Lee, 2002). However, the Bayes factor and the Bayesian information criterion have been seriously criticized as formal model comparison tools (see for example, Gelman and Rubin 1995; Spiegelhalter and Smith 1982; Zhu and Carlin 2000). On the other hand, both the deviance information criterion (DIC) and Gelfand and Ghosh's criterion (GGC) are very simple and research indicates good properties for these procedures. For example, Berg, Meyer and Yu (2004) demonstrate that DIC has strong discriminating power, even when the dimension of the parameter space is large. Concerning GGC, Wang and Ghosh (2004) show that this procedure performs well in suggesting the correct model. Since the DIC procedure is generally known, we refer to Spiegelhalter et al. (2002) for a detailed discussion on the features and implementation of this method. Concerning the GGC procedure we refer to chapter 4.

5.3.5 The Models

The model specification for the linear latent model can be expressed using the following equation (the regression constant is set to 0)

$$\eta = \alpha_1\xi_1 + \alpha_2\xi_2 + \alpha_3\xi_3 + \alpha_4\xi_4 + \alpha_5\xi_5 + \alpha_6\xi_6 + \zeta \tag{5.19}$$

where η refers to an endogenous construct, which is firm performance in this case. $\xi_1, \xi_2, \xi_3, \xi_4, \xi_5$ and ξ_6 are vectors of exogenous constructs and represent customer-driven, competitor-driven, supplier-driven, technology-monitoring, customer-relating and supplier-relating capabilities, respectively. The following proper priors are used for the structural model: $\alpha = (\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6)^T \sim \mathcal{N}(\bar{\alpha}, \Omega_\alpha)$ with $\bar{\alpha} = (1, 1, 1, 1, 1, 1)$ and $\Omega_\alpha^{-1} = \text{diag}\ (.01, .01, .01, .01, .01, .01)$; $\Phi \sim \mathcal{W}^{-1}(d_\Phi\Omega_\Phi, d_\Phi)$ where $\Omega_\Phi = \text{diag}\ (.01, .01, .01, .01, .01, .01)$ and $d_\Phi = 6$. For the measurement model, we have the following priors, $\lambda_{x,j} \sim \mathcal{N}(\bar{\lambda}_{x,j}, \Omega_{\lambda,x,j})$ with $\bar{\lambda}_{x,j} = 1.0$, and $\Omega_{\lambda,x,j}^{-1} = .01$, where j represents the nonfixed parameters; $\Theta_{\delta,jj} \sim \mathcal{IG}(a_{\delta,jj}, b_{\delta,jj})$ with $a_{\delta,jj}$ -1/2 and $b_{\delta,jj}^{-1}$ for $j = 1, ..., 38$.

The nonlinear latent variable model can be written as

$$\begin{aligned}\eta = \beta_0 + \beta_1\xi_1 + \beta_2\xi_2 + \beta_3\xi_3 + \beta_4\xi_4 + \beta_5\xi_5 + \beta_6\xi_6 \\ + \beta_7(\xi_1\xi_5) + \beta_8(\xi_1\xi_6) + \beta_9(\xi_2\xi_5) + \beta_{10}(\xi_2\xi_6) \\ + \beta_{11}(\xi_3\xi_5) + \beta_{12}(\xi_3\xi_6) + \beta_{13}(\xi_4\xi_5) + \beta_{14}(\xi_4\xi_6) + \zeta \end{aligned} \tag{5.20}$$

The priors for this model are the same as for the linear latent variable model.

5.4 Results

For the analyses described in this article, the Gibbs sampler is run. All computations are performed using WinBUGS, a freely available software for Bayesian inference Using Gibbs Sampling (Spiegelhalter, Thomas, Best and Lunn 2004). The convergence of the Gibbs sampler is monitored by the 'estimated potential scale reduction' (EPSR) value as described by Gelman and Rubin (1992).

5.4.1 Confirmatory Factor Analysis

Before estimating the propositions, we refine the strategic marketing capabilities construct to make it agree better with the observed data. In this purification stage, we eliminate the least aligned items and estimate the model. We use parameter convergence, model fit, the 95 percent coverage of the median, the average of the median, the unstandardized coefficients and standard deviations to refine the construct. In general, the model parameters converge in less than 18.000 iterations; the EPSR values are less than 1.2 in all cases. The Gibbs sampler is therefore run for 50.000 iterations. The first 20.000 iterations are the burn-in samples. Inferences are based on the last 30.000 iterations. The results are shown in table 5.1. To avoid clutter, only the posterior mean and standard deviations of the eta's, lambda and precision over the 20.000 samples are given. For the eta's, we also give the 95 percent coverage and the average of the median. In general, the unstandardized coefficients and standard deviations are considered satisfactory; the posterior mean of the parameters in practically all cases are at least twice as great as the posterior standard deviations and therefore considered significant.

5.4.2 The Linear Latent Variable Analysis Outcomes

Our framework posits direct main effects of strategic marketing capabilities on firm performance. Before discussing the model outcomes, we discuss model fit and convergence issues.

A fundamental notion in structural equation modeling is the assessment of fit. Scheines et al. (1999) propose to use a Bayesian counterpart of the classical tests for goodness of fit to judge the fit of a single Bayesian model to the observed data originally developed by Rubin (1984) (see for a detailed discussion, Gelman, Meng

Dimension	Subdimension		mean	sd	2.5%	median	97.5%
CUSTDC	cusdc_ig	eta	0.182	0.121	0.009	0.166	0.452
	cusdc_id	eta	0.240	0.083	0.073	0.243	0.397
	custdc_resp	eta	0.505	0.203	0.116	0.488	0.900
COMDC	comdc_ig	eta	0.413	0.086	0.245	0.414	0.578
	comdc_id	eta	0.392	0.082	0.231	0.392	0.552
	comdc_resp	eta	0.528	0.081	0.373	0.528	0.690
SUPPDC	suppdc_ig	eta	0.287	0.143	0.024	0.291	0.561
	suppdc_id	eta	0.286	0.148	0.020	0.293	0.557
	suppdc_resp	eta	0.202	0.119	0.013	0.197	0.445
TMC	tmc_ig	eta	0.566	0.087	0.380	0.570	0.727
	tmc_rd	eta	0.675	0.093	0.463	0.682	0.838
CRC	crc_is	eta	0.294	0.106	0.060	0.300	0.492
	crc_coop	eta	0.369	0.144	0.064	0.376	0.638
SRC	src_is	eta	0.401	0.113	0.148	0.410	0.602
	src_coop	eta	0.397	0.121	0.121	0.404	0.614
	Items		**mean**	**sd**		**mean**	**sd**
CUSTDC	custdc_ig	lambda	1.000		precision	0.624	0.121
	custdc_ig	lambda	1.329	0.377	precision	0.374	0.200
	custdc_id	lambda	1.000		precision	0.907	0.120
	custdc_id	lambda	2.074	0.295	precision	0.067	0.129
	custdc_resp	lambda	1.000		precision	0.340	0.181
	custdc_resp	lambda	0.691	0.175	precision	0.700	0.110
COMDC	comdc_ig	lambda	1.000		precision	0.219	0.055
	comdc_ig	lambda	0.900	0.086	precision	0.358	0.061
	comdc_id	lambda	1.000		precision	0.334	0.064
	comdc_id	lambda	0.935	0.100	precision	0.375	0.063
	comdc_resp	lambda	1.000		precision	0.450	0.065
	comdc_resp	lambda	1.325	0.132	precision	0.029	0.050
SUPPDC	suppdc_ig	lambda	1.000		precision	0.348	0.077
	suppdc_ig	lambda	1.03	0.130	precision	0.329	0.079
	suppdc_id	lambda	1.000		precision	0.458	0.094
	suppdc_id	lambda	0.980	0.161	precision	0.529	0.101
	suppdc_resp	lambda	1.000		precision	0.499	0.084
	suppdc_resp	lambda	1.048	0.155	precision	0.506	0.093
TMC	tmc_ig	lambda	1.000		precision	0.244	0.052
	tmc_ig	lambda	1.103	0.091	precision	0.073	0.053
	tmc_re	lambda	1.000		precision	0.025	0.035
	tmc_re	lambda	0.866	0.057	precision	0.269	0.044
CRC	crc_is	lambda	1.000		precision	0.599	0.085
	crc_is	lambda	1.242	0.159	precision	0.331	0.072
	crc_is	lambda	1.15	0.158	precision	0.427	0.076
	crc_coop	lambda	1.000		precision	0.353	0.086
	crc_coop	lambda	0.921	0.129	precision	0.448	0.084
SRC	src_is	lambda	1.000		precision	0.409	0.075
	src_is	lambda	1.032	0.132	precision	0.368	0.075
	src_coop	lambda	1.000		precision	0.441	0.076
	src_coop	lambda	1.333	0.157	precision	0.05	0.076

Note: ig is intelligence generation, id is intelligence dissemination, resp is responsiveness, re is research and development, is refers to information sharing, and coop is cooperation.

Table 5.1: Parameter Estimates

and Stern 1996). The proposed linear model relating strategic marketing capabilities to firm performance adequately represents the data since a check criterion, which compares a replicated mean error sum of squares with the observed one, of .49 is obtained.

In general, the model parameters converge in less than 12.500 iterations; the EPSR values are less than 1.2 in all cases. Figure 5.2 depicts the EPSR value for the regression coefficients. Therefore, the Gibbs sampler is run for 32.500 iterations. The first 12.500 iterations are the burn-in samples. Inferences are based on the last 20.000 iterations.

The results of the linear models are presented in table 5.2. With respect to the effect of customer-driven capabilities on firm performance, hypothesis 1a posits that the higher a firm's customer-driven capabilities, the higher the financial per-

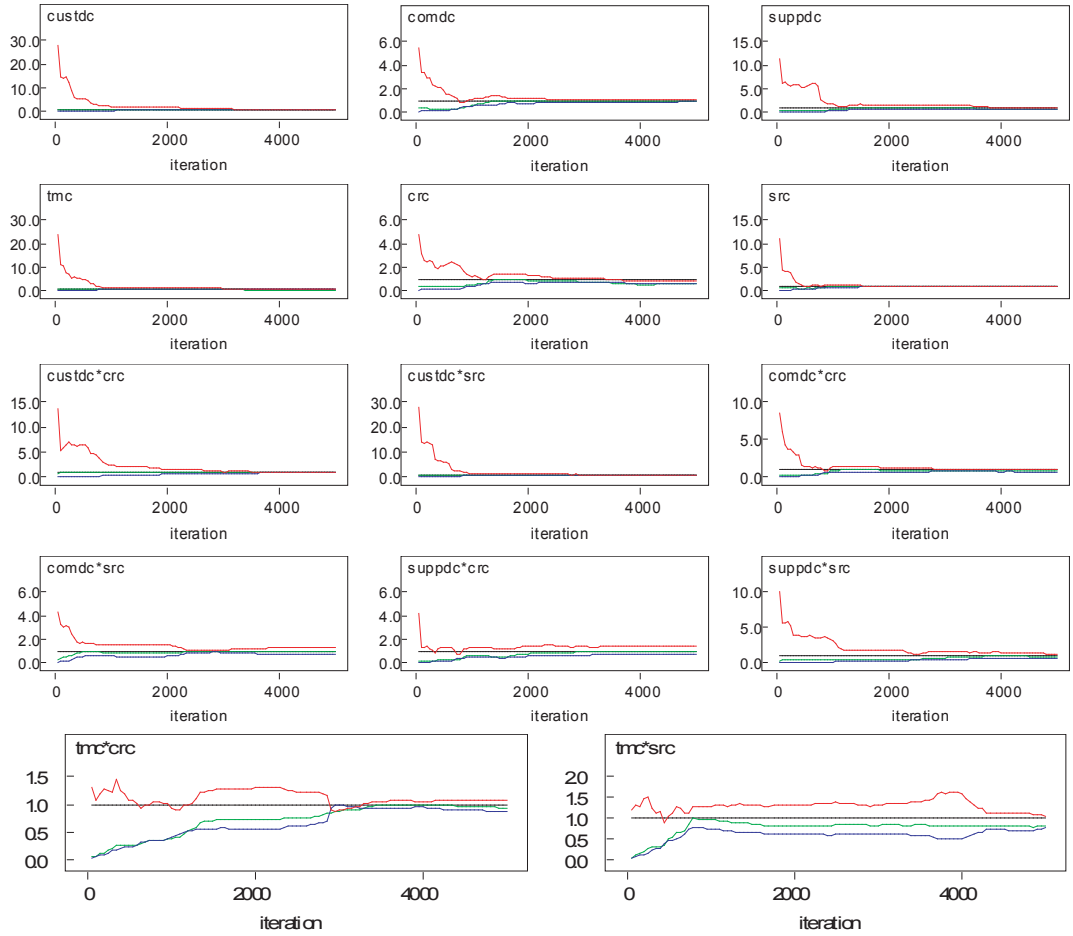


Figure 5.2: The EPSR value for the linear model

formance of the firm. This hypothesis is supported ($\beta = .29$, sd $= .076$). Consistent with hypothesis 1b, it is found that the degree of competitor-driven capabilities has a significant strong positive effect on firm performance ($\beta = .22$, sd $= .096$). Supplier-driven capabilities have a positive but slightly nonsignificant effect on firm performance ($\beta = .18$, sd $= .124$). Thus, hypothesis 1c receives no support. With respect to the effect of technology-monitoring capabilities on firm performance, hypothesis 1d posits that the higher a firm's technology-monitoring capabilities, the higher the financial performance of the firm. This hypothesis is partially supported ($\beta = .16$, sd $= .081$). Although a 95 percent coverage interval provides no support for this hypothesis, a 90 percent coverage interval did support the hypothesis. Hypothesis 1e proposes that customer-relating capabilities have a positive effect on firm performance. Support is found for this hypothesis ($\beta = .27$, sd $= .094$). Concerning hypothesis 1f, our analysis indicates a strong positive significant effect of supplier-relating capabilities on firm performance ($\beta = .51$, sd $= .118$). This result offers support for this hypothesis.

Independent Variable	mean	sd	2.5 %	median	97.5 %
Customer-Driven Capabilities	0.29	0.076	0.149	0.288	0.440
Competitor-Driven Capabilities	0.22	0.096	0.033	0.213	0.404
Supplier-Driven Capabilities	0.18	0.124	-0.037	0.166	0.471
Technology-Monitoring Capabilities	0.16	0.081	-0.016	0.156	0.309
Customer-Relating Capabilities	0.27	0.094	0.123	0.256	0.499
Supplier-Relating Capabilities	0.51	0.118	0.318	0.483	0.784

Table 5.2: Outcomes Linear Latent Variable Model

5.4.3 The Nonlinear Latent Variable Analysis Outcomes

Our second hypothesis suggests an interaction effect among the market-based capabilities on business performance. Concerning model fit, the check criterion for this model is also considered satisfactory; a value of .48 is obtained. By this standard, the model fits the data well. Furthermore, figure 5.3 suggests good convergence properties for the latent variable model parameters. The model parameters converge in less than 5000 iterations. As for the linear model, the Gibbs sampler is run for 32.500 iterations. The first 12.500 iterations are the burn-in samples. Inferences are based on the last 20.000 iterations.

Table 5.2 presents the results of the nonlinear latent variable analysis. This table shows several significant interactions, both positive and negative. Concerning hypothesis 2a, it is found that the interaction between customer-driven and customer-relating capabilities did not influence firm performance (β = .02, sd = .121). Thus, this hypothesis receives no support. Hypothesis 2b posits that the effect of customer-driven capabilities on firm performance is moderated by supplier-relating capabilities. The analysis indicates that seeking to possess high levels of both customer-driven and supplier-relating capabilities may have a negative effect on firm performance (β = -.15, sd = .104). However, the beta coefficient is slightly nonsignificant. Thus hypothesis 2b receives no support. Both hypothesis 2c and 2d indicate a contingent nature of the influence of competitor-driven capabilities on firm performance. Surprisingly, results show that the interaction between competitor-driven and customer-relating capabilities has a negative effect on firm performance (β = -.26, sd = .142), whereas the interaction between competitor-driven and supplier-driven capabilities has a positive impact on the financial performance of a firm (β = .25, sd = .115). Hypothesis 2e posits that the effect of supplier-driven capabilities on firm performance is moderated by the existence of customer-relating capabilities. This hypothesis is not supported (β = -.08, sd = .149). Although we hypothesize a synergistic effect between supplier-driven and supplier-relating capabilities, our analysis suggests the opposite (β = -.20, sd = .093). Hence, the effect of supplier-driven capabilities on firm performance tends to be moderated by the supplier-relating capabilities. Both hypothesis 2g and 2h indicate a contingent nature of the influence of technology-monitoring capabilities on firm performance. Both hypotheses are not supported.

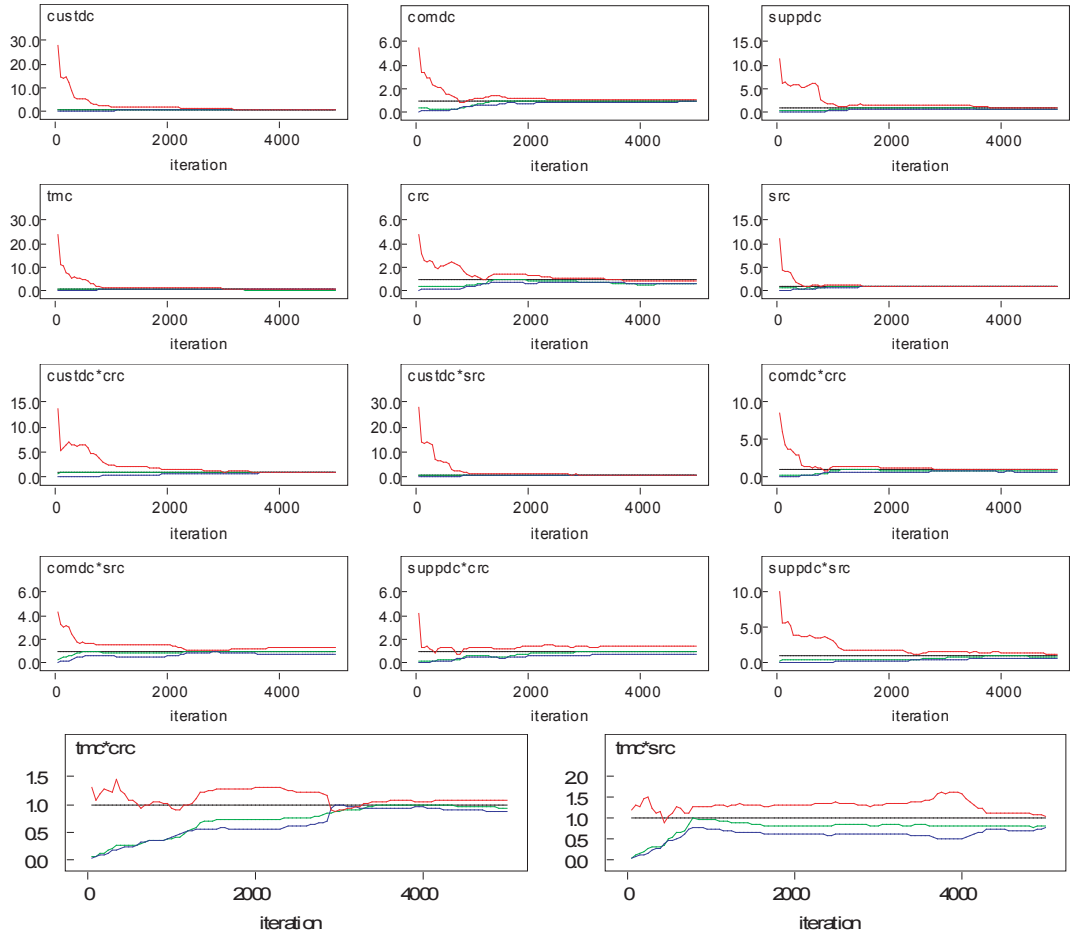


Figure 5.3: The EPSR value for the nonlinear model

5.4.4 Model Comparison

A fundamental task in structural equation modeling is model choice. We use two procedures to model choice, deviance information criterion (DIC) and Gelfand and Ghosh criterion (GGC). Concerning DIC, we encounter the problem of negative values for the effective number of parameters in a model. This even leads to a negative DIC. A simple explanation for why negative values appear in these cases is difficult to give. To formally compare the models, we only rely on GGC. A first impression is that GGC appears to work well; the MSPE shows quick and strong convergence in both cases. The MSPE value for both models is practically identical; a value of .354 (sd = .016) is obtained for the linear model and a value of .352 (sd = .016) for the nonlinear model.

Based on the outcomes reported in Table 5.3 and the meaningfulness of these results, we choose the nonlinear model as the most appropriate model. First, the Gelfand and Ghosh's criterion shows the best fit for this model, although the difference is fairly small. Second, a linear model is too simplistic and not very realistic

Independent Variable	mean	sd	2.5 %	median	97.5 %
Customer-Driven Capabilities (CDC)	0.26	0.097	0.085	0.257	0.475
Competitor-Driven Capabilities (COMDC)	0.23	0.106	-0.003	0.231	0.422
Supplier-Driven Capabilities (SDC)	0.16	0.137	-0.223	0.168	0.368
Technology-Monitoring Capabilities (TMC)	0.20	0.095	0.006	0.199	0.373
Customer-Relating Capabilities (CRC)	0.24	0.139	-0.090	0.272	0.455
Supplier-Relating Capabilities (SRC)	0.44	0.106	0.234	0.442	0.650
CDC x CRC	0.02	0.121	-0.231	0.036	0.248
CDC x SRC	-0.15	0.104	-0.357	-0.154	0.051
COMDC x CRC	-0.26	0.142	-0.609	-0.235	-0.045
COMDC x SRC	0.25	0.115	0.028	0.250	0.485
SDC x CRC	-0.08	0.149	-0.440	-0.073	0.169
SDC x SRC	-0.20	0.093	-0.396	-0.194	-0.014
TMC x CRC	-0.11	0.157	-0.388	-0.120	0.251
TMC x SRC	0.08	0.112	-0.177	0.081	0.293

Table 5.3: Outcomes NonLinear Latent Variable Model

Model	mean	sd	2.5 %	median	97.5 %
Linear Variable Model	0.354	0.016	0.324	0.354	0.385
NonLinear Variable Model	0.352	0.016	0.322	0.352	0.385

Table 5.4: Model Comparison

(Leeflang and Wittink, 2000; Leeflang et al., 2000). The previous let us to believe that the nonlinear model is more meaningful.

5.5 Discussion

Researchers in marketing management tend to adopt one of two approaches to examining competitive advantage: a focus on the market or a focus on relationships. In this study, we suggest that combining these approaches to examine competitive advantage will yield deeper insights. Building on prior research, we propose two models: (1) a main effects model, and (2) an interaction effects model. The results described in the previous section highlight some of the unique insights that emerge from this research approach.

Our main-effects model outcomes support the assertion that strategic marketing capabilities enhance financial value. The interaction effects model demonstrates the contingent nature of the influence of market-driven capabilities on firm performance. Surprisingly, results show that some combinations of strategic marketing capabilities have negative effects on the financial performance of the firm. For example, seeking high levels of supplier-driven and supplier-relating capabilities may erode firm performance. Findings also demonstrate that leveraging competitor-driven and customer-relating capabilities simultaneously to high levels may be harmful for a company, whereas the interaction between competitor-driven and supplier-relating

capabilities positively influences firm performance.

In this study, the DIC statistic appears to have some undesired properties. As mentioned before, a major problem of this statistic is the negative value generated for the number of effective parameters (P_D). We have seen this clearly in both the linear and nonlinear latent variable model. A simple explanation for why negative (P_D) appears in these cases is difficult to come with. Based on the previous, we believe that DIC in not very suitable in rather complex structural equation models. In saying this, we encourage research determining whether DIC can be applied appropriately in these classes of models.

In this study, Gelfand and Ghosh criterion (GGC) is applied to compare different models. GGC appears to work well; the MSPE shows quick and strong convergence in both cases. Despite this, we believe that further research examining more fully the performance of GGC suggesting the correct structural equation model is needed. Also, these studies may apply and compare other loss functions besides squared error loss.

Several researchers have argued that collaborative relationships are not appropriate for every market or customer. Our findings indeed indicate that building and maintaining strong relationships is a viable strategy, under certain conditions, for wholesalers to achieve competitive advantage. This is in line with Corsten and Kumar's (2005) outcomes. These researchers demonstrate that suppliers achieve greater economic performance and develop their capabilities in collaborative relationships. Our result also suggests that building strong relationship capabilities is only profitable under certain conditions. The analysis indicates that being driven by suppliers and simultaneously building strong relationships with the same suppliers is harmful. Possibly, this strategy requires extensive resources and the outcomes, because of power asymmetry and moral hazard etc., may not always be in favor of the firm.

This study suggests that a firm's ability to generate, disseminate and respond to relevant competitor's actions and strategies is a major component in generating financial performance in this industry. This is in line with previous research. Marketing researchers generally find that lacking competitor-driven capabilities reduce business performance (e.g., Clark and Montgomery, 1996). Therefore, Clark and Montgomery even suggest that "paranoia" may stimulate performance. However, developing competitor-driven capabilities is not in all situations the preferred strategy.

5.6 Management Implications

The strategic marketing capabilities construct represents a significant step forward in the evolution of the marketing concept. It provides an instrument for assessing the degree to which a firm is capable of sensing and relating to the market. In this article, we investigate the extent to which strategic marketing capabilities influence firm performance in a linear and nonlinear fashion. Our results may have implications for the business-to-business industry. Perhaps the main implication of

this study is that the development of both strong market-sensing and market-relating capabilities could be harmful for a company. This also provides some evidence why some powerful companies manage to perform bad. The management of marketing capabilities is an extremely complex task. The complexity of managing these capabilities leads us to believe that the development of these capabilities is a top management concern. This is also in line with former research suggesting the support of top management in developing strategic marketing capabilities (McNamara 1972; Webster 1988).

Our analysis also reveals the importance of market-relating capabilities in building strong firms. Based on this outcome, we believe that wholesale companies have to focus primarily on the management of relationships, especially with suppliers and other stakeholders. However, given the reported importance of market-driven capabilities, it is not recommended to neglect these capabilities. It is however highly advisable to promote and develop competitor-driven capabilities while maintaining high levels of supplier-relating capabilities.

5.7 Conclusion

Many companies consider investments in marketing capabilities as a means of increasing firm performance. This study indicates that this may not always be the case. This suggests that the management of marketing is a rather complex task that needs full involvement from (top) management.

Although this research provides insights into the relationship between strategic marketing capabilities and firm performance, further research investigating other relevant dependent variables, such as service quality, equity and trust, and research methodologies is necessary. The interplay between market-driven and market-relating capabilities in determining market performance is also a worthwhile and useful area for further research.

Chapter 6

Development and Assessment of the WholeSaleQual Construct

Abstract This paper describes the development of an instrument, which we call WholeSaleQual, for assessing customer perceptions of quality in a wholesale environment. In developing this construct, we integrate several scales from the quality literature, which are largely investigated independently in the past. The purpose of this paper is to (1) describe the development of a model for measuring quality in a wholesale setting, (2) compare the developed construct with a hierarchical model, and (3) investigate an operational level model, by estimating the relative importance of the quality attributes, using partial least squares regression. Factor analytical methods suggest that the originally proposed nonhierarchical model better represents the variance-covariance matrix than the hierarchical model. Furthermore, it seems that organizations excel when they are able to deliver superior quality to their customers. Also, the applied methodology may help managers faced with the problem of how to trade off competing quality improvement initiatives. We consider the research and managerial implications of this study.

6.1 Introduction

During the past decade, there has been a growing stream of research exploring the construct of quality. Studies in this area have addressed conceptual issues (e.g., Grönroos, 1984; Parasuraman, Zeithaml and Berry, 1985), measurement issues (e.g., Brady and Cronin, 2001; Parasurman, Zeithaml and Berry, 1988, 1991, 1994) and consequences of quality (e.g., Zeithaml, Berry and Parasuraman, 1996). Although considerable progress has been made, these streams of research have been among the most debated in services marketing. For example, Brady and Cronin (2001) argue that little advance has been made "to what should be measured" (p. 34).

The growing body of research on quality in marketing is largely conducted by surveying or interviewing customers (end-users) in a retail setting (e.g., Babakus and Boller, 1992; Brown, Churchill and Peter, 1993; Carman, 1990; Cronin and Taylor, 1992; Parasuraman et al., 1988). Several authors have attempted to expand the theoretical domain of service quality to include other settings by introducing integrative, more complex, (hierarchical) models (c.f., Brady and Cronin, 2001; Bienstock, Mentzer, and Bird, 1997; Dabholkar, Shepherd and Thorpe, 2000; Holmlund and Kock, 1995; Mentzer, Flint and Kent, 1999; Mentzer, Flint and Hult, 2001; Rust and Oliver, 1994). However, this stream of research has neglected to investigate a thor-

ough business-to-business model of quality. This neglect is notable because these studies do not tell a complete story. A notable exception is Mentzer et al. (2001), who integrate logistics, information and service attributes to develop their logistics service quality construct. Their main thesis is that service quality is important, but provides little insight into issues relevant in a business-to-business setting, such as the delivered product, logistics and information. In the same spirit, Westbrook and Peterson (1998) state that despite the growing interest in the business-to-business sector, little research has been conducted measuring or developing a specific quality measure for this sector. They argue that in these settings, the evaluation of quality is much more complex. Therefore, they call for further investigation of the underlying determinants of quality for business-to-business companies.

Following recent literature suggesting the appropriateness to develop sector specific quality models (Carman, 1990; Mentzer et al., 2001), this paper develops a quality model for wholesaling. In this service setting, the combinations of delivered services and products, and offered logistics and information, comprise the value added to customers. Following Mentzer et al. (2001) we propose a nonhierarchical quality model for wholesaling. This concerns a simple model where all dimensions, which are related to service quality (e.g., Parasuraman et al., 1985), logistics service quality (e.g., Mentzer et al., 2001), product quality (e.g., Rust and Oliver, 1994), and information quality (e.g., Maltz and Kohli, 1996), are given equal weight and treated as if they occur simultaneously. We also investigate whether a hierarchical quality model is a better representation of quality in a wholesale setting. This competing model has the following higher-order dimensions: (1) service quality, (2) product quality, (3) logistics service quality, and (4) information quality. These four dimensions have different subdimenions, which are derived from previous research.[1]

In this study we do not only develop a quality construct for wholesaling, but go a step further by relating operational quality perceptions (dimensions of the proposed WholeSaleQual construct and subdimensions of the competing hierarchical model) to customer satisfaction. We refer to this modeling approach, following Soteriou and Chase (2000), as an "operational level analysis." This approach enables us to derive potential points for improvement. In general, the problem of an operational level analysis is the occurrence of several statistical problems, such as the problem of multicollinearity and small sample size, that may influence or limit the significance of the outcomes, especially when applying standard multiple linear regression, which is largely utilized and recommended in the quality literature. To analytically derive concrete information we utilize partial least squares regression (PLSR). This algorithm has many advantages when considering an operational level analysis (see for example, chapter 3 in this dissertation; Martens and Martens, 2001).

In this chapter we report the results of two studies. In study 1, we introduce and describe the development of the WholeSaleQual construct. We investigate two plausible factor structures of WholeSaleQual: (1) a nonhierarchical model, and (2) a hierarchical model. We find that a nonhierarchical operational quality model,

[1]Note that these subdimensions all become first-order factors in the nonhierarchical model.

where all dimensions contribute equally to quality, fits the data better than a model with a hierarchical structure. In study 2, we relate our operational quality model to customer satisfaction. In doing so, we use both PLSR and ordinary least squares regression (OLS). Our results suggest that several quality attributes explain customer satisfaction. Furthermore, PLSR provides a good estimation method to derive fruitful conclusions, given the high multicollinearity in our dataset, whereas OLS fails to extract valuable outcomes.

6.2 WholeSaleQual Construct (Study 1)

6.2.1 Introduction

Today, service firms focus on customer perceived quality as a key to financial success. However, there is a lot of heterogeneity between service firms. For example, unlike banks, wholesalers offer logistics and physical products. Therefore, findings of several marketing researchers suggest the development of sector specific quality models (e.g. Carman, 1990; Dabholkar et al., 1996; Mentzer et al., 2001). In this study, we develop a quality model for the wholesale industry, one of the major industries in the western economy, which we call WholeSaleQual.

6.2.2 WholeSaleQual

The main purpose of wholesalers is to deliver the right amount of the right product at the right place at the right time in the right condition at the right price with the right information (Coughlan et al., 2000). This suggests that wholesalers create value through services, products, logistics and information. Hence, to investigate the degree to which a wholesaler is able to deliver quality, one has to investigate the offered services, products, logistics and information simultaneously. Therefore, we propose and develop a new quality construct for wholesaling with dimensions related to: service quality (e.g., Parasuraman et al., 1985), logistics service quality (e.g., Mentzer et al., 2001), product quality (e.g., Gronroos, 1982; Rust and Oliver, 1994), and information quality (e.g., Maltz and Kohli, 1996).

In developing our WholeSaleQual model, we could choose between two plausible factor structures: (1) nonhierarchical, and (2) hierarchical. A nonhierarchical factor structure suggests that all dimensions contribute equally to the model (see for example research in the field of service quality, Parasuraman et al., 1985, 1988; Mentzer et al., 2001). Other researchers prefer the examination of hierarchical conceptualizations of quality (for example, Brady and Cronin, 2001; Dabholkar, Thorpe and Rentz, 1996). Their main thesis is that a complex conceptualization better represents the dynamics of the market.

Following the main stream in this research field, we propose a nonhierarchical structure of quality. Hence, we argue that customers indeed break several dimensions, related to service, product, logistics and information, into various dimensions. Furthermore, we investigate whether this factor structure outperforms more complex ones.

hypothesis 1 a nonhierarchical conceptualization of WholeSaleQual is a better representation of the variance-covariance matrix than a hierarchical conceptualization of WholeSaleQual.

6.3 Method

As described previously, our WholeSaleQual construct has eighteen factors. These factors relate to: (1) service quality, (2) product quality, (3) logistics service quality, and (4) information quality. Scales of the factors we examine are available in the literature or could be easily derived from previous work. Next, we provide a small overview.

6.3.1 Service Quality

Service quality is one of the most studied qualitative measures of performance. Several conceptualizations of service quality are introduced in the literature. SERVQUAL, the most examined model, assesses customer perceptions of service quality in retailing organizations (Parasuraman et al., 1985). After the work of Parasurman et al. (1988), who measured perceived service quality as the difference between perceived service and expected service, researchers begin to examine the validity of SERVQUAL across different industrial settings (Carman, 1990; Babakus and Boller, 1992; Brown, Churchill and Peter, 1993). These researchers find that the computed disconfirmation has a poor model fit and suggest to combine perceptions and expectations into a single scale. Grönroos' model (1984), like SERVQUAL, has its roots in the disconfirmation perspective, and hence, is subjected to the same measurement critic as the Parasuraman et al. (1988) model. Based on the previously mentioned findings, Cronin and Taylor (1992) propose an alternative method of operationalizing perceived service quality, called SERVPERF. The results of Cronin and Taylor (1992) show that their SERVPERF approach might be an improved means of measuring the service quality construct. After their work, many other researchers provide support for the performance-based measure of service quality (e.g. Dabholkar et al., 2000). Therefore, we use SERVPERF to measure service quality. Hence, we have the following components of service quality: (1) reliability, (2) responsiveness, (3) assurance, (4) empathy and (5) intangibles.

6.3.2 Product Quality

Product quality refers to the technical quality of the product that is delivered. Concerning the conceptualizations of product quality, several scales/ constructs have been developed in the (marketing) literature (Sousa and Voss, 2002; Stone-Romero, Stone and Grewal, 1997). Fornell, Johnson, Anderson, Cha and Bryant (1996) conceptualize perceived quality in two components of consumption experience: (1) reliability, and (2) customization. They define customization as the degree to which the firm's offering is customized to meet heterogeneous customer needs. Reliability

refers to the degree to which the firm's offering is reliable, standardized, and free from deficiencies. In this study, building on the marketing dominated product quality literature, we add two important dimensions of product quality (see also Mentzer et al., 2001): (3) product availability, and (4) (product-related) sales services. This is in line with Rosenbloom's (2001) assertion that in order to satisfy the markets' needs "the products of producing and manufacturing firms must be made available to those markets" (p. 36).

6.3.3 Logistics Service Quality

Another important value-added activity of wholesalers is logistics. Mentzer, Gomes and Krapfel (1989) and Mentzer et al. (2001) argue that two elements exist in service delivery: marketing customer service (MCS) and physical distribution service (PDS). In this study MCS is partly incorporated in the service quality and product quality scales. Based on recent literature (e.g., Meuter, Ostrom, Roundtree and Bitner, 2000), which emphasizes the role of technology in logistics, we divide logistics service quality (LSQ) into (a) service technologies (ST quality), and (b) physical distribution service. Incorporating ST quality into the LSQ scale is frequently suggested by supply chain researchers. As argued by Mentzer and Bird (1997, p. 34), business-to-business logistic services are offered in a context in which people are replaced with "things" and the customer and provider are often physically separated. Concerning the ST based literature, there is some literature investigating the quality perceptions when using ST (e.g., Dabholkar, 1996; Meuter et al., 2000). Meuter et al.'s (2000) findings suggest that the following three dimensions result in satisfying incidents: (1) system reliability, (2) time benefit, and (3) easy to use. Basically, Dabholkars (1996) attribute-based model of technology-based self service options includes these three dimensions. Concerning PDS, an extensive stream of research has dealt with this element (e.g., Mentzer el al., 1989; Mentzer et al. 2001). In general, this stream of research emphasizes components like order accuracy, timeliness and tangibles. Building on the previously mentioned streams of research, we incorporate six logistics service quality dimensions: (a) order reliability, (b) simplicity, (c) convenience, (d) accuracy, (e) timeliness, and (f) tangibles.

6.3.4 Information Quality

According to Mentzer et al. (2001) information quality refers to customers' perceptions of the information provided by the supplier's organization. Several researchers propose various information quality constructs (e.g., Innis and La Londe, 1994; Maltz and Kohli, 1996; Moenaert and Souder, 1996). Based on this stream of research and the interviews, as described in chapter 1, we propose the following dimensions of information quality: (1) comprehensiveness, (2) relevance, and (3) transparency. The scales for both comprehensiveness and relevance are derived from the literature (Innis and La Londe, 1994; Moenaert and Souder, 1996). The third subdimension of information quality, transparency, is derived from field interviews. These interviews indicate that transparency is an important component of

information quality in wholesaling.

6.3.5 Sample

As already mentioned, we develop a quality measure for the wholesaling industry. To generate data, we use the official records of the Dutch Chamber of Commerce's database to select potential customers of electrotechnical wholesalers. We sent 2921 questionnaires to these potential customers in the Netherlands. The customers are asked to rate the degree to which they are satisfied with the offerings of one of their wholesalers in 46 questions and to give the name of this supplier. These questions are measured on a seven-point scale, where 1 = "strongly disagree" and 7 = "strongly agree." Also, we add a question indicating their overall satisfaction with the wholesaler; this measure is used in Study 2. We measure satisfaction with one indicator, which represents an overall judgment (satisfaction with numerous transactions) of the wholesalers. We measure this indicator on a ten-point Likert scale, where 1 = "very dissatisfied" and 10 = "very satisfied." The mailing result in 490 responses, which is a response rate of 16.8%.

6.4 Results Study 1

Table 6.1 shows the descriptive statistics and correlations. First, the correlation between the components of each dimension of WholeSaleQual is moderate to high ($\geq .45$ for service quality, $\geq .43$ for product quality, $\geq .41$ for logistics service quality and $\geq .35$ for information quality) and significant. Second, the correlation between all subdimensions of WholeSaleQual is also moderate to high. This provides us with a first impression about the factor structure. To fully investigate the best fitting factor structure confirmatory factor analysis is applied.

By using confirmatory factor analysis, the researcher does not 'prove' the proposed model but only confirms that it is one of several possible models. Therefore, it is possible that a different model could fit the data more adequately. Here, we estimate two models: (1) an eighteen first-order factor model (operational level model), and (2) a four second-order factor model with eighteen first-order factors (hierarchical model). Then we compare the first model with the hierarchical one.

6.4.1 Operational Factor Structure

Consistent with the micro-level quality management literature, we incorporate all dimensions (subdimensions from our hierarchical factor model) as first-order factors. Our confirmatory factor analysis indicates the following fit statistics for the operational level model: $\chi^2 = 1186.34$, d.f. = 512, p = .00, RMSEA = .052; SRMR = .037; NNFI = .98; CFI = .99; IFI = .99. Although the χ^2 statistic is significant, other fit statistics suggest an excellent representation of the variance-covariance matrix to the hypothesized measurement model. The reliability coefficients and average variance extracted are acceptable (Appendix E).

	Mean	Sd	1a	1b	1c	1d	1e	2a	2b	2c	2d	3a	3b	3c	3d	3e	3f	4a	4b	4c	5
1. Service Quality																					
1a. Reliability	**5.51**	**1.03**	-																		
1b. Responsiveness	**5.74**	**1.01**	**.69****	-																	
1c. Assurance	**5.86**	**.88**	**.61****	**.69****	-																
1d. Empathy	**5.55**	**1.07**	**.48****	**.66****	**.65****	-															
1e. Tangibles	**5.63**	**.89**	**.45****	**.51****	**.54****	**.49****	-														
2. Product Quality																					
2a. Reliability	**5.52**	**1.05**	**.41****	**.42****	**.36***	**.30****	**.39****	-													
2b. Customization	**5.93**	**.74**	**.39****	**.44****	**.42****	**.36****	**.47****	**.69****	-												
2c. Availability	**5.28**	**1.09**	**.45****	**.39****	**.37****	**.33****	**.41****	**.60****	**.57****	-											
2d. Sales Services	**4.98**	**1.40**	**.41****	**.47****	**.48****	**.52****	**.38****	**.43****	**.44****	**.46****	-										
3. Logistics Quality																					
3a. Reliability	**5.94**	**.83**	**.57****	**.55****	**.53****	**.50****	**.42****	**.57****	**.66****	**.63****	**.42****	-									
3b. Accuracy	**5.67**	**.97**	**.46****	**.47****	**.42****	**.45****	**.44****	**.50****	**.55****	**.56****	**.28****	**.72****	-								
3c. Simplicity	**6.25**	**.84**	**.36****	**.44****	**.51****	**.34****	**.37****	**.35****	**.45****	**.45****	**.34****	**.63****	**.41****	-							
3d. Timeless	**5.87**	**.94**	**.55****	**.52****	**.56****	**.39****	**.45****	**.50****	**.55****	**.64****	**.40****	**.71****	**.57****	**.65****	-						
3e. Condition	**5.83**	**.87**	**.43****	**.47****	**.45****	**.39****	**.47****	**.51****	**.56****	**.42****	**.30****	**.66****	**.62****	**.49****	**.52****	-					
3f. Tangibles	**5.91**	**.86**	**.31****	**.39****	**.38****	**.35****	**.39****	**.49****	**.54****	**.38****	**.29****	**.57****	**.43****	**.44****	**.51****	**.60****	-				
4. Information Quality																					
4a. Relevance	**5.50**	**1.01**	**.42****	**.49****	**.45****	**.38****	**.48****	**.57****	**.60****	**.55****	**.46****	**.55****	**.41****	**.48****	**.55****	**.45****	**.51****	-			
4b. Comprehensiveness	**5.18**	**1.17**	**.48****	**.55****	**.51****	**.59****	**.50****	**.52****	**.48****	**.55****	**.69****	**.55****	**.39****	**.46****	**.55****	**.45****	**.46****	**.67****	-		
4c. Transparancy	**5.50**	**1.39**	**.43****	**.43****	**.43****	**.42****	**.32****	**.40****	**.40****	**.51****	**.39****	**.49****	**.35****	**.46****	**.49****	**.36****	**.38****	**.60****	**.52****	-	
5. Customer Satisfaction	**7.93**	**.86**	**.44****	**.47****	**.38****	**.36****	**.28****	**.29****	**.38****	**.33****	**.26****	**.47****	**.35****	**.33****	**.43****	**.31****	**.26****	**.44****	**.39****	**.35****	-

* p < .05; ** p < .01.

Table 6.1: Descriptive Statistics and Correlations

6.4.2 Second-order Factor Model

The fit statistics for the second-order factor model show the following values: $\chi^2 = 2227.39$, d.f. $= 641$, p $= .00$; RMSEA $= .072$; SRMR $= .065$; NNFI $= .97$; CFI $= .97$; IFI $= .97$. The chi-square value is significant. Other goodness-of-fit measures, however, indicate a reasonable overall fit of this hierarchical model of quality to the data.

Summary. Our results indicate, based on the fit statistics, that an operational quality model fits the covariance matrix significantly better than the hierarchical model. For example, RMSEA and SRMR are significantly smaller in the case of an operational factor structure. Also, NNFI, CFI and IFI statistics are higher for the operational factor model, indicating a better relative fit. This suggests that despite the high correlations (see table 6.1), confirmatory factor analysis could discriminate between the subdimensions. These findings do support hypothesis 1 and demonstrate that an operational quality model is superior in assessing customer perceptions of quality in wholesale.

6.5 WholeSaleQual and Performance (Study 2)

In the process of making service-delivery decisions, different members, who focus on different attributes based on their orientation, may influence the final decision making. For example, the product manager might focus on product-related aspects, such as product reliability, whereas the logistics manager is more concerned with on-time delivery and the ordering process. Hence, allocation of resources to improve performance may become very complex. Management is frequently asking questions as: which operational variables are essential or relatively more important to ensure and improve market performance? and how can we formally investigate this? In this study, we propose a method, operational level analysis combined with partial least squares regression, that may facilitate the decision-making process in

business markets, such as wholesaling. This method may help managers faced with the problem of how to trade off competing quality improvement initiatives. Hence, the aim is twofold: (1) to show the relevance of this theoretical model, and (2) to reveal the strength of partial least squares regression in dealing with marketing models showing high levels of multicollinearity.

Concrete, this method enables us to relate the operational quality model to customer satisfaction. Concerning our theoretical relationships, ample research suggests the importance of these links. For example, the marketing perspective proposes that quality perceptions, in the aggregate, directly lead to customer satisfaction (cf., Anderson and Sullivan, 1993). However, we are unaware of a comprehensive disaggregated model that relates operational quality dimensions to customer satisfaction in a wholesaling context. Hence, we hypothesize that

hypothesis 2 WholeSaleQual dimensions have a positive effect on customer satisfaction

6.5.1 Partial Least Squares Regression

A dark side of quality data is the occurrence of severely skewed frequency distribution and high multicollinearity (Fornell, 1995). Several methods have been proposed in the statistical literature to deal with this problem, such as principle components regression (Massy, 1965), Sliced Inverse Regression (Li, 1990) and partial least squares regression (Martens and Neas, 1989). However, previous research suggests the superiority of PLSR on both principle components regression (Frank and Friedman, 1993) and sliced inverse regression (Naik and Tsai, 2000). Therefore, to investigate hypothesis 2, we utilize univariate partial least squares regression (PLSR).[2]

PLSR is a linear regression method based on partial least squares (Wold, 1966). PLSR is an algorithm that models the relationship between an $\mathbf{Y}$ variable or a set of $\mathbf{Y}$ variables and independent variables.[3] Next, a brief summary of the PLSR algorithm will be given; a more detailed treatment is provided by Martens and Naes (1989) and Martens and Martens (2001).

Partial Least Squares Regression

In general, the algorithm consists of three steps (see for detailed discussion, Höskuldsson, 2003; Martens and Martens, 2001): (1) computation of the PLS com-

[2]As mentioned before, a popular method to investigate the previous proposition is to use principle component regression. However, PLSR is found to have better properties (see for example, Frank and Friedman, 1993). A problem inherent in using principle component regression, as pointed out by Jolliffe (1982), is the risk that small structures in $\mathbf{X}$, which may well explain $\mathbf{Y}$, disappear in the PC modeling of $\mathbf{X}$.

[3]Note that although some may believe that the partial least squares algorithm originally developed by Wold (1973, 1982), also known as partial least squares path modeling, and PLSR (Wold, Martens and Wold, 1983; Martens and Naes, 1989) are equivalent, this is not the case (See Martens (2001) discussing this issue).

ponents [$\mathbf{t}_a$ (a = 1, ..., A)], (2) estimation of a linear regression of $\mathbf{Y}$ on the retained principle components (PCs), and (3) jack-knife validation, or alternatively other resampling methods, such as bootstrapping, of the parameters in the final model.

In the first step, the weights are found as the eigenvector of the matrix $\mathbf{X}_{a-1}^T \mathbf{Y}\mathbf{Y}^T \mathbf{X}_{a-1}$. Then the linear PLSR model estimates a few variables (latent variables) called X-scores, denoted by $\mathbf{T}$ [$\mathbf{t}_a$, a = 1,2, ..., A]. The X-scores are orthogonal and estimated as linear combinations of the original X-variables with the weight coefficients $\mathbf{W}$ ($\mathbf{w}_a$, a = 1,2,...,A).

Once the proper number of PCs to retain is chosen, the second step concerns the estimation of $\mathbf{Y}$ on the retained PLSR components. The third step seeks to validate the coefficients. Since the statistical theory cannot be used, because the vector of regression coefficients is a nonlinear function of $\mathbf{Y}$, to ascertain statistical significance of the parameters, resampling methods, such as jack-knifing, are frequently used (see Martens and Martens, 2001).

The Prediction Model

After estimating the model, a prediction model can be determined. The common way to estimate a prediction model is by projecting the new $\mathbf{X}$ values onto the model in order to calculate new scores and then using these scores to predict new samples (Hoy, Steen and Martens, 1998)

$$\mathbf{y}_{ij,pred} = \mathbf{y}_j + \mathbf{t}_{i,pred}\mathbf{q}_j^T \tag{6.1}$$

where i is the sample number, j is the $\mathbf{y}$-variable number, $\mathbf{t}_{i,pred}$ is the new scores and $\mathbf{q}_j$ is the $\mathbf{y}$-loadings from the likelihood.

Model Complexity

PLSR, which is often used with numerous and correlated $\mathbf{X}$-variables, is rather sensitive and substantial risk for over-fitting exists. Therefore, it becomes essential to determine the correct complexity of the model by establishing the predictive significance of each PC. The standard practice to determine model complexity in this stream of research is to calculate the prediction error by means of cross-validation. This presents a practical and reliable method to check the predictive validity of the obtained model.[4] The root mean squares errors of prediction (RMSEP) is employed for comparison among models, which is given by

$$\mathbf{RMSEP} = \sqrt{\frac{1}{N}\sum_{i=1}^{n}(\mathbf{y}_i - \hat{\mathbf{y}}_i)^2} \tag{6.2}$$

where $\mathbf{y}$ represents the actual value and $\hat{\mathbf{y}}$ is the value of the predicted variable.

[4]Note that cross validation is, in the absence of an independent validation set, used to establish model validation.

6.6 Results

In this study, we mean-center both the **Y** and **X** variables. We use the $Unscrambler^{TM}$, version 9.1, to analyze the models. Next, we present our results in the following sequence. First, we relate the dimensions of WholeSaleQual to customer satisfaction, using PLSR. Second, after we investigate the PLSR model, we estimate an ordinary least squares (OLS) regression in order to examine the degree to which this method is relatively superior or inferior in estimating models of our class of data.

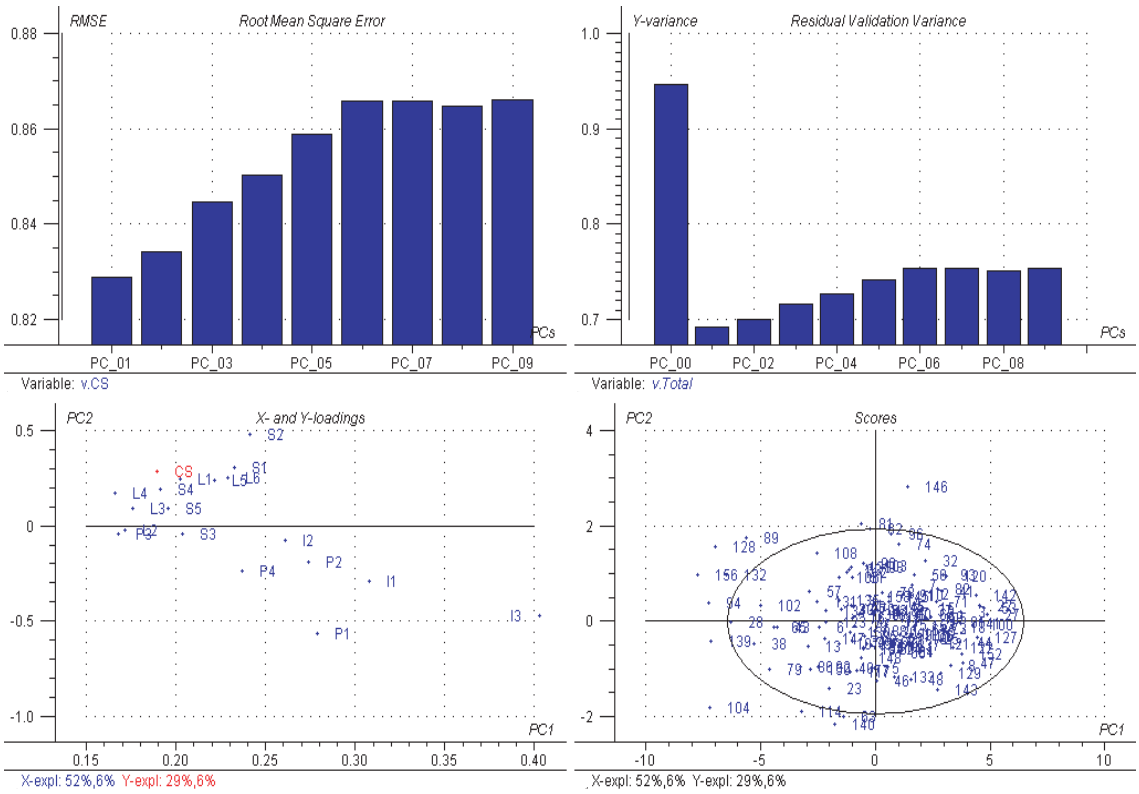
6.6.1 Model Outcomes

PLS regression is run with eighteen wholesale quality dimensions as **X**-matrix and customers' overall satisfaction as **Y**-matrix. Figure 6.1 summarizes the results of our analysis in an accessible graphical manner. The first step is to determine the correct complexity of the model. The upper left plot of figure 6.1 indicates the root mean squares error of prediction (RMSEP). RMSEP shows that one PC may be the optimal number of PCs. Furthermore, the upper right plot, the residual validation variance plot, also indicates that one PC is correct, because it reaches a minimum after PC_00, which represents the average point in the data set. Actually, one PC explains 52% of the variance in **X**. This PC explains 29% of the variation in **Y**. Since PLSR is rather sensitive to outliers we also compute the Hotelling T^2 Ellipse. The 95 percent confidence ellipse shown in the lower right plot of figure 6.1 is based on Hotelling T^2 statistic. Observations well outside the Hotelling Ellipse are outliers. In our case the number of outliers is limited. This leads us to believe that they may not have a (serious) effect on the obtained results.

The PLS-regression coefficients reveal the strength of the relationship between WholeSaleQual dimensions and overall customer satisfaction. Figure 6.2 shows the estimated effects and their reliability ranges. The error bars in this figure show estimates of the reliability range of $\hat{b}$, expressed as $\hat{b} \pm 2\hat{s}(\hat{b})$, where $\hat{s}(\hat{b})$ is estimated by cross-validation of the model parameters (jack-knifing) (see for a discussion, Martens and Martens, 2001). The regression outcomes show small uncertainty limits. The sign of all the variables is positive and the effect is clearly non-zero. All coefficients have their jack-knife distributions well above zero and thus can be considered statistically significant. So, hypothesis 2 is confirmed. The figure shows that the clearest and strongest predictors for customer satisfaction are dimensions of information quality (information relevance, comprehensiveness and transparency) and service responsiveness (S_1) and reliability (S_2).

In short, we obtain the following equation

$$\begin{aligned}\textbf{Customer Satisfaction} = {} & .052\mathbf{S}_1 + .056\mathbf{S}_2 + .032\mathbf{S}_3 + .037\mathbf{S}_4 + .037\mathbf{S}_5 + .040\mathbf{P}_1 + \\ & .046\mathbf{P}_2 + .034\mathbf{P}_3 + .035\mathbf{P}_4 + .044\mathbf{L}_1 + .030\mathbf{L}_2 + .031\mathbf{L}_3 + \\ & .035\mathbf{L}_4 + .046\mathbf{L}_5 + .048\mathbf{L}_6 + .054\mathbf{I}_1 + .055\mathbf{I}_2 + .069\mathbf{I}_3 \end{aligned} \tag{6.3}$$



note: CS is customer satisfaction, S1 is service responsivness, S2 is service reliability, S3 is service tangibles, S4 is assurance, S5 is empathy, P1 is product-related sales services, P2 is product availability, P3 is customization, P4 is product reliability, L1 is timeless, L2 is logistics tangibles, L3 is condition, L4 is order simplicity, L5 is accuracy, L6 is order reliability, I1 is information relevance, I2 is information comprehensiveness and I3 is information transparancy.

Figure 6.1: The PLS-graphical outcomes

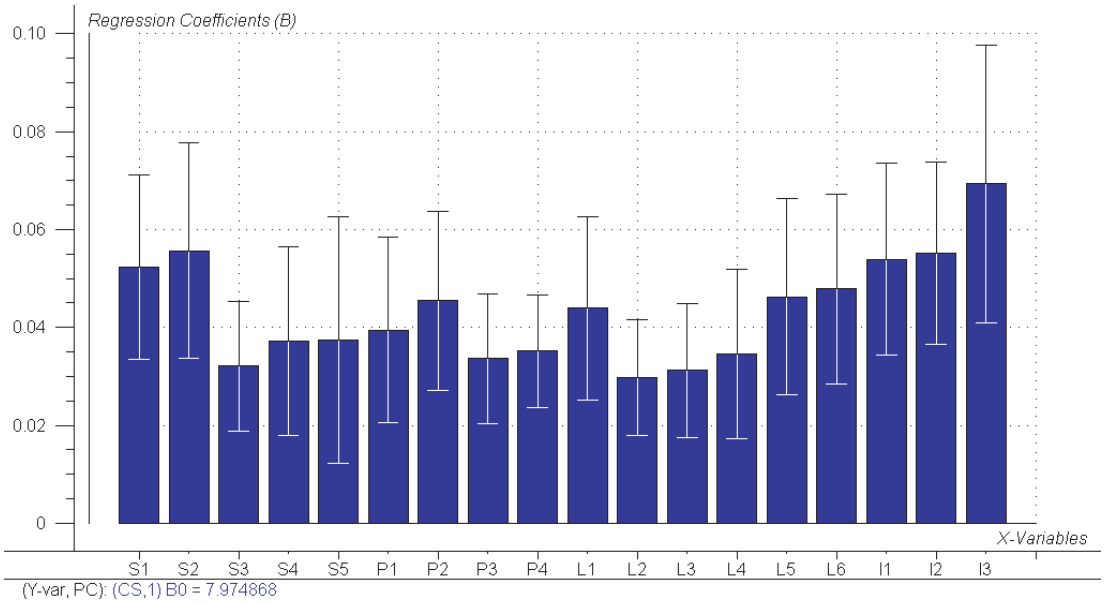
6.6.2 The Prediction Results

After we have estimated the model using both the **X** and **Y** variables, we now estimate a model, based on projection, that only contains **X** variables (the prediction model). We estimate the model for the prediction of customer satisfaction.

Figure 6.3 graphically displays the outcomes. Generally, no wrong predictions are given; all predictions are less than one and a half and higher than minus two and a half. The variation is sometimes high, which indicates that some of the predictions are not well. In general, the predictions are relatively well. This provides further strength for the estimated model and established relationships.

6.6.3 PLSR vs. Ordinary Least Squares Regression

Quality researchers, despite the risk of high multicollinearity between X-variables, largely investigate the relationship between independent and dependent variables using ordinary least squares (OLS). To investigate the degree to which this approach is justified in the case of highly correlated operational variables, we estimate the model



note: S1 is service responsivness, S2 is service reliability, S3 is service tangibles, S4 is assurance, S5 is empathy, P1 is product-related sales services, P2 is product availability, P3 is customization, P4 is product reliability, L1 is timeless, L2 is logistics tangibles, L3 is condition, L4 is order simplicity, L5 is accuracy, L6 is order reliability, I1 is information relevance, I2 is information comprehensiveness and I3 is information transparancy.

Figure 6.2: 95% Jack-Knife Confidence Intervals of the PLS Regression Coefficients in the Likelihood Model

by means of OLS regression and compare the results with the previously estimated PLSR outcomes.

Figure 6.4 shows the regression outcomes of the WholeSaleQual-customer satisfaction relationship. Unlike PLS regression parameters, these (OLS) parameters are all, see the p-values plot (lower plot), statistically nonsignificant; the t-values are all less than 1.8.

Confronting the previously mentioned results with that of PLSR, we can see, from a pragmatical view, that OLS regression frequently performs bad relative to PLSR. This result is also widely reported in the statistical literature (e.g., Garthwaite, 1994; Wold, Sjöström and Eriksson, 2001). The analyses suggest that PLSR reduces the 'lack of selectivity' problem (that no single X-variable is sufficient to predict $\mathbf{Y}$) even in the case of collinear and noisy independent variables. In short, the results suggest the strength of PLSR as a method to predict dependent variable(s) in the case of high multicollinearity between variables.

6.7 Contributions

In this paper, we provide an approach and method for translating customer feedback into managerial actions for improving market performance. This analysis enables managers in wholesaling to recognize the quality attributes that need to be improved to stimulate customer satisfaction. Next, we cite some contributions of

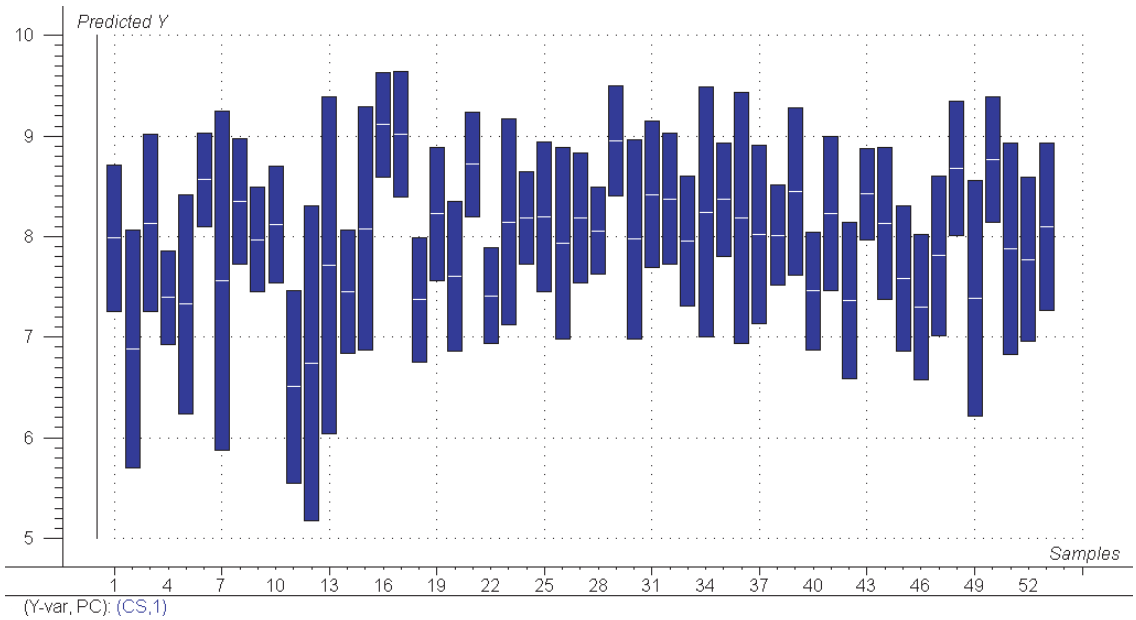


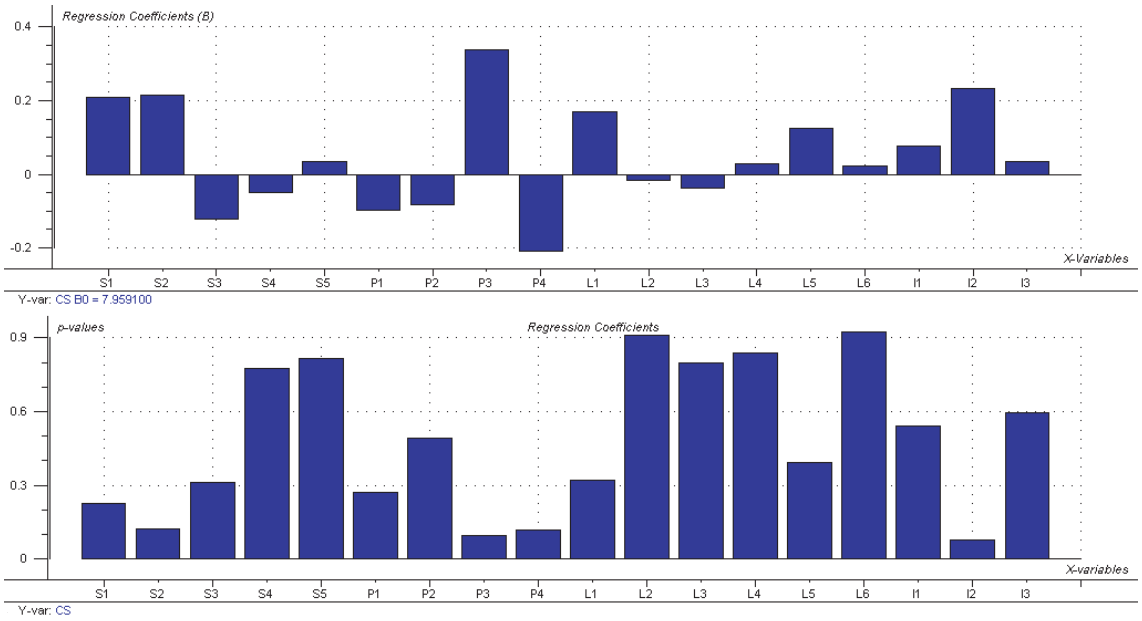
Figure 6.3: The Prediction Model

this article.

The first contribution is the development of the WholeSaleQual construct. Although many quality constructs exist, little research has been conducted to develop a broad quality construct by incorporating several quality dimensions for wholesaling. The proposed model is especially valuable, since the customers of wholesalers receive services, product, information and form quality perceptions about logistics services. As far as we know, this is the first attempt to develop a comprehensive quality model for wholesaling.

A second contribution is the investigation of two plausible models of WholeSaleQual, a hierarchical and a nonhierarchical quality model. Since no comprehensive quality construct exists for wholesaling, this step is necessary. Furthermore, it provides the marketing researcher and practitioner with valuable information: on which criteria (and level) do customers make decisions? Based on our findings, we recommend the nonhierarchical (operational) quality model.

Good marketing data is scarce and frequently suffers from (high) collinearity, and therefore cannot be analyzed appropriately with most regression methods. A consequence of this is that marketing researchers and scientists only model those variables that they think are most important, and thus eliminate other (possible useful) variables. A third contribution is our application of a method of analysis that provides good estimates, even in the presence of a rather small sample size and high multicollinearity. This method is originally introduced in econometrics and further developed in chemometrics. However, despite its possible advantages, this method is largely ignored. With PLSR one can investigate the impact of all variables



note: CS is customer satisfaction, S1 is service responsivness, S2 is service reliability, S3 is service tangibles, S4 is assurance, S5 is empathy, P1 is product-related sales services, P2 is product availability, P3 is customization, P4 is product reliability, L1 is timeless, L2 is logistics tangibles, L3 is condition, L4 is order simplicity, L5 is accuracy, L6 is order reliability, I1 is information relevance, I2 is information comprehensiveness and I3 is information transparancy.

Figure 6.4: OLS Regression Results

simultaneously. For example, Parasuraman et al.'s (1985) original SERVQUAL model could be estimated without worrying too much about (multi)collinearity. By applying this pragmatic method a manager can answer questions as: should the firm increase service responsiveness, improve product attributes, invest in logistics or none of the above? In short, this method enables management to identify specific customer needs and to efficiently allocate resources to (a) offer better products and services, (b) redesign products and services, and (c) introduce more desired products and services in order to fully maximize perceived quality.

In this study, we initially use confirmatory factor analysis (CFA) to refine the constructs under study. Then we estimate a univariate partial least squares regression model. The combination of these methods simplified the analysis and thus the interpretations of the obtained results. It provides us with a clear sense of the product, information, and service attributes that customers desire most. Furthermore, the PLSR outcomes supply in-depth information about the importance of the attributes to market performance. It reveals some relevant information for service improvements, such as the importance of information quality in enhancing customer satisfaction. Also, some quality attributes are less influential, such as service empathy, product-related sales services and product quality. This kind of information is essential to guide a company's market strategy.

A fifth contribution is our explicit link between operational level analysis and PLSR as a method to implement this approach. Actually, former research using an operational level modeling approach tends to use one of four methods: (1) correlation

analysis, (2) multiple regression analysis, (3) covariance analysis, and/or (4) data envelopment analysis. These four methods provide only unbiased estimates when some assumptions are fulfilled. First, applying these four methods in conducting operational level modeling, especially when operational variables tend to be numerous, requires a rather high sample size. Second, because operational variables are in general highly correlated, multiple regression and covariance analysis give biased estimates. Third, correlational analysis does not indicate causality. Fourth, data envelopment analysis requires very specific data and it does not tell which operational variables will lead to some improvements. PLSR, on the contrary, does not require high sample size and uncorrelated independent variables. Furthermore, it provides an indication of causality and generates specific outcomes that may facilitate the decision-making process.

6.8 Limitations

As with every study, this research has limitations. The first limitation concerns our proposed analytical method. A major drawback of the PLSR method is its vague statistical behavior. This makes it difficult to perform usual inferential tasks related to modeling, such as assessing uncertainty in coefficient estimates. Therefore, a major problem of PLSR is that we cannot make the quantitative probabilistic statement like "95% confidence." However, PLSR is generally used when many independent variables and high (multi)collinearity among these variables exist. In this case, the traditional approach to selecting variables, based on significant testing, has some basic defects (see for a discussion, Höskuldsson, 2003). Therefore, we think that Martens and Martens' (2000) approach, based on jack-knifing, is appropriate to detect the parameters uncertainty in our present case.

A second limitation is related to our developed WholeSaleQual construct. Although we carefully integrate different constructs, we find some high cross-correlations. For example, some subdimensions of logistics service quality are also related to some dimensions of WholeSaleQual (i.e., service quality and product quality). Future research has to deal with this issue and ought to develop measures and to seek for methods to improve the convergence and discriminant validity of the measures.

Chapter 7

Strategic Marketing Capabilities and Perceived Quality: A Dyadic Approach

Abstract This study investigates the effect of strategic marketing capabilities on several indicators of operational quality, relationship quality and overall quality. Linking supplier responses to customer responses, the results support the notion that firms are more likely to satisfy their customers when they possess superior customer-relating capabilities. Furthermore, it seems that organizations excel when they understand and respond to their competitors more effectively than their rivals do. Surprisingly, results show that supplier-driven capabilities in general have a negative effect on perceived quality. The implications of these findings are discussed.

7.1 Introduction

In recent years, considerable effort has been devoted to understanding how marketing contributes to competitive advantage (e.g., Srivastava, Shervani and Fahey 1998, 1999). In general, marketing researchers tend to adopt one of two approaches to examining competitive advantage: (1) a market-driven view of competitive advantage (Day, 1994; Kohli and Jaworski, 1990; Narver and Slater, 1990), and (2) a relational view of competitive advantage (Dyer and Singh, 1998). A decade of research has produced a rich body suggesting the importance of these perspectives to developing competitive advantage. Despite this, a growing number of researchers suggest that combining these perspectives to examine competitive advantage will yield better insights.

In a first attempt to explicate the previously mentioned emerging literature, we develop and validate in chapter 4 an integrated model, linking the relationship marketing perspective to the market orientation model, for evaluating a firm's market focus, called the strategic marketing capabilities construct. We argue, following Day and Wensley (1988), Narver and Slater (1990), Kohli and Jaworski (1990), Bhwaradwaj et al. (1993), Day (1994), Hooley, Broderick and Möller (1998) and Hooley, Fahy, Beracs, Fonfara and Snoj (1999), that market-driven organizations have superior sensing and relating capabilities that set them apart. Empirically, results from chapter 5 confirm this view. The findings indicate that organizations indeed excel when they develop and leverage superior strategic marketing capabilities more effectively than their rivals do.

An interesting question that remains unexplored is whether strategic market-

ing capabilities lead to customer-based advantage. Although there is ample (conceptual) research (e.g., Hooley et al., 1998) suggesting a positive relationship between strategic marketing capabilities and customer perceived value, such as perceived quality, no research to date takes the entire concept of strategic marketing capabilities, as proposed and developed in chapter 4, into consideration. As suggested by early research in this area (e.g., Drucker, 1954), this is essential to determine the relative value or strength of a (generic) marketing model. By relating the strategic marketing capabilities model to customer-based advantage, the aim is to contribute to the market-based management literature. For example, Srivastava et al. (2001, p. 796) call for future research by stating that "both the RBV and marketing researchers must commit to carefully and systematically identifying and documenting how particular market-based assets and capabilities contribute to generating and sustaining specific forms of customer value."

To fill the previously mentioned gap, we relate strategic marketing capabilities to several indicators of customer perceived quality. Reviewing the strategic marketing (e.g., Roth and Jackson, 1995) and quality literature (e.g., Zeithaml, Berry and Parasurman, 1988), we investigate the following consequences of strategic marketing capabilities: (1) operational quality, with service quality, product quality, logistics service quality and information quality as indicators, (2) overall quality, and (3) relationship quality (trust, commitment and regret). To investigate the propositions we use a dyadic approach, data generated from both customers and suppliers. Although this approach is conceptually difficult and time-consuming to conduct, it generates the most useful results. In this respect, Pelham (1997) states that "future studies should assess the reliability of internal judgments of the firm's level of market orientation by comparison with the judgments of outsiders such as distributors and customers. Customers can also provide a more objective judgment of relative product quality."

This chapter is organized as follows. In the next section, we discuss the conceptual framework and hypotheses. After that, methodological issues are described. Finally, we test the framework in the electrotechnical wholesale sector in the Netherlands and discuss the outcomes.

7.2 Conceptual Framework and Hypotheses

Our conceptual framework visualizes the role of strategic marketing capabilities in affecting perceived quality (Figure 7.1). The proposed framework is grounded in the classical marketing concept and the emerging market-based perspective. Drucker (1954) argues that marketing is not a specialized activity, but rather "the whole business seen from the point of view of its final result, that is, from the customer's point of view" (p. 39). Houston (1986) defines the marketing concept as "the willingness to recognize and understand the consumer's needs and wants, and the willingness to satisfy those needs and wants" (p. 86). According to the marketing concept, firms with strong strategic marketing capabilities are thus more likely to excel in developing and maintaining a customer-based advantage, i.e.,

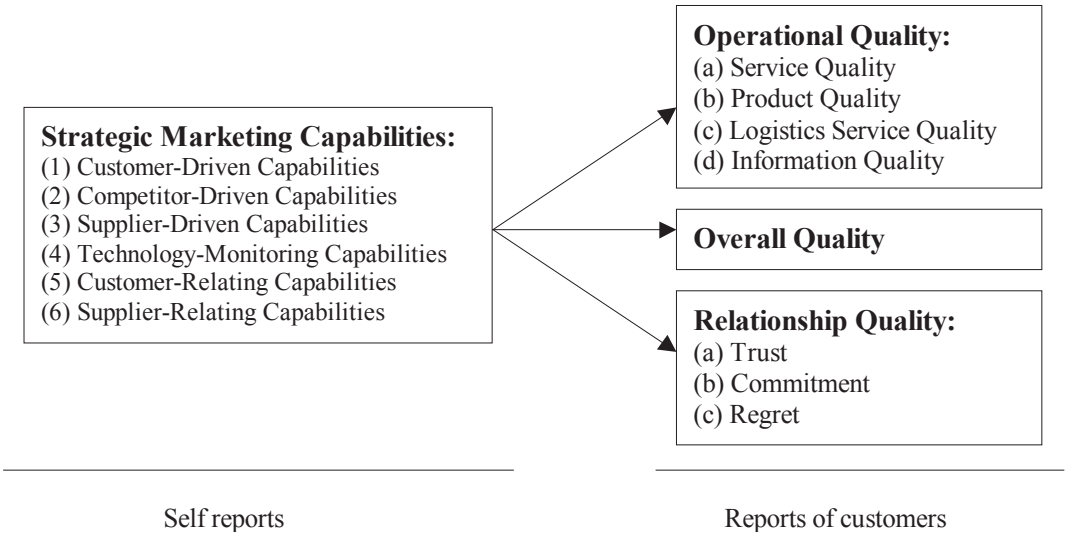


Figure 7.1: Conceptual Framework

customer satisfaction and quality (e.g., Drucker, 1954; Houston, 1986; Kohli and Jaworski, 1990; Narver and Slater, 1990).

Marketing strategy researchers also suggest a direct effect of strategic marketing capabilities on customer satisfaction (Bharadwaj et al., 1993; Day, 1994; Day and Wensley, 1988; Hunt and Morgan, 1995; Srivastava et al., 1998). For example, Day and Wensley (1988) argue that "it is wise to use the customer in the analysis of competitive superiority in skills and resources; the assessment of the influence of firms' skills and resources on customer satisfaction and loyalty" (p. 16). Bharadwaj et al. (1993) even state that "A firm's skills and resources constitute potential sources of competitive advantage only if they offer benefits desired by customers" (p. 93). This is (also) in line with the central proposition of Srivastava et al. (1998), who propose that "the greater the value that can be generated from market-based assets for external entities, the greater their satisfaction and willingness to be involved with the firm and, as a consequence, the greater the potential value of these marketplace entities to the firm" (p. 5). Furthermore, Matsuno and Mentzer (2000) argue that investigating market orientation's implications on other performance criteria, such as customer satisfaction, should make an important contribution to the body of knowledge.

In this study, we investigate three possible consequences of strategic marketing capabilities (customer-driven, competitor-driven, supplier-driven, technology-monitoring, customer-relating and supplier-relating capabilities):[1] (1) overall quality, (2) operational quality, and (3) relationship quality. This is in line with research

[1]Since the strategic marketing capabilities concept and construct are already treated in detail in chapter 4 we will not discuss this construct. Instead, we refer the reader to this chapter for further details about this model.

from both marketing (e.g., Menon, Jaworski and Kohli; 1997) and management science (e.g., Roth and Jackson, 1995). Concerning operational quality we examine four constructs: (a) service quality, (b) product quality, (c) logistics service quality, and (d) information quality.[2] In this study, we also incorporate relationship quality as a consequence of strategic marketing capabilities since it serves as an indicator of the health and future wellbeing of long-term service sales relationships (Crosby, Evans and Cowles, 1990, p. 76). However, no consensus exists on which components comprise relationship quality (De Wulf, Odekerken-Schroder and Iacobucci, 2001). Prior conceptualizations of relationship quality emphasize several indicators, such as relationship satisfaction, trust, relationship commitment, fairness, conflict and regret (e.g., De Wulf et al., 2001; Jap, 2001; Jap, Manolis and Weitz, 1999). In this study, we incorporate three components of relationship quality: (1) trust, (2) commitment, and (3) regret.

In summary, according to this stream of research, creation of sustainable customer value requires the development of strong strategic marketing capabilities. This relationship is also the core of the developed conceptual framework. In addressing the research questions we combine the company perspective and the customer perspective.

7.2.1 Customer-Driven Capabilities and Quality

Customer-driven capabilities refer to the processes of generation, dissemination of customer information and strategy implementation based on this information. Several marketing researchers relate the concept of market-focus to customer perceptions (e.g., Jaworski and Kohli, 1993; Matsuno and Mentzer, 2000). Empirically, Homburg and Pflesser (2000) find that market-oriented behaviors have a significant positive effect on market performance (e.g., customer satisfaction, retention). Siguaw et al. (1998) investigate the linkage between market-orientation and both trust and commitment. Their findings suggest that supplier market orientation has a positive influence on commitment and satisfaction with financial performance. In their discussion, these researchers argue that further investigation is necessary. Furthermore, Kelley (1992), using the approach of Saxe and Weitz (1982), shows that the extent to which customer orientation is displayed by the (selling) personnel influences the level of satisfaction and relationship quality experienced by the customers. In a channel setting, Langerak's (2001) results indicate that a firm's market orientation has no (direct) effect on satisfaction with the relationship, as perceived by customers. This is in line with Siguaw et al.'s (1998) study in a distribution channel context. Their analysis could not support their hypothesis that supplier's market orientation has an effect on distributor's trust. Despite these latter findings, we propose, in line with the marketing concept, that firms with higher customer-driven capabilities will have more satisfied customers. Hence,

[2]Research based on dyadic data tends to emphasize service quality when relating operations/marketing to customer value (Roth and Jackson, 1995; Soteriou and Zenios, 1999). In this study, we introduce a broader perspective by taking a number of important operational quality components into consideration.

hypothesis 1 the higher the firm's customer-driven capabilities, the higher the (a) overall quality, (b) service quality, (c) product quality, (d) logistics service quality, (e) information quality, (f) trust, (g) commitment, and the lower the perceived (h) regret, as reported by customers

7.2.2 Competitor-Driven Capabilities and Quality

Competitor-driven capabilities refer to an organization's capability in gathering, disseminating and using competitor information. Market orientation literature suggests that firms with strong competitor capabilities are more likely to outperform competitors on relative value provided to customers (e.g., Narver and Slater, 1990; Noble, Sinha and Kumar, 2002). Empirically, Roth and Jackson's (1995) findings suggest that market acuity, which represents the awareness of the managers concerning the competitors' level of service quality as well as their own, has a positive effect on service quality. So,

hypothesis 2 the higher the firm's competitor-driven capabilities, the higher the (a) overall quality, (b) service quality, (c) product quality, (d) logistics service quality, (e) information quality, (f) trust, (g) commitment, and the lower the perceived (h) regret, as reported by customers

7.2.3 Supplier-Driven Capabilities and Quality

Supplier-Driven Capabilities refer to the firm's "intelligence generation and dissemination activities that are necessary to understand how the know-how and skills of suppliers can be used to create superior customer value" (Langerak, 2001, p. 223). Langerak (2001) hypothesize a direct link between supplier orientation of purchasers, as perceived by suppliers, and supplier's trust in the relationship. Their findings are in line with their hypothesis. Langerak's (2001) results suggest that a firm's supplier orientation may have a direct effect on satisfaction with the relationship, as perceived by supplier. However, he does not examine the extent to which a company's supplier-driven capabilities relate to the degree to which this company is able to satisfy customers. In this study, we hypothesize that supplier-driven capabilities directly influence customer satisfaction. The rationale behind this is that the higher the firm's knowledge concerning the suppliers and their offerings the more likely it is that the firm can offer a higher value to its customers. Hence,

hypothesis 3 the higher the firm's supplier-driven capabilities, the higher the (a) overall quality, (b) service quality, (c) product quality, (d) logistics service quality, (e) information quality, (f) trust, (g) commitment, and the lower the perceived (h) regret, as reported by customers

7.2.4 Technology Monitoring Capabilities and Quality

Following Srinivasan et al. (2002) and Bharadwaj (2000), we define a technology monitoring capability as an organization's ability to acquire knowledge about new technology development and use this information in offering a better technical solution to the market. Gatignon and Xuereb's (1997) findings indicate that a technology-orientation in markets in which demand is relatively uncertain is necessary for a firm to produce superior products and to be able to market innovations better. Following these researchers and Day (1994), we hypothesize a positive effect of technology-monitoring capabilities on perceived quality.

hypothesis 4 the higher the firm's technology-monitoring capabilities, the higher the (a) overall quality, (b) service quality, (c) product quality, (d) logistics service quality, (e) information quality, (f) trust, (g) commitment, and the lower the perceived (h) regret, as reported by customers

7.2.5 Customer-Relating Capabilities and Quality

Getting closer to the customer is often proposed as a valuable strategy or strategic orientation (e.g., Granovetter, 1985) and is indicative of a firm's ability (1) to distribute information to the customer about the organization's processes, personnel, and so forth and (2) to engage in collaborative cooperation with the customer. Customer-relating capabilities may be major drivers of customer value (e.g., Anderson and Narus, 1990; Cannon and Perreault, 1999; Doney and Cannon, 1997; Gruen, 2000; Morgen and Hunt, 1994; Rosenzweig et al., 2003). Crosby, Evans and Cowles (1990) find that relational selling behavior, which contains among others the components interaction intensity and co-operative intentions, has a strong effect on relationship quality. Rosenzweig et al.'s (2003) results demonstrate that high integration intensity (i.e., interorganizational information sharing and cooperation) directly influences superior product quality, delivery reliability, process flexibility, and cost leadership. Anderson and Narus' (1990) findings suggest a strong influence of cooperation on trust. They state that "meeting or exceeding the performance objectives through cooperation leads to trust and satisfaction with the working partnership" (p. 56). Based on previously mentioned literature, we hypothesize a direct link between a firm's capability to maintain relationships with customers and the customers' perception of quality.

hypothesis 5 the higher the firm's customer-relating capabilities, the higher the (a) overall quality, (b) service quality, (c) product quality, (d) logistics service quality, (e) information quality, (f) trust, (g) commitment, and the lower the perceived (h) regret, as reported by customers

7.2.6 Supplier-Relating Capabilities and Quality

Supplier-relating capabilities refer to an organization's capability to share information and collaborate with suppliers to achieve collaborative channel relationships. Some research suggests a positive effect of these activities on customer perceptions (Lee, So and Tang, 2000; Langerak, 2001; Frohlich and Westbrook, 2001). Empirically, Lee et al.'s (2000) analysis suggest that information sharing alone could provide significant inventory reduction and cost savings to the manufacturer. Higginson and Alam (1997) argue that close "working relationships between members of the supply chain can lead to improved quality of products and information, more efficient processes, and increased sharing of expertise and risks" (p. 20). Hence,

hypothesis 6 the higher the firm's supplier-relating capabilities, the higher the (a) overall quality, (b) service quality, (c) product quality, (d) logistics service quality, (e) information quality, (f) trust, (g) commitment, and the lower the perceived (h) regret, as reported by customers

7.3 Method

7.3.1 Samples

A two-stage plan is used to obtain independent sets of dyads. The first stage involves using the official records of the Dutch Chamber of Commerce's database to select potential customers of electrotechnical wholesalers. This stage is already described in chapter 6. The mailing results in 490 responses, which is a response rate of 16.8%, and 178 names of different wholesalers (suppliers).

The second stage of the sampling plan involves a mailing survey to the wholesalers. We sent 178 questionnaires to the management. After three waves, we receive 59 usable questionnaires from the wholesalers (i.e., a response rate of 34 percent, which is satisfactory). From this database we could match 86 sets (a total of 172) of questionnaires from wholesalers and their customers suitable for a dyadic analysis.

7.3.2 Measurement

Scales of the constructs we examine are available in the literature. Below, we give references that develop/consider the construct under study in greater detail and the interested reader is referred to these studies (see also chapters 4 and 6) for a more comprehensive discussion. To investigate the constructs we use (Bayesian) confirmatory factor analysis. The outcomes for the constructs under study are not shown; the details of the strategic marketing capabilities construct are given in chapter 4 and 5 (see Appendix D) and those of the operational quality model (WholeSaleQual) in chapter 6 (see Appendix E). As reported earlier, the analyses show good properties for the constructs.

Overall Quality

Overall quality is a postpurchase phenomenon and reflects how much the customer likes or dislikes the overall offering (both service and product) after purchasing (Bitner and Hubbert, 1994). We measure quality using one item: the overall perceived quality. Hence, the overall quality indicator is an overall impression of the relative inferiority/superiority of the organization and is measured on a ten-point Likert scale.

Relationship Quality

As mentioned before, we use three dimensions of relationship quality: (1) trust, (2) commitment, and (3) regret. The measures for these dimensions are outlined in Appendix A.2. Next, we briefly discuss these dimensions.

Trust. Following Crosby, Evans and Cowles (1990), we define trust as a confident belief that the supplier can be relied upon to behave in such a manner that the long-term interest of the customer will be served. Consistent with previous work (Kumar, Scheer and Steenkamp, 1995) we include four items to measure trust, such as 'this supplier is trustworthy' and 'when making important decisions, this supplier considers our welfare as well as its own.'

Commitment. Following Moorman, Zaltman and Deshpande, 1992), we define commitment as "an enduring desire to maintain a valued relationship" (p. 71). Commitment is a three item scale derived from Kumar, Scheer and Steenkamp's (1995) study.

Regret. Regret is the "painful sensation of recognizing that 'what is' compares unfavorably with 'what might have been'" (Sugden, 1985, p. 77). To measure regret we use the scales used by Tsiros and Mittal (2000): (1) our organization regrets choosing this wholesaler, (2) our organization feels bad for choosing this wholesaler, and (3) our organization should have chosen another wholesaler.

7.4 Results

For the analyses described in this article, the Gibbs sampler is run. All computations are performed using WinBUGS, a freely available software for Bayesian inference Using Gibbs Sampling (Spiegelhalter, Thomas, Best and Lunn 2004). The convergence of the Gibbs sampler is monitored by the 'estimated potential scale reduction' (EPSR) value as described by Gelman and Rubin (1992).

To investigate the relationship between strategic marketing capabilities and perceived quality we apply standard multiple linear regression. In general, the model parameters converge immediately in less than 1.000 iterations; the EPSR values are less than 1.2 in all cases. Therefore, the Gibbs sampler is run for 10.000 iterations. The first 2.000 iterations are the burn-in samples. Inferences are based on the last 8.000 iterations. The results of the linear models are presented in the tables 7.1 to 7.4. In these Tables, only the posterior mean, standard deviations, the 95 percent coverage and the average of the median of the regression coefficients over the 8.000

	Dependent Variable: Overall Quality				
Independent Variable	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**
Intercept	**7.90**	**0.08**	**7.74**	**7.90**	**8.06**
Customer-Driven Capabilities	-0.21	0.16	-0.53	-0.21	0.11
Competitor-Driven Capabilities	**0.29**	**0.11**	**0.07**	**0.29**	**0.50**
Supplier-Driven Capabilities	**-0.43**	**0.22**	**-0.87**	**-0.43**	**0.01**
Technology-Monitoring Capabilities	0.12	0.08	-0.05	0.12	0.28
Customer-Relating Capabilities	**0.29**	**0.13**	**0.03**	**0.29**	**0.55**
Supplier-Relating Capabilities	0.14	0.15	-0.16	0.14	0.42
mspe	1.66	0.22	1.28	1.65	2.14
Deviance	342.3	4.05	336.3	341.7	352.0
P_D	7.98				
DIC	350.3				

mspe is the mean square prediction error, P_D is the effective number of parameters and DIC is the deviance information criterion.

Table 7.1: Outcomes strategic marketing capabilities-overall quality link

samples are given. Furthermore, we incorporate two model selection procedures: (1) deviance information criterion (Spiegelhalter, Best, Carlin and Van der Linde 2002), and (2) Gelfand and Ghosh's criterion (Gelfand and Ghosh, 1998).

7.4.1 Strategic Marketing Capabilities and Overall Quality

The framework posits direct main effects of strategic marketing capabilities on overall quality. Hypothesis 1a indicates a positive link between a firm's customer-driven capabilities and the perceived overall quality. However, this hypothesis is not supported (β = -.21, sd = .16). Consistent with hypothesis 2a, it is found that the degree of competitor-driven capabilities has a significant strong positive effect on overall quality (β = .29, sd = .11). Contrary to our expectations, supplier-driven capabilities has a significant strong negative effect on overall quality (β = -.43, sd = .22). Thus, no support is found for this hypothesis. With respect to the effect of technology-monitoring capabilities on overall quality, hypothesis 4a posits that the higher a firm's technology-monitoring capabilities, the higher the perceived overall quality. This hypothesis is partially supported (β = .12, sd = .08). Hypothesis 5a proposes that customer-relating capabilities have a positive effect on overall quality. This hypothesis is supported by the analysis (β = .29, sd = .13). Concerning hypothesis 6a, analysis indicates a positive but nonsignificant effect of supplier-relating capabilities on overall quality (β = .14, sd = .15). Thus, hypothesis 6a receives no support.

7.4.2 Strategic Marketing Capabilities and Operational Quality

Hypotheses 1b, 2b, 3b, 4b, 5b and 6b suggest that possessing superior strategic marketing capabilities leads to higher levels of service quality, as perceived by customers. As can be seen from Tables 7.2 and 7.3, few coefficients, based on a 95 percent coverage interval, are considered statistically significant. This is also true

	Dependent Variable									
	Service Quality					Product Quality				
Independent Variable	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**
Intercept	**5.86**	**0.07**	**5.73**	**5.86**	**6.00**	**5.58**	**0.09**	**5.41**	**5.58**	**5.75**
Customer-Driven Capabilities	-0.02	0.13	-0.26	-0.02	0.24	0.14	0.16	-0.17	0.14	0.45
Competitor-Driven Capabilities	-0.04	0.09	-0.22	-0.04	0.14	0.07	0.11	-0.14	0.07	0.28
Supplier-Driven Capabilities	-0.15	0.20	-0.53	-0.15	0.24	-0.33	0.23	-0.78	-0.33	0.15
Technology-Monitoring Capabilities	-0.03	0.07	-0.16	-0.03	0.10	-0.08	0.08	-0.23	-0.08	0.08
Customer-Relating Capabilities	**0.22**	**0.13**	**-0.03**	**0.22**	**0.47**	0.18	0.16	-0.12	0.18	0.49
Supplier-Relating Capabilities	0.08	0.13	-0.17	0.08	0.33	0.17	0.15	-0.13	0.17	0.46
mspe	0.74	0.12	0.53	0.73	1.00	1.12	0.18	0.81	1.11	1.53
Deviance	156.7	4.13	150.9	156.1	166.6	194.4	4.18	188.3	193.7	204.5
P_D	8.05					8.07				
DIC	164.8					202.4				

mspe is the mean square prediction error, P_D is the effective number of parameters and DIC is the deviance information criterion.

Table 7.2: Outcomes service quality and product quality as consequences of strategic marketing capabilities

for the models indicating the relationship between strategic marketing capabilities and the remaining indicators of operational quality. However, a consistent result is that customer-relating capabilities have a significant effect on service quality (β = .22, sd = .13), logistics service quality (β = .30, sd = .13), information quality (β = .38, sd = .22). Surprisingly, supplier-driven capabilities have a negative impact on information quality (β = -.65, sd = .34). By these results only hypotheses 5b, 5d and 5e are supported.

	Dependent Variable									
	Logistics Service Quality					Information Quality				
Independent Variable	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**
Intercept	**5.97**	**0.07**	**5.84**	**5.97**	**6.11**	**5.41**	**0.12**	**5.17**	**5.41**	**5.66**
Customer-Driven Capabilities	-0.00	0.13	-0.25	-0.01	0.26	0.00	0.22	-0.44	0.00	0.45
Competitor-Driven Capabilities	0.01	0.09	-0.16	0.01	0.19	0.11	0.15	-0.19	0.11	0.40
Supplier-Driven Capabilities	-0.29	0.20	-0.69	-0.29	0.11	**-0.65**	**0.34**	**-1.31**	**-0.66**	**0.03**
Technology-Monitoring Capabilities	-0.06	0.06	-0.18	-0.06	0.06	0.03	0.11	-0.20	0.03	0.24
Customer-Relating Capabilities	**0.30**	**0.13**	**0.06**	**0.31**	**0.56**	**0.38**	**0.22**	**-0.05**	**0.38**	**0.82**
Supplier-Relating Capabilities	**0.23**	**0.13**	**0.00**	**0.23**	**0.49**	0.32	0.21	-0.10	0.32	0.74
mspe	0.76	0.12	0.54	0.76	1.02	2.31	0.37	1.67	2.28	3.13
Deviance	161.5	4.18	155.5	160.8	171.7	256.5	4.18	250.4	255.8	266.6
P_D	8.07					8.07				
DIC	169.6					264.5				

mspe is the mean square prediction error, P_D is the effective number of parameters and DIC is the deviance information criterion.

Table 7.3: Outcomes logistics service quality and information quality as consequences of strategic marketing capabilities

7.4.3 Strategic Marketing Capabilities and Relationship Quality

As Table 7.4 shows, customer-driven capabilities have a nonsignificant effect on trust (β = -.11, sd = .18), commitment (β = -.18, sd = .15) and regret (β = -.04, sd = .23). Thus, hypotheses 1f, 1g and 1h receive no support. Contrary to our expectations, as can be seen from Table 7.4, the regression coefficients indi-

	Dependent Variable														
	Trust					Commitment					Regret				
Independent Variable	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**	**mean**	**sd**	**2.5 %**	**median**	**97.5 %**
Intercept	**5.75**	**0.10**	**5.56**	**5.75**	**5.94**	**6.10**	**0.09**	**5.93**	**6.10**	**6.27**	**1.59**	**0.13**	**1.34**	**1.59**	**1.85**
Customer-Driven Capabilities	-0.11	0.18	-0.46	-0.11	0.23	-0.18	0.15	-0.49	-0.18	0.12	-0.04	0.23	-0.50	-0.04	0.42
Competitor-Driven Capabilities	-0.02	0.12	-0.25	-0.01	0.22	-0.00	0.11	-0.21	0.00	0.20	-0.03	0.16	-0.34	-0.02	0.28
Supplier-Driven Capabilities	-0.35	0.26	-0.86	-0.35	0.18	-0.18	0.23	-0.63	-0.18	0.29	0.18	0.35	-0.50	0.17	0.88
Technology-Monitoring Capabilities	0.03	0.09	-0.15	0.03	0.19	0.03	0.08	-0.12	0.04	0.18	-0.02	0.12	-0.25	-0.02	0.20
Customer-Relating Capabilities	**0.31**	**0.17**	**-0.03**	**0.31**	**0.65**	0.20	0.15	**-0.10**	**0.19**	**0.50**	**-0.49**	**0.23**	**-0.94**	**-0.50**	**-0.03**
Supplier-Relating Capabilities	**0.24**	**0.17**	**-0.09**	**0.24**	**0.57**	0.12	0.15	-0.17	0.12	0.41	0.00	0.22	-0.43	0.01	0.44
mspe	1.41	0.23	1.01	1.39	1.90	1.09	0.18	0.78	1.07	1.47	2.48	0.40	1.79	2.45	3.35
Deviance	213.7	4.18	207.6	213.0	223.8	191.5	4.18	185.5	190.9	201.7	262.8	4.19	256.8	262.2	273.1
P_D	8.07					8.07					8.07				
DIC	221.7					199.6					270.9				

mspe is the mean square prediction error, P_D is the effective number of parameters and DIC is the deviance information criterion.

Table 7.4: Outcomes strategic marketing capabilities-relationship quality link

cating the effect of competitor-driven, supplier-driven and technology-monitoring capabilities on the indicators of relationship quality are all statistically nonsignificant. Therefore, hypotheses 2f, 2g, 2h, 3f, 3g, 3h, 4f, 4g and 4h are not supported by the data. Customer-relating capabilities are positively associated with trust (β = .31, sd = .17), negatively related to regret (β = -.49, sd = .23), but not related to relationship commitment (β = .20, sd = .15). In general this provides support for hypotheses 5f and 5h. Contrary to our hypotheses in 1f, 1g and 1h, the results show that supplier-relating capabilities positively but nonsignificantly influence trust (β = .24, sd = .17), commitment (β = .12, sd = .15) and regret (β = .00, sd = .22). Thus, hypotheses 6f, 6g and 6h are not supported.

7.5 Discussion

The advantages of satisfied customers are many (see Fornell, 1992; Anderson, Fornell and Lehmann, 1994). For example, customer satisfaction is generally believed to reduce marketing costs, increase marketing costs for competitors and reduce failure costs. In this study, we address how an organization's strategic marketing capabilities affect customer perceived quality. The results described in the previous section highlight some of the unique insights that emerge from this study.

Market orientation literature suggests that firms with strong market-driven capabilities are more likely to outperform competitors on relative value provided to customers (e.g., Narver and Slater, 1990; Noble, Sinha and Kumar, 2002). Recently, Slater and Narver (2000, p. 120) argue that "It has become conventional wisdom that an organization's ability to continuously generate intelligence about customer's expressed and latent needs, and about how to satisfy those needs, is essential for it to continuously create superior customer value." However, the data only partially support this proposition. The outcomes are in line with Langerak's (2001) and Sigauw et al.'s (1998) findings. These results lead to a dilemma: is a customer orientation not important in satisfying customers? Hamel and Prahalad (1994) already question the worth of a customer orientation; they argued that "customers are notoriously lacking ...". This could indicate that customer-driven capabilities

are essential but not sufficient to create customer satisfaction. We speculate that this relationship may be mediated (Schneider et al., 1998) or moderated (Rindfleisch and Moorman, 2003) by other variables. Therefore, it appears that the relationship between customer orientation and perceived quality has not been fully explained.

This study suggests that a firm's ability to generate, disseminate and respond to relevant competitor's actions and strategies is a major component in satisfying customers in this industry. This outcome can be explained using the equity theory. Equity refers to "the ratio of one person's outcomes to inputs is equal to the other person's outcome/input ratio" Walster and Walster (1975, p. 21). Because customers are highly informed they can make this comparison very easily. They know the assortment and the prices of different suppliers. Another plausible explanation is that perceived value is typically a relative judgement; customers evaluate a certain brand (relationship) as good in comparison with other similar brands (relationships). Companies are then probably more able to provide value for customers when they offer a relatively better service and/or product to customers; a better offering than the competitors.

The analysis indicates that an emphasis on technology do not influence quality, as perceived by customers. This suggests that market-driving by technology may not be a feasible strategy to follow in the wholesale setting. A possible reason for these outcomes is that technology-monitoring capabilities are already highly developed in wholesaling and do not give a comparative advantage to these companies.

The past decade has witnessed an increase of interest in customer relationship development and management (e.g., Kalwani and Narayandas, 1995; Verhoef, 2003; Webster, 1992). The basic notion is that developing and maintaining strong relationships with customers (and stakeholders) may stimulate performance; for example, by sharing critical resources and facilitating knowledge transfer (Hardy, Phillips and Lawrence, 2003). This study provides support to this perspective. It is found that organizations excel when they develop and maintain customer-relating capabilities more effectively than their rivals do. Hence, this leads us to believe that building and maintaining strong relationships may be a viable strategy for wholesalers to satisfy customers.

Marketing researchers often argue that a company has to reduce the number of suppliers and has to develop, build and enhance relationships with these suppliers (Geyskens, Steenkamp and Kumar, 1998). The data support this view. The results suggest that development of high supplier-driven capabilities has a negative effect on perceived quality. Hence, firms that are strongly oriented toward their suppliers are less able to satisfy customers. On the other hand, firms with strong supplier-relating capabilities are more likely to satisfy customers. Building strong relationships with suppliers is only possible when a company selects a small number of suppliers. This may have a positive effect on satisfaction, trust and commitment (Anderson and Narus, 1990; Anderson and Weitz, 1992; Doney and Cannon, 1997; Morgan and Hunt, 1994). Furthermore, this could decrease the transaction costs for both the customer and supplier.

The attainment of market performance is achieved by developing market-relating capabilities, but not market-driven capabilities, more efficiently and ef-

fectively than competitors. A plausible explanation is that market-relatedness has a direct effect, while market-drivenness has an indirect effect on market performance, possibly through innovativeness. Taking the results outlined in chapter 5 into account it appears that the 'relational view of competitive advantage' is most likely to be the winning marketing strategy for wholesalers. To generalize the findings, however, more empirical work must be done to explore and explicate the value of strategic marketing capabilities to business performance.

7.6 Management Implications

The preceding analyses highlight some basic strategies for developing and managing marketing strategies. For example, to increase the chance of satisfying customers, companies have to be aware that they will not be driven by suppliers but to engage in strong relationships with their customers (and suppliers). A consequence of this strategy is the importance of cutting the number of suppliers and building relationships only with those suppliers who are able to deliver valuable services and products.

The analyses also reveal the importance of competitor-driven capabilities in satisfying customers. Based on this outcome, we believe that wholesale companies have to focus primarily on competitors (and certainly not on their suppliers). Although superior customer-driven capabilities do not facilitate perceived quality, it is not recommended to neglect customers. It is highly advisable to promote and develop competitor-driven capabilities while maintaining high levels of customer-driven capabilities.

7.7 Conclusion

The goal of this study is to provide a first step in investigating the consequences for customers of developing strong strategic marketing capabilities. We use a dyadic approach, linking customer quality perceptions to management reports. A dyadic approach has the advantage of eliminating the problems of common method variance. Furthermore, the customer's (supplier's) perceptions are explicitly dealt with in estimating and discussing the results. The dyadic approach reveals very interesting outcomes. The results suggest that some capabilities do influence customer perceptions of quality whereas others do not. This leads us to conclude that the management of strategic marketing capabilities is a rather complex task and deserves attention from the top management. Furthermore, an integrated construct of marketing could enhance our understanding of marketing and could be a very interesting avenue for further research. Taking the importance of both an integrated model of marketing and a dyadic approach in estimating and analyzing the model, we conclude that future research including these two perspectives is necessary.

Chapter 8

Revisiting the Service-Profit Chain Framework: Extension of Theory and an Empirical Assessment

Abstract Considerable progress has been made in identifying the elements in the service-profit chain. Despite the recent progress, troubling gaps and shortcomings remain. To fill these gaps, we extend the 'service-profit chain' framework by explicitly incorporating the service operations management and relationship marketing perspective into this model. In this extended framework, we model the relationship between organizational service capabilities and profitability as a chain of effects. To estimate this model, we use dyadic data obtained from the suppliers and their customers. We discuss and apply bootstrap methods, which are recently recommended to assess the strength of mediation. Our findings indicate support for this extended service-profit chain model. The results support the following service-profit chain: organizational service capabilities → employee service capabilities → internal service outcomes → service relationships management → external service outcomes → financial performance. The implications of these finding for future research and for service firms are addressed.

8.1 Introduction

The field of services marketing management has undergone tremendous growth in popularity among both academics and practitioners over the past two decades. During this period, several concepts and views have been developed. Generally, these concepts largely emphasize the interrelationships between operational service variables, market performance (i.e., service quality) and financial performance. The most general model in this field is the service-profit chain (Heskett, Jones, Loveman, Sasser and Schlesinger, 1994). This framework aims to detect the (financial) consequences of internal service quality by modeling the relationship between internal service quality and profitability as a chain of effects. Empirically, Heskett et al. (1997) collect evidence from 20 service organizations, lending support to some of the linkages in this model.

Despite the recent progress in understanding the service-profit relationship (e.g., Bowman and Narayandas, 2004; Heskett et al., 1994; Kamakura, Mittal, de Rosa and Mazzon, 2001; Soteriou and Zenios, 1999) troubling gaps and shortcomings remain. First, the service-profit chain (SPC) framework is rather simplistic. In general, the importance of internal service quality is largely emphasized in these models and as a consequence little research has been conducted investigating other relevant service operations, such as customer orientation and service technology. In

this respect, Kamakura et al. (2002) argue that studies investigating comprehensive models of customer assessments, service operations, and outcomes are lacking. Second, researchers have largely studied specific links (of the service-profit chain framework) in isolation (e.g., Anderson and Mittal, 2000; Roth and Jackson, 1995; Schneider et al., 1985; Schneider et al., 1998; Soteriou and Zenios, 1999), which led to mixed and inconsistent findings. Third, although customer relationship management is found to influence both market performance (i.e., service quality) and financial performance and furthermore is affected by internal service operations, little research has been conducted investigating its relevance to the SPC framework.

To fill these gaps, we extend the SPC focus by incorporating other relevant service-related operations into the SPC framework. This is in line with recent research (see for example, Bowman and Narayandas, 2004; Kassinis and Soteriou, 2003). The general assumption behind our (extended) framework is that service-oriented organizations are committed to fulfill the needs of the customer as well as the needs of the service provider (this is basically Schneider et al.'s (1998) 'service climate' and Roth and Jackson's (1995) 'service capability' thesis). The rationale behind this is that service providers build relationships with customers and are therefore responsible for the fulfillment of the needs of customers (Grönroos, 2000). Furthermore, customer relationship management balances the customer–service provider linkage, which is largely seen as a shortcoming of the classical SPC framework. Finally, customer perceived outcomes positively influence business performance. Summarizing the previous, we model the relationship between organizational service operations/capabilities[1] and profitability as a chain of effects. First, the organizational service capabilities influence employee service capabilities. Second, improved employee service capabilities result in positive internal service outcomes. In turn, internal service outcomes affect customer-linking operations. Fourth, customer-linking operations lead to external service outcomes. Finally, the increased external service outcomes lead to greater profitability.

In our extended SPC framework, mediation takes a central role. To detect the degree or strength of mediation, several methods have been proposed in the psychometric literature. Two methods have become influential and widely used: (1) Baron and Kenny's (1986) test, and (2) Sobel's (1982) method. However, these classical methods have been criticized (Shrout and Bolger, 2002; MacKinnon et al., 1995; MacKinnon et al., 2002; MacKinnon, Lockwood and Williams, 2004). To overcome problems associated with the previously mentioned methods, several researchers propose to use bootstrap inference (Efron and Tibshirani, 1993) to assess (the strength of) mediation (MacKinnon et al., 2004; Shrout and Bolger, 2002).

This chapter develops and extends the classical SPC framework. Furthermore, we put this framework into an empirical examination, using data from both wholesalers (suppliers) and their customers. Dyadic data is most suitable and appropriate when investigating the linkages from suppliers to customers. To investigate the sig-

[1]Note that service management strategists frequently address the importance of organizational service operations in explaining both service outcomes and financial performance (e.g., Roth and Jackson, 1995; Soteriou and Chase, 2000; Soteriou and Zenios, 1999).

nificance of the mediators, we use bootstrap methods.

This chapter is organized as follows. We briefly review the 'service-profit chain' literature. Next, we present our extended SPC model. Then, we formulate the hypotheses. Thereafter, the data collection approach and methods of analysis are described. Finally, we present the results and discuss their consequences for both marketing science and practice.

8.2 Background

The 'service-profit chain' framework has been the focus of a great deal of academic study. The general idea is that the relationship between service operations and business performance may be modeled as a chain of effects. In this context, two streams of research may be identified. The first stream actually investigates a 'service-satisfaction chain.' This stream of research aims identifying the relationship between service operations and service quality. Two models dealing with this framework are (1) the service climate model (Schneider et al., 1980; Schneider et al., 1985; Schneider et al., 1998), and (2) the gap model (Brown and Swartz, 1989; Parasuraman et al., 1985; Zeithaml et al., 1988). The service climate model's general thesis is that a customer service-oriented climate both influences employee's and customer's perceptions of value. The main outcome of this stream of research is that it is unwise to develop strategies and tactics, such as behavioral-based rewards, that may motivate employees to deliver excellent service if their working conditions prevent them from doing so. However, after two decades of research, Schneider et al. (1998) state that "We suspect that much of what we have called 'service climate' will map well onto what services marketing researchers are calling 'market orientation'" (p. 160). Concerning the second model, Zeithaml et al. (1988) develop an extended model of service quality to examine the internal gaps that impede the delivery of high service quality (see Parasurman, Zeithaml and Berry, 1985). Although their thesis is clear and sound, subsequent research could not support most of their propositions (Parasuraman et al., 1990).

The second stream in this field emphasizes a more aggregate model of the 'service-profit chain' framework.[2] This model actually incorporates the variables largely emphasized in the 'service-satisfaction chain' and is basically a generalization of the previously mentioned framework. Three models dealing with the general 'service-profit chain framework' are: (1) the service-profit chain (Heskett et al., 1994), (2) the service capability framework (Roth and Jackson, 1995) and (3) the return on quality model (Rust et al., 1995).

Concerning the first framework, Heskett et al. (1994) introduce this model, which emphasizes the human factor in delivering service value and in turn profitability. They develop this model from their analysis of successful service organizations. Heskett et al. (1994) depict the relationship between services and profit as a chain

[2]Note that this stream of research basically incorporates the (nested) 'satisfaction-profit chain' framework (Anderson and Mittal, 2000). Therefore, we did not include this framework as a third stream of research.

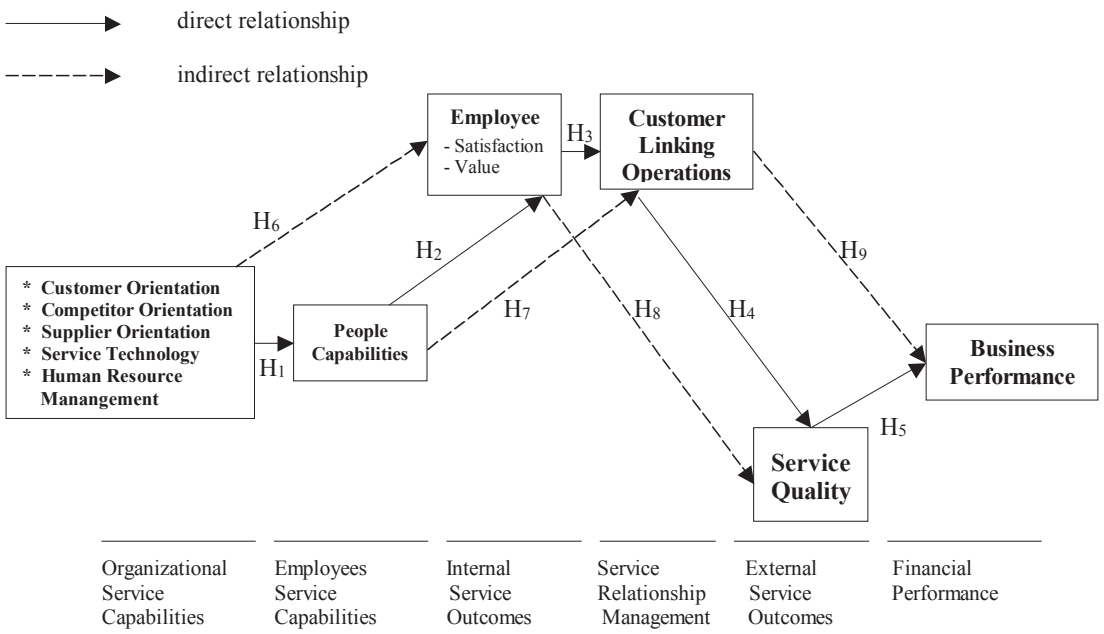


Figure 8.1: Extended Service-Profit Chain Framework

of effects: "Profit and growth are stimulated primarily by customer loyalty. Loyalty is a direct result of customer satisfaction. Satisfaction is largely influenced by the value of services provided to customers. Value is created by satisfied, loyal and productive employees and employee satisfaction results primarily from high-quality support services and policies that enable employees to deliver results to customers" (p. 164-165). Although some researchers have empirically investigated this framework (e.g., Rucci et al., 1998; Kamakura et al., 2001), their results and ample other research suggest that other operational variables may influence both employee- and customer-based advantage and business performance (e.g., Roth and Jackson, 1995; Schneider et al., 1998). The service capability model basically suffers from the same problems. In this model, the relationship between human resources and service quality perceptions is largely emphasized (e.g., Soteriou and Chase, 2000; Soteriou and Zenios, 1999); other relevant variables, such as customer orientation and employee attitude, are ignored. Concerning the return on quality model, this is a quite abstract framework, although Rust et al. (2004) recently made an attempt to implement this model.

8.3 Conceptual Framework

In developing our framework, we integrate the previously mentioned models. These are largely complementary in nature and an integration of these models may enhance our understanding of the development of market-based performance. We also extend the SPC framework by explicitly incorporating the 'customer relationship management' perspective into our framework.

Basically, our conceptual framework builds on Heskett et al.'s (1994) classical framework and upgrades it by incorporating other relevant service-related operations and the customer relationship management perspective. We model the relationship between organizational service capabilities and profitability as a chain of effects (Figure 8.1). First, the organizational service capabilities influence employee service capabilities. Second, improved employee service capabilities result in positive internal service outcomes. In turn, internal service outcomes affect the management of service relationships. Fourth, service relationship management leads to external service outcomes. Finally, the increased external service outcomes lead to greater profitability. We now focus on the extension of the classical SPC framework. These extensions of the classical SPC framework will be discussed.

8.3.1 Organizational Service Capabilities

As mentioned earlier, the aim of this study is to extend the service-profit chain framework. The first step in extending this framework is by incorporating other relevant internal organizational service capabilities into the classical SPC framework. Integrating Roth and Jackson's service capabilities model into the SPC framework suggests the incorporation of service technology as a critical organizational service capability (see also Chase and Bowen's (1991) typology). The service climate literature indicates the relevance of market-orientation in satisfying both employees and customers. The following market orientation dimensions are relevant (Langerak, 2001): (a) customer orientation, (b) competitor orientation, and (3) supplier orientation. In summary, the integration of service capability and service climate into the SPC framework result in the identification of five relevant service organizational capabilities (see also, Chase and Bowen, 1991; Grönroos, 1997; Parasuraman and Grewal, 2000; Schneider and Bowen, 1999; Schneider, Parkington and Buxton, 1980): (1) customer orientation, (2) competitor orientation, (3) supplier orientation, (4) service technology, and (5) human resource management. These capabilities are generally viewed as critical in (ultimately) delivering superior services (Albrecht and Zemke, 1985; Berry, Contant and Parasuraman, 1991; Schneider and Bowen, 1995; Schneider, Wheeler and Cox, 1992).

8.3.2 Employee Service Capabilities

The second extension concerns the inclusion of employee service capabilities as a consequence of organizational service capabilities and as a determinant of employee attitudes. A central role for frontline employees' capabilities in the employee–organization link is frequently suggested by organizational psychologists (e.g., Schneider et al., 1980; Schneider et al., 1985) and organizational behaviorists (e.g., Bettencourt and Brown, 1997; Bettencourt, Meuter and Gwinner, 2001; Organ and Ryan, 1995). The rationale behind this is, as expressed by Berry and Parasurman (1992, p. 25), that "customers "buy" the people when they buy a service." Therefore, Berry (1986) argues that a central question in services marketing is how to "give contact employees the knowledge and skills to be effective marketers."

Similarly, Bitner (1995) states that in order for employees to deliver superior service and build long-term relationships, they must posses certain capabilities and skills.

8.3.3 Service Relationship Management

We further extend the classical SPC framework by proposing a central role for 'service relationship management' in developing a market-based advantage. The rationale behind this link is fivefold. First, it is largely recognized that the service experience, which basically distinguishes one service firm from another, is a result of the unique interaction or number of interactions between customers and the supplier (Solomon, Surprenant, Czepiel and Gutman, 1985). The economic sociology literature (Granovetter, 1985) also argues that economic transactions take place within the context of relationships. Second, marketing scholars argue that there has been a shift from a transaction to a relationship focus (Day and Montgomery, 1999; Gronroos, 1994; Gummesson, 1994) and that customer relationships will be seen as the key strategic resource of the business (Webster, 1992). Empirically, the link between service relationship management and market-based advantage, i.e., service quality and business performance, is largely suggested in the marketing literature (e.g., Kalwani and Narayandas, 1995). Third, a problem of the classical SPC framework is the relationship between both employee attitude and productivity/retention and customer perceived outcomes. For example, Silvestro and Cross (2000) find no significant correlations between service value and employee satisfaction. Furthermore, which is far more evident, the nature of the relationship between job satisfaction and job performance remains unclear (e.g., Ryan, Schmit and Johnson, 1996; Brown and Peterson, 1993). By incorporating service relationship management as a mediator between employee attitude and service quality in our framework, we seek to contribute to this stream of literature. Fourth, the rites of integration perspective, which refers to planned (social) interactions that have the objective of achieving 'a temporary sense of closeness' between customers and service providers (Siehl, Bowen and Pearson, 1992, p. 537), supports the incorporation of service relationships into the SPC framework. Siehl et al.'s (1992) main thesis is that service organizations design rites of integration to produce a necessary level of psychological closeness, which, in turn, affects a favorable evaluation, by customers, of the service delivery process. Fifth, since service quality is hard to assess (Parasuraman et al., 1985) it is suggested that firms will suboptimally hire low ability workers (see for a discussion, Levin and Tadelis, 2005). Therefore, Levin and Tadelis (2005) recently propose 'partnership' to alleviate these problems. Their central thesis is that close relationships will emerge when human capital plays a central role in delivering quality and when customers are at a disadvantage relative to firms in assessing the ability of employees.

8.4 Hypotheses

In our conceptual framework, we assume both direct (or main) and indirect (or mediation) effects. Basically, the core thesis is the explicit relatedness of the links. For example, it is more likely that organizational service capabilities influence employee service capabilities whereas the relationship between organizational service capabilities and service quality is less likely to occur. Since the direct effects are essential in the SPC framework, we first outline the direct effects. Then we propose the indirect effects.

8.4.1 Direct Effects

Link 1: Organizational Service Capabilities → Employee Service Capabilities The first part of our conceptual framework deals with the relationship between organizational service capabilities (customer orientation, competitor orientation, supplier orientation, service technology and human-resource management) and employee service capabilities. This is in line with Hallowell et al.'s (1996) proposition that if an organization delivers good service to its employees, enabling them to deliver superior services to customers, the employees will feel they have the ability to serve customers well. Specifically, the proposed relationship between human resource capabilities and people capabilities is in line with the human resource management literature (e.g., Kamoche, 1996; Lado and Wilson, 1994) and services marketing (Berry and Parasuraman, 1992; Bowen and Lawler, 1992; Levin and Tadelis, 2005; Schneider and Schechter, 1991). Proposing a direct effect of service technology on people capabilities, Roth and Jackson's (1995) analysis confirms this relationship. Marketing researchers suggest that market orientation may influence people capabilities (Kohli and Jaworski, 1990; Sigauw, Brown and Widing, 1994). For example, Langerak (2001) proposes a direct effect of a firm's market orientation on the customer orientation of salespeople, as reported by customers. His data supports the proposed relationship. In summary, we propose that

hypothesis 1 the higher the organizational service capabilities, the higher the employee service capabilities

Link 2: Employee Service Capabilities → Internal Service Outcomes The relationship between people capabilities and employee satisfaction is often proposed (e.g., Mengüç, 1996; Sigauw et al., 1994; Spreitzer et al., 1997). Berry and Parasuraman (1992, p. 28) state that "Employees are unlikely to be motivated to perform services they do not feel competent and confident to perform." Sigauw et al. (1994) hypothesize a direct relationship between salespeople customer orientation and job satisfaction. However, their proposition is not supported. In a replication study, Mengüç (1996) reveals a significant relationship between customer orientation of the salesperson and employee satisfaction. Spreitzer et al. (1997) argue that "it makes intuitive sense that those who feel more competent about their work are likely to feel more satisfied about their work." Empirically, Thomas and

Tymon (1994) find that competence is related to lower levels of strain in a sample of managers. They did not find support for the relationship between competence and work satisfaction. In their second sample, however, the competence dimension predicted work satisfaction. In line with the former, we propose a positive effect of people capabilities on both employee satisfaction and value.

hypothesis 2 the higher the firm's employee service capabilities, the higher the following internal service outcomes: (a) employee satisfaction, and (b) employee value

Link 3: Internal Service Outcomes → Service Relationship Management Concerning the relationship between internal service outcomes and service relationship management.[3] relative little theoretical and/or empirical research exists. A notable exception is Bettercourt and Brown (1997), who propose and report a nonsignificant relationship between job satisfaction and cooperation (as part of contact employee prosocial service behaviors). There is however some literature implicitly suggesting a link between internal aspects of performance and customer-linking operations. Motowidlo and Van Scotter (1994) propose a "contextual performance" construct. Their main thesis is that individuals contribute to organizational effectiveness by doing things that are not main tasks but are important in shaping the organizational and social 'context' that supports task activities. Extrapolating this idea to an interorganizational perspective, we argue that a (boundary-spanning) contextual performance, such as helping customers and collaborative information sharing with customers, could be a consequence of employee attitude[4] and is essential for developing superior service quality. The social exchange theory, which posits that employees will engage in reciprocal behavior with those from whom they benefit, suggests that higher levels of employee satisfaction will stimulate employees to express service-oriented behaviors. Pruden and Reese (1972) demonstrate that highly satisfied salesmen tend to avoid interorganizational conflict. In summary, when the organizational objectives imply the delivery of superior service through service encounters, employee satisfaction is very likely to determine a salesperson's relationship-driven behavior. So,

hypothesis 3 the higher the internal service outcomes, the higher the customer-linking operations

Link 4: Service Relationship Management → External Service Outcomes The relationship between service relationship management and external service outcomes, as perceived by customers, is rather compelling.[5] The rationale be-

[3]In this study we use a proxy for service relationship management, which we call customer-linking operations.

[4]We believe that employee attitude is a critical driver of boundary–spanning contextual performance. For example, Organ and Ryan (1995), in a review of 55 studies, conclude that employee attitudes are robust predictors of organizational citizenship behavior.

[5]We define service quality, following Bitner and Hubbert (1994), as a customer's overall evalu-

hind this is twofold. First, the customer may perceive these relationship building activities as an investment of the focal firm. For example, Cannon and Homburg (2001) discuss the effect of relational processes on customer costs and find some evidence indicating a negative relationship. Second, it is largely suggested that a service relationship strategy is more likely to result in positive customer perceptions (Crosby, Evans and Cowles, 1990). Empirically, Soteriou and Chase (1998) investigate the relationship between customer contact dimensions (communication time and intimacy) and service quality and found support for their customer contact model. Anderson and Narus's (1990) analysis demonstrates a positive relationship of both communication and cooperation on trust, which, in turn, influences satisfaction. Crosby, Evans and Cowles (1990) report a significant positive effect of relational selling behavior on relationship quality.

hypothesis 4 the higher the customer-linking operations, the higher the service quality, as perceived by customers

Link 5: External Service Outcomes → Financial Performance The relationship between service quality, as perceived by customers, and business performance has received a great deal of attention in marketing (Zeithaml, 2000). Research suggests that it is satisfaction and loyalty that lead to quantitative outcomes (e.g., Anderson, Fornell and Lehmann, 1994; Fornell, 1992; Ittner and Larcker, 1999). In a recent study, Pugh, Dietz, Wiley and Brooks (2002) show that a 1.3 improvement in customer ratings of the sales staff led to a .5 percent improvement in sales, which in this case translated into an additional 4 million dollar in revenue. Hence,

hypothesis 5 the higher the service quality, as perceived by customers, the higher the financial business performance

8.4.2 Indirect Effects

The previous section outlined the direct effects representing subsequent linkages. Our conceptual framework also suggests indirect effects (see Figure 8.1). In general, an indirect effect occurs when the main effect of the independent variable on the mediator and the effect of the mediator on the dependent variable are both significant (in the method section we discuss a formal method to detect mediation significance). We propose the following mediation effects

hypothesis 6 organizational service capabilities influence internal service outcomes indirectly by increasing employee service capabilities

hypothesis 7 employee service capabilities have an indirect effect on customer-linking operations through both dimensions of internal service outcomes

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ation based on all encounters and experiences with a specific organization.

hypothesis 8 internal service outcomes indirectly influence service quality through customer-linking operations

hypothesis 9 customer-linking operations have an indirect effect on financial performance through service quality

8.4.3 Database & Measurement

Data for this study are collected in 2003 as part of a larger research project which required two stages of data collection. The process of data collection is already described in the previous chapters. For this chapter, we have 57 matched sets (a total of 114) of questionnaires from wholesalers and their customers suitable for our analysis.

Scales of the constructs we examine are available in the literature or could be easily derived from previous work and modified to suit our research setting (see Table 8.1). All items of these scales, with the exception of the employee value scale, are measured on a seven-point scale. Items of the employee value construct are measured on a four-point scale. Table 8.1 summarizes the construct and the corresponding fit statistics (see Appendix F).

8.4.4 Methods of Analysis

To test the hypotheses, we use two methods: (1) standard linear regression analysis, and (2) mediation analysis. Specifically, to estimate the direct (main) effect, we apply ordinary least squares regression (OLS). Although our dyadic data are limited, a sample size of 57, the models could be easily estimated; all the models incorporate three, four or five independent variables. For example, for our five main-effect model, we have a sample size/independent variables ratio of approximately 10. Generally, a ratio of 5 or 10 is recommended (Hair et al. 1998). Finally, to assess mediation we use the bootstrap methods. Since the bootstrap method is recently recommended and classical methods have some serious limitations, we discuss these methods in-depth.

Classical Mediation Tests

Besides the hypothesized direct effects, we provide a test for the mediation hypothesis by applying mediation analyses. Mediation analysis or analysis of indirect effects may be utilized to assess the indirect effect, which exists when an independent variable causes a mediating variable, which, in turn, causes a dependent variable (Sobel, 1990). Two tests widely used are (1) Baron and Kenny's (1986) causal steps method, and (2) Sobel's (1982) product of coefficient test.

Baron and Kenny's Causal Steps Method Baron and Kenny (1986) introduce a method, based on a causal steps approach, to assess mediation. This method involves the estimation of a direct effects model, eliminating the mediation

Construct	Fit Statistics
Customer Orientation (Kohli and Jaworski, 1990; Jaworski and Kohli, 1993)	Chi Square = 3.75, d.f. = 6, p = .71, NNFI = 1.00, CFI = 1.00, IFI = 1.00; GFI = .99; RMSEA = .00; SRMR = .022
Competitor Orientation (Narver and Slater, 1990; Jaworski and Kohli, 1993)	Chi Square = 9.04, d.f. = 6, p = .17; NNFI = .99; CFI = .99; IFI = 1.00; RMSEA = .061; SRMR = .025.
Supplier Orientation (Langerak, 2001)	Chi Square = 6.29, d.f. = 6, p = .39, NNFI = 1.00, CFI = 1.00, IFI = 1.00; GFI = .98; RMSEA = .019; SRMR = .026
Service Technology (Bharadwaj, 2000)	Chi Square = 1.15, d.f. = 1, p = .28; NNFI = 1.00; CFI = 1.00; IFI = 1.00; GFI = 1.00; RMSEA = .033; SRMR = .007
Human Resource Management (Hartline and Ferrell, 1996; Lytle, Hom and Mokwa, 1998)	Chi Square = 23.2, d.f. = 16, p = .11; NNFI = .97; CFI = .98; IFI = .98; GFI = .96; RMSEA = .058; SRMR = .037
People Capabilities (Roth and Jackson, 1995)	Chi Square = 16.27, d.f. = 13, p = .23, NNFI = .99, CFI = 1.00, IFI = 1.00; GFI = .97; RMSEA = .043; SRMR = .036
Internal Service Outcomes (Churchill, Ford and Walker, 1974)	Chi Square = 3.78, d.f. = 1, p = .05, NNFI = .86, CFI = .98, IFI = .98; GFI = .99; RMSEA = .14; SRMR = .034
Customer-Linking Operations (Buvik and John, 2000; Cannon and Homburg, 2001; Lusch and Brown, 1996)	Chi Square = 2.42, d.f. = 1, p = .12; NNFI = .96; CFI = .99; IFI = .99; GFI = .99; RMSEA = .10; SRMR = .018
Service Quality (Parasuraman, Zeithaml and Berry, 1988)	Chi Square = 54.32, d.f. = 25, p = .00, NNFI = .99, CFI = .99, IFI = .99; GFI = .98; RMSEA = .049; SRMR = .022
Business Performance (Lusch and Brown, 1996)	Chi Square = 3.40, d.f. = 2, p = .18; NNFI = .99; CFI = 1.00; IFI = 1.00; RMSEA = .072; SRMR = .021

Table 8.1: Constructs and Fit Statistics

variable and comparing the direct effects with the corresponding coefficients from a model that includes the mediation variable. A full mediation is indicated if (1) the independent variable (X) produces significant effects on the dependent variable (Y), (2) the independent variable (X) significantly influences the mediator (M), (3) the mediator (M) has a significant effect on the dependent variable (Y), and (4) the effect of the independent variable (X) becomes statistically insignificant when introducing the mediator variable (M) in the model. Partial mediation is indicated when the direct effect of the independent variable(s) reduces but does not become nonsignificant in the fourth step.

Sobel's Product of Coefficient Test Another approach to investigate mediation is the so called product of coefficient method. This approach involves testing the significance of the mediating variable effect by dividing the estimate of the product of the direct effect of X on M (α) and M on Y (β) ($\alpha\beta$) by its standard error and compare this value to a standard normal distribution (MacKinnon et al., 2002, p. 89). MacKinnon et al. (1995) and Shrout and Bolger (2002) argue that

mediation occurs when the estimated indirect effect ($\alpha\beta$) is nonzero and significant. This effect, however, is subjected to estimation error. Therefore, the standard error of the indirect effect can be estimated by using Sobel's (1982) large-sample formula. This standard error, based on first-order Taylor series approximation of the product of α and β, may be expressed as $s_{\hat{\alpha}\hat{\beta}} = \sqrt{\hat{\alpha}^2 s_{\hat{\beta}}^2 + \hat{\beta}^2 s_{\hat{\alpha}}^2}$ This formulae tests whether the indirect effect is different from zero through z statistics and constructs a confidence interval. An often used confidence interval (95%) for the indirect effect is $(\hat{\alpha}\hat{\beta}) \pm s_{\hat{\alpha}\hat{\beta}} z_{.975}$ where z equals the constant 1.96.

Comments on the classical mediation tests Baron and Kenny's (1986) causal steps method of examining the significance of the mediation effect has been criticized (MacKinnon et al., 2002; Shrout and Bolger, 2002). First, some researchers have questioned the necessity of testing the overall association in step 1 (Collins, Graham and Flaherty, 1998; MacKinnon, Krull and Lockwood, 2000). Second, MacKinnon et al. (2002) indicate that Baron and Kenny's (1986) causal steps method have Type I error rates that are too low and have very low power, unless the sample size is large.

Sobel's (1982) approach also has several limitations. First, this method will only yield accurate estimates when the product $\hat{\alpha}\hat{\beta}$ is normally distributed (Shrout and Bolger, 2002). Note however that the product of two normal random variables is not normally distributed (Lomnicki, 1967). Second, several researchers observed that symmetric confidence intervals constructed using normality assumptions tended to give asymmetric error rates (Stone and Sobel, 1990). A consequence of this is the lack of statistical power to reject the null hypothesis that $\hat{\alpha}\hat{\beta}$ equals zero (MacKinnon et al., 2002). Furthermore, recently, MacKinnon et al. (2004) indicate that more accurate confidence limits are obtained using resampling methods. In their study, they found the (bias-corrected) bootstrap method to outperform other methods.

Bootstrap Method

To overcome the limitations associated with Baron and Kenny's (1986) and Sobel's (1982) methods, Shrout and Bolger (2002) argue that with nonsymmetric confidence intervals for $\alpha\beta$, as in our case, bootstrap methods should be used to assess mediation. Furthermore, this alternative for the classical methods is especially recommended when the sample size is rather small. Because this is the case in our study, and also usually the case in many services marketing studies, we investigate the mediating role of our mediators, applying bootstrap inference[6] in calculating the standard error.

Efron's (1979) bootstrap approach allows the distribution of $\hat{\alpha}\hat{\beta}$ to be examined empirically, which may determine a possible mediation and the strength of this mediation. Efron and Tibshirani (1993) suggest a percentile interval with cutpoints

[6]Chernick (1999) defines bootstrap as follows (p. 7): "Given a sample of n independent identically distributed random vectors X_1, X_2, ..., X_n and a real-valued estimator $\theta(X_1, X_2, ..., X_n)$ of the distribution function parameter θ, bootstrap methods assess the accuracy of $\hat{\theta}$ as defined in terms of the empirical distribution function F_n."

	MEAN	SD.	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Customer Orientation (X1)	5.56	.64	-										
Competitor Orientation (X2)	4.64	1.04	.41**	-									
Supplier Orientation (X3)	5.38	.81	.45**	.62**	-								
Service Technology (X4)	5.05	1.40	.25	.17	.21	-							
Human Resource Management (X5)	5.00	.88	.54**	.40**	.51**	.23	-						
People Capabilities (X6)	5.52	.75	.62**	.60**	.61**	.08	.67**	-					
Employee Satisfaction (X7)	3.36	.51	.41**	.22	.30	.07	.51**	.51**	-				
Employee Value (X8)	2.92	.51	.09	.09	.27	.14	.31*	.37**	.32*	-			
Customer-Linking Operations (X9)	5.38	.81	.40**	.34*	.35*	.23	.34**	.42**	.36**	.20	-		
Service Quality (X10)	5.74	.53	.03	.00	-.08	-.01	-.02	.14	-.01	.04	.08	-	
Business Performance (X11)	5.13	.90	.30*	.21	.23	.26	.18	.29*	.00	.08	.33**	.29*	-

** Correlation is significant at the .01 level

* Correlation is significant at the .05 level

Table 8.2: Descriptive Statistics and Correlations

that exclude $(\alpha/2)$ x 100% of the values from each tail of the empirical distribution. Following Shrout and Bolger (2002), we construct a bootstrap distribution and investigate the significance of the mediation by the following steps: (1) using the original data set as a population reservoir, we create many bootstrap replicate data sets ($N = 1000$) by randomly sampling observations with replacement from the data set, (2) for the bootstrap sample, we estimate both the $\hat{\alpha}$ and $\hat{\beta}$, (3) we investigate the distribution of the estimates and determine the $(\alpha/2)$ x 100% and $(1-\alpha/2)$ x 100% percentiles of the distribution, (4) we estimate $s_{\hat{\alpha}\hat{\beta}} = \sqrt{\hat{\alpha}^2 s^2_{\hat{\beta}} + \hat{\beta}^2 s^2_{\hat{\alpha}}}$ by using the bootstrap mean and standard error, and (5) we test mediation by calculating $(\hat{\alpha}\hat{\beta}) \pm s_{\hat{\alpha}\hat{\beta}} z_{.975}$.

8.5 Findings

The descriptive statistics and Pearson correlations of the model's variables are shown in Table 8.2. First, the correlation among the organizational service capabilities, except service technology, is significant and exceeds .40, which indicates a strong correlation. Second, the correlation between the organizational service capabilities, except that of service technology, and people capabilities is significant and exceeds .60, indicating a very strong correlation. Third, the correlation between people capabilities and both employee attitude and customer-linking operations is significant and positive. Fourth, the association between employee attitude and customer-linking operations is strong and significant. Fifth, contrary to our expectations, the correlation between customer-linking operations and service quality is nonsignificant. Sixth, consistent with the literature, the correlation between service quality and business performance is significant and strong. This provides us with a first impression of possible relationships between the linkages. To fully investigate these relationships, multiple linear regression is applied. The results of our ordinary least squares regression are presented in table 8.3.

Direct Effects. Hypothesis 1 posits a direct effect of organizational service

	Dependent Variable					
	PC	**ES**	**EV**	**CLO**	**SQ**	**BP**
	Coefficient[a] (s.e.)[b]	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
Independent Variables						
Intercept	1.39 (.541)**	2.07 (.492)***	1.59 (.457)***	3.67 (.729)***	6.17 (.540)***	1.85 (1.241)
Customer Orientation	**.30 (.117)****					
Competitor Orientation	**.18 (.072)****					
Supplier Orientation	.12 (.107)					
Service Technology	-.09 (.045)*					
Human Resource Management	**.30 (.088)*****					
People Capabilities (PC)		**.33 (.077)*****	**.24 (.082)*****			
Employee Satisfaction (ES)				**.48 (.206)****		
Employee Value (EV)				.10 (.205)		
Customer-Linking Operations (CLO)					.06 (.109)	
Service Quality (SQ)						**.47 (.216)****
F- value	18.933***	17.956***	8.360***	3.836**	0.302	4.727**
R^2	.71	.26	.14	.13	.01	.08

* p < .10; ** p < .05; *** p < .01.
[a] unstandardized regression coefficient.
[b] s.e. refers to standard error.
Note: BP refers to Business Performance.

Table 8.3: Direct Effects

capabilities on people capabilities. Our analysis reveals a significant effect of customer orientation ($B = .30$, p = .02), competitor orientation ($B = .18$, p = .02) and human resource management ($B = .30$, p = .00) on people capabilities. Contrary to our hypothesis, we find that people capabilities are not significantly associated with service technology ($B = -.09$, p = .06) and supplier orientation ($B = .12$, p = .26). Therefore, the first hypothesis is partially supported. Table 8.2 reveals a relatively high correlation among the organizational service capabilities. To identify the degree of collinearity between independent variables we use the statistic 'variance inflation factor' (VIF) as the diagnosis tool. VIF values for customer orientation, competitor orientation, supplier orientation, service technology and human resource management are 1.7, 1.9, 2.1, 1.1 and 1.7, respectively. This indicates the absence of serious multicollinearity problems (Hair et al. 1998).

Hypothesis 2 proposes a direct main effect of people capabilities on both employee satisfaction and employee value. The outcomes support this hypothesis. People capabilities have a positive and significant association with both employee satisfaction ($B = .33$, p = .00) and employee value ($B = .24$, p = .00). Hypothesis 3 states that employee attitudes positively influence customer-linking operations. Employee satisfaction has a significant positive effect ($B = .47$, p = .02) on customer-linking operations. However, employee value has a (positive but) nonsignificant effect ($B = .11$, p = .57) on customer-linking operations. Therefore, hypothesis 14 is partially supported.

Hypothesis 4 posits a direct effect of customer-linking operations on service quality. The results in table 8.3 indicate a positive but nonsignificant effect ($B = .06$, p = .10) for this relationship. However, as can be seen, this relationship is just significant at a p-value of .10. Therefore, hypothesis 4 is only supported at an uncertainty level of .10.

	Dependent Variable						
	PC	ES	EV	Indirect Effect			
	Coefficient[a] (s.e.)[b]	Coefficient (s.e.)			Bootstrap Percentile	Bootstrap Mean	Bootstrap SD
Independent Variables							
Customer Orientation (A_1)	**.30 (.117)****				(.09, .52)	.296	.116
Competitor Orientation (A_2)	**.18 (.072)****				(.03, .37)	.175	.080
Supplier Orientation (A_3)	.12 (.107)				(-.11, .40)	.128	.129
Service Technology (A_4)	-.09 (.045)				(-.16, .00)	-.086	.040
Human Resource Management (A_5)	**.30 (.088)*****				(.08, .49)	.297	.108
People Capabilities (B_1)		**.33 (.077)*****			(.20, .45)	.323	.066
People Capabilities (B_2)			**.24 (.082)*****		(.06, .35)	.240	.070
A_1*B_1				**.10 (.009)****	(.01, .18)	.096	.008
A_2*B_1				**.06 (.006)****	(.00, .11)	.057	.005
A_3*B_1				.04 (.009)	(-.04, .13)	.041	.008
A_4*B_1				-.03 (.003)	(-.06, .00)	-.027	.003
A_5*B_1				**.10 (.007)****	(.01, .17)	.094	.007
A_1*B_2				**.07 (.010)****	(.00, .14)	.071	.008
A_2*B_2				.04 (.006)	(-.00, .09)	.042	.006
A_3*B_2				.03 (.009)	(-.03, .09)	.031	.009
A_4*B_2				-.02 (.004)	(-.04, .00)	-.020	.003
A_5*B_2				**.07 (.007)****	(.00, .14)	.070	.008

** p < .05; *** p < .01.

[a] unstandardized regression coefficient.

[b] standard error.

Note: ES is employee satisfaction; EV is employee value.

Table 8.4: Bootstrap Inference: Hypothesis 6 and 7

Finally, in hypothesis 5, we predict a direct effect of service quality on business performance. Our analysis indicates a positive significant effect ($B = .47$, p = .03) of service quality on business performance, lending support for this hypothesis.

Mediation Analysis. Hypothesis 6 posits a indirect effect of organizational service capabilities on internal service quality. Table 8.4 provides the estimated coefficients, indicating whether the mediation is significant or not. Applying Sobel's test using bootstrap inference,[7] we only find a significant indirect effect of customer orientation, competitor orientation and human resource management on employee satisfaction. This provides partial support for hypothesis 6a. Table 8.4, lower part, shows the estimated indirect effect of organizational service capabilities on employee value (hypothesis 6b). The bootstrap percentile results indicate that the indirect effect of both customer orientation and human resource management on employee value is significantly different from zero. Based on this outcome, hypothesis 6b is also partially supported. Hypothesis 7 proposes an indirect effect of people capabilities on customer-linking operations through both employee satisfaction and employee value. The outcomes are shown in table 8.5. In accordance with hypothesis 7, we find a positive significant indirect effect of people capabilities on customer-linking operations (confidence interval (CI): .01, .29) through employee satisfaction. However, the proposed indirect effect of people capabilities on customer-linking op-

[7] We might estimate the 95% bootstrap confidence interval for the indirect effect using $(\hat{\alpha}\hat{\beta}) \pm s_{\hat{\alpha}\hat{\beta}} z_{.975}$. However, this standard error estimate is based on large samples. In calculating the confidence interval for the standard normal confidence interval we use the t-test, value 2.00.

	Dependent Variable								
	ES	EV	CR	SQ	BP	Indirect Effect			
	Coefficient[a] (s.e.)[b]	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)		Bootstrap Percentile	Bootstrap Mean	Bootstrap SD
Independent Variables									
People Capabilities (PC_1)	**.33 (.077)****						(.20, .45)	.323	.066
PC_2		**.24 (.082)****					(.06, .35)	.240	.070
Employee Satisfaction (ES)			**.48 (.209)****				(.12, .90)	.463	.193
Employee Value (EV)			.10 (.205)				(-.29, .43)	.115	.190
PC_1--> ES -->CR						**.16 (.016)****	(.01, .29)	.149	.013
PC_2--> EV -->CR						.02 (.017)	(-.06, .12)	.028	.013
ES			**.48 (.209)****				(.12, .90)	.463	.193
EV			.10 (.205)				(-.29, .43)	.115	.190
CR				.06 (.109)			(-.12, .26)	.062	.098
CR					**.42 (.173)****		(.05, .72)	.040	.183
ES --> CR --> SQ						.03 (.023)	(-.06, .12)	.029	.019
EV --> CR --> SQ						.01 (.022)	(-.03, .04)	.007	.019
CR				.06 (.109)			(-.12, .26)	.062	.098
SQ					**.47 (.216)****		(.06, .81)	.477	.189
CR --> SQ --> BP						.03 (.024)	(-.07, .13)	.030	.018

** p < .05
[a] unstandardized regression coefficient.
[b] standard error.
Note: SQ is service quality and BP is business performance.

Table 8.5: Bootstrap Inference: Hypothesis 8 and 9

erations, through employee value, is not supported (CI: -.06, .12). Hypothesis 8 posits an indirect effect of internal service quality on service quality. However, this hypothesis is not supported by our analysis. Hypothesis 9 proposes an indirect effect of customer-linking operations on business performance through service quality. The confidence interval of bootstrap percentile (-.07, .13) indicates that the indirect effect is not significant. This outcome does not support this proposition leading to the rejection of hypothesis 9.[8]

8.6 Discussion

This study is motivated by three objectives: (1) extension of the classical SPC framework by developing a broader conceptualization of the SPC model, (2) to empirically investigate this extended service-profit chain model, and (3) to apply bootstrap inference as an alternative to the classical methods of mediation analysis. Concerning the proposed conceptual framework, our analysis offers initial support for this model. Based on our main-effects-only and mediation analysis, we found the following chain: organizational service capabilities (customer orientation, competitor orientation and human-resource management) → employee service capabilities

[8] Additional analysis indicate a positive effect of customer-linking operations on business performance. This effect reduces significantly when controlling for service quality (while service quality in the same model has a strong effect on business performance). This led us to believe that service quality possibly mediates the relationship between customer-linking operations and business performance. Although this sounds plausible, we encourage researchers to further investigate this linkage.

→ internal service outcomes → service relationships management → external service outcomes → financial performance.

Concerning the first linkage our analysis provides some support. Both customer orientation and competitor orientation have a direct effect on people capabilities and an indirect effect on employee satisfaction. These findings confirm that of Sigauw et al.'s (1994) and Mengüç's (1996). These researchers detect a strong relationship between market orientation and employee satisfaction. Furthermore, Mengüç (1996) finds that customer orientation of the salesperson influences employee satisfaction. Also, human-resource management is directly related to people capabilities and indirectly related to both employee satisfaction and value. Although some literature suggests (Heskett el al., 1994; Lings, 2004) and indicates (Reukert, 1992) a direct relationship between human-resource management and job satisfaction,[9] we only find an indirect effect through people capabilities. These findings are in line with previous research. For example, Ramaswami and Singh (2003) could not find support for their proposition that fair distribution of rewards influences employee feelings of satisfaction. Preitzer et al.'s (1997) data suggests that empowerment explains a relatively small amount of variance in job satisfaction. Hartline and Ferrel (1996) propose people capability and employee satisfaction as mediators of the relationship between human resource capabilities and service quality. Their findings suggest that behavior-based evaluation has an indirect positive effect on employee satisfaction.

The relationship between employee service capabilities and internal service outcomes is largely supported. First, employee service capabilities directly influence employee attitude and customer-linking operations. Furthermore, they have an indirect effect on customer-linking operations. These findings are in line with organizational psychologists and behaviorists thesis that the internal climate influences employee's motivation and behavior (Organ and Ryan, 1995).

Although it is frequently suggested that a relational orientation enables or creates for the supplier ongoing opportunities to identify the customer's (unmet) needs and desires, we could only find partial support for this proposition. A plausible explanation for this finding may be derived from Cannon and Perreault's (1999) study. Cannon and Perreault's (1999, p. 457) results indicate that "some buyer firms do not want or need close ties with all of their suppliers. They are satisfied with the effective performance of suppliers who simply meet their needs without extensive entanglements." This suggests that a firm task performance, such as (effective) distribution and selling, may also be essential to satisfy customer's needs. Using an uncertainty level of .10 we however find support for this hypothesis. In short, we believe that this linkage is essential and plausible and future research is needed to clarify this issue.

[9]To examine this issue, we estimated two models with organization service capabilities as independent variables and job satisfaction and value as dependent variables. The findings indicate nonsignificant beta coefficients for these models.

8.7 Limitations and Further Research

The generalization of the findings presented in this paper should proceed with caution. As with every study, this research has several limitations. Although investigating a single industry can be valuable, in that it reduces the variation present when observations of many industries are made in the same study, it may decrease the ability to generalize the outcomes. Future research in other settings is necessary to increase the validity of this extended service-profit chain framework. Another limitation of this study is that we measured both employee satisfaction and employee value as the (marketing) managers' perceptions of employee attitude. Although (marketing) managers increasingly interact with customers, this will not always be the case. Therefore, to increase validity, we suggest investigating the extended framework from three perspectives: (1) the customers, (2) the managers, and (3) the front-line employees. We agree with Hartline and Ferrell (1996), who argue that "such an approach would seem preferable [to] asking a single sample (e.g., managers)" (p. 62).[10] Another limitation relates to the fact that customer-linking operations explain rather little variance in service quality. Although customer-linking operations significantly influence business performance, this finding puzzles us and we encourage further research clarifying this linkage.

Several opportunities for further research may be identified. Although we speculate that the SPC framework could be relatively robust in different settings, it is unclear whether all the proposed organizational service capabilities are relevant in other research settings. We also encourage future research identifying other relevant organizational service capabilities.

A contribution of this study is the extension of the 'contextual performance' construct to an interorganizational setting. Although our model dimensions (customer-linking operations) slightly differ from those proposed in organizational psychology, we believe it is a good proxy for an interorganization contextual performance measure. We encourage marketing researchers to further refine the interorganizational contextual performance construct, which is different from constructs such as extra-role behavior and prosocial behavior (Motowidlo and Van Scotter, 1994).

In this study, the relationship between relationship-linking operations and service quality is partially indicated. Therefore, we believe that future research linking a relational orientation to customer's perceptions of service is necessary, since ample research suggests the relevance of building and maintaining relationships with customers to customer outcomes (e.g., Cannon and Perreault, 1999; Morgan and Hunt, 1994). A notable advantage of customer relationship management is provided by Bolton (1998). Her findings suggest that customers having many months of experience with the supplier weigh prior cumulative satisfaction more heavily and new experience less heavily. Therefore, we speculate that this relationship might be mediated by perceived relationship investment. For example, De Wulf, Odekerken-Schröder and Iacobucci (2001) report a significant positive effect of different rela-

[10]Note that we use two perspectives, from both the customers and the managers. This dyadic perspective is generally used and thus acceptable.

tionship marketing tactics, such as interpersonal communication and preferential reward, on customer perceptions of a retailer's relationship investment, which, in turn, is found to affect relationship quality. Furthermore, based on recent research (e.g., Morgan and Hunt, 1994; Sirdeshmukh, Singh and Sabol, 2002) in the field of relationship marketing, we speculate a mediator role for trust, commitment and fairness connecting customer-linking operations to customer's perceived service outcomes.

Previous psychometric research recommends using bootstrap inference when calculating Sobel's test. For example, recently, MacKinnon et al. (2004) investigate the performance of the distribution of the product with (several) resampling methods. Their simulation analysis indicates that the classical distribution of the product methods performs worst. Of the resampling methods, the outcomes suggest that the bias-corrected bootstrap provides the most accurate confidence limits and greatest statistical power. Based on their study, we recommend to further investigate the bias-corrected bootstrap, especially in the case of real data.

8.8 Conclusions

The goal of this study is to provide a first step in refining and extending the service-profit chain framework. Our findings indicate that the classical SPC model needs to be modified in order to explicitly deal with the service encounter and other organizational service resources. The analysis leads us to conclude that the following chain most appropriately represents the service-profit chain in this study: organizational service capabilities → employee service capabilities → internal service outcomes → service relationships → external service outcomes → financial performance. Besides providing support for our extended framework, the analysis confirms the explicit relatedness of the links. Though the relationships have been confirmed, improved conceptual SPC frameworks appear necessary to further refine and explain the causal processes linking organizational service capabilities with financial performance. In establishing the linkages in this framework it is important to apply sound methods to detect mediation, which is essential to further validate this framework. This led us to conclude that indeed a service-profit chain structure could enhance our understanding of market-based performance and could be a very interesting avenue for further research.

APPENDIX A.1
Items used in questionnaire for the electrotechnical wholesalers

Customer-Driven Capabilities
- we regularly visit our customers to sense their satisfaction with our employees
- we regularly contact customers to detect their satisfaction with our logistical services
- the product attributes most desired by our customer are well determined
- employees responsible for sales are well informed about customer's desired logistical services
- agreements made with customers are well communicated by frontline employees to our expedition department
- the product needs of our customers are well communicated to our sales employees
- we adapt our assortment quickly to the specific desires of the customers
- we utilize the reactions of customers to adapt our services
- logistical improvements are generally made using customer's suggestions

Competitor-Driven Capabilities
- we regularly collect data about the capabilities of our competitors
- the products offered by our competitors are investigated in detail
- we investigate the after sales services offered by our competitors well
- information about the logistics capabilities of our competitors is well communicated to the expedition department
- our sales employees are well informed about the product offerings of our competitors
- we are quick to respond to significant changes in the product offerings of our competitors
- we are quick to respond on significant changes in the logistics of our competitors
- we are quick to respond to significant changes in the services of our competitors

Supplier-Driven Capabilities
- we investigate the offered assortment of different suppliers well the products of our suppliers are evaluated
- we investigate well the products introduced in the market by our suppliers
- employees are well informed about the offerings of potential suppliers
- management is well informed about the performance of the suppliers
- we are quick to engage in commercial relationships with suppliers who offer a better alternative
- when the performance of our suppliers falls short, we immediately take action

Technology-Monitoring Capabilities
- we are up to date concerning the logistics systems introduced in the market
- we are up to date concerning innovative order systems entering the market
- we investigate technologies that could support our distribution
- we constantly investigate technologies that could support our order fulfillment

Customer-Linking Capabilities
- we inform our customers immediately when problems occur in the delivery process
- we inform our customers well about changes in our services
- we inform our customer well about significant changes in our logistics
- we cooperate well with customers to solve possible logistics-related problems
- we cooperate well with customers to develop better delivery systems
- we cooperate well with customers to adapt our logistics services to their wants

Supplier-Linking Capabilities
- we inform our suppliers well about the product quality as perceived by our customers
- we are quick to inform our suppliers about relevant developments in our company that possibly affect them
- we cooperate well with suppliers to inspect the quality of delivered products
- we cooperate well with suppliers to improve the quality of their assortment

Information-Technology Capabilities
- we have sufficient technical competence in the field of IT
- our logistical systems are supported with the latest applications
- our order systems are supported with the latest applications
- we are competent in maintaining our order systems
- our automated order systems are supported with the latest applications

Logistics Capabilities
- we investigate well the required quality of the received goods
- received goods are well stored
- we document well the received goods
- received orders are processed efficiently by our employees
- we are good in distributing the ordered goods

Human-Related Capabilities
- The communication skills of our sales people are well determined during the assessment stage
- employees are well trained to resolve customer complaints in an effective manner
- employees with customer contact are well trained in maintaining strong relationships
- employees with customer contact are fully authorized to solve customer problems
- employees with customer contact are stimulated to take decisions resulting in satisfied customers
- employees are free to use their judgments to solve customer problems
- our salespeople are also evaluated on their ability to manage customer relationships
- the ability to maintain good relationships with customers is an important evaluation criterion for salespeople
- salespeople's reward is partially based on their capability to maintain good relationships with customers
- employees with customer contact are also rewarded on their ability to increase customer satisfaction

People Capabilities
- our salespeople communicate clearly toward our customers
- salespeople listen well to customers
- our salespeople treat the customers well
- our salespeople speak the customers' language
- our employees are flexible in changing their customer approach
- our employees have good insight into the assortment offered by our company
- our employees are able to handle changes inside and outside the organization
- our employees have good insight into the marketing goals of our company

Internal Service Outcomes
- Employee Satisfaction
I am satisfied about the way in which my colleagues deal with me
I am satisfied with my working conditions
- Employee Value
compared with other companies, working conditions here are good
compared with other companies, promotion opportunities here are good

Wholesale Business Performance
Compared to other wholesalers, how would you rate your firm's performance over the last three years in terms of:
- sales growth
- profit growth
- overall profitability
- labor productivity
- cash flow

APPENDIX A.2
Items used in questionnaire sent to customers of electrotechnical wholesalers[11]

Service Reliability
- xxx provides its services at the promised time
- xxx provides its services in the promised way

Service Responsiveness
- Employees of xxx are always willing to give our organization prompt service
- xxx' employees deal effectively with problems that arise during the transaction process

Service Empathy
- xxx gives our organization individual attention
- Employees of xxx understand our specific needs

Service Assurance
- Our organization feels confident during transactions with xxx's employees
- Employees of xxx are consistently courteous with our organization

Service Tangibles
- xxx's employees are neat-appearing
- xxx's employees look like professionals

Sales Services
- xxx provides us before purchase with technical assistance
- xxx provides us after purchase with technical assistance

Product Reliability
- We never encounter technical problems with xxx's products
- The options of xxx products are extensive

Product Availability
- xxx's products are always available
- xxx can easily deliver every desired quantity of products

Customization
- The products we buy from xxx fit our technical requirements well
- The products of xxx fit our personal requirements well

[11] xxx = the focal firm.

Order Reliability
- ordering from xxx means that our organization will get just what it ordered
- xxx' order processing is reliable
- ordering from xxx is perceived as reliable

Order Simplicity
- ordering from xxx is simple
- to order from xxx requires little work

Order Condition
- Products received from xxx are rarely damaged
- Damage rarely occurs as a result of the transport mode

Timeless
- Time between placing requisition and delivery is short
- Deliveries always arrive on the promised date

Logistics Accuracy
- xxx' deliveries rarely contain the wrong products
- xxx deliveries rarely contain incorrect quantities

Tangibles
- The transport mode of xxx meets the most modern requirements
- xxx's vehicles always look well cared for

Information Comprehensibility
- Information about the technical aspects of xxx's product are clearly communicated
- Relevant details about the delivered products are clearly communicated

Information Relevance
- Information provided in xxx's documentation is relevant
- Relevant information provided in xxx's documentation is clearly written

Information Transparency
- Information about order status is accessible when an order is placed
- Information about the projected delivery date is always accessible when an order is placed
- Information about the planned delivery date is always accessible when an order is placed

Relationship Quality

Trust
- this supplier is trustworthy
- when making important decisions, this supplier considers our welfare as well as its own
- we believe the information that this vendor provides us
- this supplier is genuinely concerned that our business succeeds

Commitment
- even if we could, we would not drop the supplier because we like being associated with it
- we want to remain a member of the supplier's network because we genuinely enjoy our relationship with it
- our positive feelings toward the supplier are a major reason we continue working

Regret
- our organization regrets choosing this wholesaler
- our organization feels bad for choosing this wholesaler
- our organization should have chosen another wholesaler

APPENDIX B

Market-Based Capabilities Construct

Market-Based Business Capabilities Construct [χ^2 = 281.23, d.f. = 192, p = .00; RMSEA = .058; NNFI = .97; CFI = .97; IFI = .97; SRMR = .068].

Market-Driven Capabilities
Customer-Driven Capabilities (Composite Reliability (CR): .73; average variance extracted (AVE): .50)
the product attributes most desired by our customer are well determined
we adapt our assortment quickly to the specific desires of the customers
wants and needs of our customers are well communicated to our buyers
Competitor-Driven Capabilities (CR: .85; AVE: .65)
we regularly collect data about the capabilities of our competitors
our sales employees are well informed about the product offerings of our competitors
we are quick to respond to significant changes in the services of our competitors

Relationship-Driven Capabilities
Customer-Linking Capabilities (CR: .82; AVE: .53)
we inform our customers well about (changes in) our services
we inform our customer well about (significant changes in) our logistics
we cooperate well with our customers to solve possible logistics-related problems
we cooperate well with our customers to adapt our logistics services to their wants
Supplier-Linking Capabilities (CR: .82; AVE: .60)
we inform our suppliers well about the product quality as perceived by our customers
we are quick to inform our suppliers about relevant developments in our company
we cooperate well with suppliers to improve the quality of their assortment

Supply Chain Capabilities
Information-Technology Capabilities (CR: .90; AVE: .70)
we have sufficient technical competence in the field of IT
our logistical systems are supported with the latest applications
our order systems are supported with the latest applications
we are competent in maintaining our order systems
Logistics Capabilities (CR: .82; AVE: .53)
we investigate well the required quality of the received goods
received goods are well stored
we document well the received goods
received orders are processed efficiently by our employees
we are good in distributing the ordered goods

Human Resource Capabilities
Human-Related Capabilities (CR: .71; AVE: .45)
- The communication skills of our sales people are well determined during the assessment stage
- employees with customer contact are well trained in maintaining relationships
- employees with customer contact are stimulated to take decisions resulting in satisfied customers
- salespeople's reward is partially based on their capability to maintain good relationships with customers
People Capabilities (CR: .81; AVE: .57)
our salespeople communicate clearly toward our customers
our salespeople treat the customers well

our salespeople speak the customers' language
our employees are flexible in changing their approach toward customers

Wholesale Business Performance [χ^2 = 3.40, d.f. = 2, p = .18; RMSEA = .072; NNFI = .99; CFI = 1.00; IFI = 1.00; SRMR = .021]. Compared to other wholesalers, how would you rate your firm's performance over the last three years in terms of (CR: .91; AVE: .70):
- profit growth
- overall profitability
- labor productivity
- cash flow

APPENDIX C

Strategic Marketing Capabilities Construct

Customer-Driven Capabilities
Intelligence Generation
- we regularly visit our customers to sense their satisfaction with our employees
- we regularly contact customers to detect their satisfaction with our logistical services
- we investigate which product attributes our customers value most
Intelligence Dissemination
- employees responsible for sales are well informed about customer's desired logistical services
- agreements made with customers are well communicated by frontline employees to our expedition department
- the product needs of our customers are well communicated to our sales employees
Responsiveness
- we adapt our assortment quickly to the specific desires of the customers
- we utilize the reactions of customers to adapt our services
- logistical improvements are generally made using customer's suggestions

Competitor-Driven Capabilities
Intelligence Generation
- we regularly collect data about the logistical capabilities of our competitors
- the products offered by our competitors are investigated in detail
- we investigate the after sales services offered by our competitors well
Intelligence Dissemination
- information about the logistics capabilities of our competitors is well communicated to the expedition department
- our sales employees are well informed about the product offerings of our competitors
Responsiveness
- we are quick to respond to significant changes in the product offerings of our competitors
- we are quick to respond on significant changes in the logistics of our competitors
- we are quick to respond to significant changes in the services of our competitors

Supplier-Driven Capabilities
Intelligence Generation
- we investigate the offered assortment of different suppliers well
- the products of our suppliers are evaluated thoroughly
- we investigate well the products introduced in the market by our suppliers
Intelligence Dissemination
- employees are well informed about the offerings of potential suppliers
- management is well informed about the performance of the suppliers

Responsiveness
- we are quick to engage in commercial relationships with suppliers who offer a better alternative
- when the performance of our suppliers falls short, we immediately take action

Technology-Monitoring Capabilities
Intelligence Generation
- we are up to date concerning the logistics systems introduced in the market
- we are up to date concerning innovative order systems entering the market
Research and Development
- we investigate technologies that could support our distribution
- we constantly investigate technologies that could support our order fulfillment

Customer-Relating Capabilities
Information Sharing
- we inform our customers immediately when problems occur in the delivery process
- we inform our customers well about changes in our services
- we inform our customer well about significant changes in our logistics
Cooperation
- we cooperate well with customers to solve possible logistics-related problems
- we cooperate well with customers to develop better delivery systems
- we cooperate well with customers to adapt our logistics services to their wants

Supplier-Relating Capabilities
Information Sharing
- we inform our suppliers well about the product quality perceived by our customers
- we are quick to inform our suppliers about relevant developments in our company that possibly affect them
Cooperation
- we cooperate well with suppliers to inspect the quality of delivered products
- we cooperate well with suppliers to improve the quality of their assortment

APPENDIX D

Purified Strategic Marketing Capabilities Construct

Customer-Driven Capabilities
Intelligence Generation
we regularly visit our customers to sense their satisfaction with our employees
we regularly contact customers to detect their satisfaction with our logistical services
Intelligence Dissemination
employees responsible for sales are well informed about customer's desired logistical services
agreements made with customers are well communicated by frontline employees to our expedition department
Responsiveness
we adapt our assortment quickly to the specific desires of the customers
we utilize the reactions of customers to adapt our services

Competitor-Driven Capabilities
Intelligence Generation
we regularly collect data about the logistical capabilities of our competitors
we investigate the after sales services offered by our competitors well
Intelligence Dissemination
information about the logistics capabilities of our competitors is well communicated to the expedition department
our sales employees are well informed about the product offerings of our competitors
Responsiveness
we are quick to respond to significant changes in the product offerings of our competitors
we are quick to respond to significant changes in the services of our competitors

Supplier-Driven Capabilities
Intelligence Generation
we investigate the offered assortment of different suppliers well
we investigate well the products introduced in the market by our suppliers
Intelligence Dissemination
employees are well informed about the offerings of potential suppliers
management is well informed about the performance of the suppliers
Responsiveness
we are quick to engage in commercial relationships with suppliers who offer a better alternative
when the performance of our suppliers falls short, we immediately take action

Technology-Monitoring Capabilities
Intelligence Generation
we are up to date concerning the logistics systems introduced in the market
we are up to date concerning innovative order systems entering the market
Research and Development
we investigate technologies that could support our distribution
we constantly investigate technologies that could support our order fulfillment

Customer-Relating Capabilities
Information Sharing
we inform our customers well about changes in our services
we inform our customer well about significant changes in our logistics

Cooperation
we cooperate well with our customers to solve possible logistics-related problems
we cooperate well with our customers to adapt our logistics services to their wants

Supplier-Relating Capabilities
Information Sharing
we inform our suppliers well about the product quality perceived by our customers
we are quick to inform our suppliers about relevant developments in our company that possibly affect them
Cooperation
we cooperate well with suppliers to inspect the quality of delivered products
we cooperate well with suppliers to improve the quality of their assortment

APPENDIX E

WholeSaleQual[12]

Service Reliability (CR: .77; AVE: .62)
- xxx provides its services at the promised time
- xxx provides its services in the promised way

Service Responsiveness (CR: .73; AVE: .58)
- Employees of xxx are always willing to give our organization prompt service
- xxx' employees deal effectively with problems that arise during the transaction process

Service Empathy (CR: .76; AVE: .62)
- xxx gives our organization individual attention
- Employees of xxx understand our specific needs

Service Assurance (CR: .70; AVE: .54)
- Our organization feels confident during transactions with xxx's employees
- Employees of xxx are consistently courteous with our organization

Service Tangibles (CR: .65; AVE: .79)
- xxx's employees are neat-appearing
- xxx's employees look like professionals

Sales Services (CR: .86; AVE: .75)
- xxx provides us before purchase with technical assistance
- xxx provides us after purchase with technical assistance

Product Reliability (CR: .59; AVE: .42)
- We never encounter technical problems with xxx's products
- The options of xxx products are extensive

Product Availability (CR: .78; AVE: .65)
- xxx's products are always available
- xxx can easily deliver every desired quantity of products

Customization (CR: .75; AVE: .59)
- The products we buy from xxx fit our technical requirements well
- The products of xxx fit our personal requirements well

Order Reliability (CR: .83; AVE: .62)
- ordering from xxx means that our organization will get just what it ordered
- xxx' order processing is reliable
- ordering from xxx is perceived as reliable

Order Simplicity (CR: .86; AVE: .75)
- ordering from xxx is simple
- to order from xxx requires little work

Order Condition (CR: .82; AVE: .69)
- Products received from xxx are rarely damaged
- Damage rarely occurs as a result of the transport mode

Timeless (CR: .71; AVE: .55)
- Time between placing requisition and delivery is short
- Deliveries always arrive on the promised date

Logistics Accuracy (CR: .82; AVE: .70)
- xxx' deliveries rarely contain the wrong products

[12] xxx = the focal firm.

- xxx deliveries rarely contain incorrect quantities

Logistics Service Tangibles (CR: .78; AVE: .63)
- The transport mode of xxx meets the most modern requirements
- xxx's vehicles always look well cared for

Information Comprehensibility (CR: .81; AVE: .69)
- Information about the technical aspects of xxx's product are clearly communicated
- Relevant details about the delivered products are clearly communicated

Information Relevance (CR: .78; AVE: .64)
- Information provided in xxx's documentation is relevant
- Relevant information provided in xxx's documentation is clearly written

Information Transparency (CR: .92; AVE: .79)
- Information about order status is accessible when an order is placed
- Information about the projected delivery date is always accessible when an order is placed
- Information about the planned delivery date is always accessible when an order is placed

APPENDIX F

SPC framework: used study constructs

Customer Orientation (Composite Reliability (CR): .87; average variance extracted (AVE): 69)
- Intelligence Generation (CR: .64; AVE: .47)
we regularly visit our customers to sense their satisfaction with our employees
we regularly contact customers to detect their satisfaction with our logistical services
- Intelligence Dissemination (CR: .63; AVE: .47)
employees responsible for sales are well informed about customer's desired logistical services
agreements made with customers are well communicated to our expedition department by frontline employees
- Responsiveness (CR: .52; AVE: .36)
we adapt our assortment quickly to the specific desires of the customers
we utilize the reactions of customers to adapt our services

Competitor Orientation (CR: .92; AVE: .80)
- Intelligence Generation (CR: .81; AVE: .69)
we regularly collect data about the logistical capabilities of our competitors
we investigate well which after sales services our competitors offer
- Intelligence Dissemination (CR: .88; AVE: .79)
information about the logistics capabilities of our competitors is well communicated to the expedition department
our sales employees are well informed about the product offering of our competitors
- Responsiveness (CR: .85; AVE: .73)
we are quick to respond to significant changes in the product offerings of our competitors
we are quick to respond to significant changes in the services of our competitors

Supplier Orientation (CR: .94; AVE: .85)
- Intelligence Generation (CR: .79; AVE: .65)
we investigate well the assortment of different suppliers
we investigate well the products introduced in the market by our suppliers
- Intelligence Dissemination (CR: .60; AVE: .43)
employees are well informed about the offerings of potential suppliers
management is well informed about the performance of the suppliers
- Responsiveness (CR: .61; AVE: .44)
we are quick to engage in commercial relationships with suppliers who offer a better alternative
when the performance of our suppliers falls short, we immediately take action

Service-Technology (CR: .87; AVE: .77)
- Human IT-Resources (CR: 90.; AVE: .81)
we employ several information technology (IT) specialists
we have sufficient technical competence in the field of IT
- IT-Infrastructure (CR: .94; AVE: .89)
our logistical systems are supported with the latest applications
our automated order systems are supported with the latest applications

Human Resource Management (CR: .80; AVE: .51)
- Service Training (CR: .77; AVE: .63)
employees are well trained to resolve customer complaints in an effective manner
employees with customer contact are well trained in maintaining relations
- Empowerment (CR: .80; AVE: .67)
employees with customer contact are fully authorized to solve customer problems
employees are free to use their judgments to solve customer problems
- Behavioral-Based Evaluation (CR: .74; AVE: .59)
our salespeople are also evaluated on their ability to manage customer relationships
the ability to maintain good relationships with customers is an important evaluation criterion for salespeople
- Behavioral-Based Reward (CR: .84; AVE: .72)
salespeople's reward is partially based on their capability to maintain good relationships with customers
employees with customer contact are also rewarded on their ability to increase customer satisfaction

People Capabilities (CR: .90; AVE: .81)
- Sales-Related Skills (CR: .87; AVE: .63)
our salespeople communicate clearly toward our customers
salespeople listen well to customers
our salespeople speak the customers' language
our employees are flexible in changing their customer approach
- Employee Knowledge (CR: .80; AVE: .57)
our employees have good insight into the assortment offered by our company
our employees are able to handle changes inside and outside the organization
our employees have good insight into the marketing goals of our company

Customer-Linking Operations
- Information Sharing (CR: .75; AVE: .59)
we inform our customers well about changes in our services
we inform our customers well about significant changes in our logistics
- Cooperation (CR: .56; AVE: .72)
we cooperate well with our customers to solve possible logistics-related problems
we cooperate well with our customers to adapt our logistics services to their wants

Internal Service Outcomes
- Employee Satisfaction (CR: .66; AVE: .51)
I am satisfied about the way in which my colleagues deal with me
I am satisfied with my working conditions
- Employee Value (CR: .66; AVE: .50)
compared with other companies, working conditions here are good
compared with other companies, promotion opportunities here are good

External Service Outcomes
Reliability (CR: .78; AVE: .64)
- when xxx promises to do something by a certain time, it does so
- xxx performs the service right the first time
- xxx provides its services at the time it promises to do so
Responsiveness (CR: .78; AVE: .65)
- employees of xxx are always willing to help you
- employees of xxx are never too busy to respond to you requests
- employees of xxx are always willing to give you prompt service
Empathy (CR: .73; AVE: .58)
- xxx gives you individual attention
- xxx has employees who give you personal attention
- employees of xxx understand your specific needs
- xxx does not have your best interest at heart (-)
Assurance (CR: .69; AVE: .53)
- the behavior of employees of xxx instills confidence in customers
- employees of xxx are consistently courteous with you
- employees of xxx have the knowledge to answer your questions
- you feel safe in your transactions with xxx employees

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Summary in Dutch

1. Inleiding

In dit proefschrift staat het fenomeen marktgerichtheid centraal. Marktgerichtheid werd tot voor kort in de literatuur gedefinieerd als het door een onderneming verzamelen van marktinformatie, het verspreiden van deze informatie door de gehele organisatie en het nemen van beslissingen op basis van marktinformatie (Kohli en Jaworski, 1990), en als een gerichtheid op de klant en concurrent en het denken vanuit een geïntegreerd besluitvormingsproces (Narver en Slater, 1990). De bij deze beschrijving behorende meetschalen geven in globale termen een operationalisering van het concept marktgerichtheid.

Recente marketing literatuur toont evenwel aan dat het klassieke concept van marktgerichtheid enkel mag worden gezien als één van de capaciteiten van een onderneming (Day, 1994; Vargo and Lusch, 2004). Bijvoorbeeld, Srivastava, Shervani en Fahey (1998, 1999) geven aan dat relationship-driven resources eveneens belangrijke marketingcapaciteiten zijn. In dit proefschrift wordt beargumenteerd dat de klassieke implementatie van het marketing concept verouderd raakt en wordt een tweetal nieuwe modellen, als alternatief voor de oude constructen, ontwikkeld: (1) markt-gerelateerde ondernemingscapaciteiten en (2) strategische marketingcapaciteiten. Het eerste model integreert de outside-in en inside-out capaciteiten in één model, en is gebaseerd op Day (1994). Het tweede model gaat gedetailleerd in op het outside-in perspectief (de strategische marketingcapaciteiten).

Tevens relateren we de marketingcapaciteiten aan zowel gepercipieerde kwaliteit als bedrijfsresultaten. In figuur 9.1 wordt het onderzoeksmodel beknopt beschreven. De relaties zijn geschat met data verkregen bij de electrotechnische groothandel in Nederland en haar klanten. We beschikken dus over zogenaamde "dyadische" data. Om de benodigde data te verzamelen is een twee trapsbenadering gevolgd. In de eerste fase werden gegevens van klanten van de elektrotechnische groothandel verzameld middels een via de post verzonden schriftelijke enquete. Deze enquete onderzocht de kwaliteitsperceptie van de klanten. Hierbij werd het verzoek gedaan om de enquete voor een bepaalde leverancier in te vullen en de NAW-gegevens van deze leverancier te vermelden. Met gegevens verkregen van de Kamer van Koophandel en de klanten konden we een database aanmaken die in totaal 843 NAW-gegevens van de elektrotechnische groothandel omvatte. In de tweede fase werden gegevens van de elektrotechnische groothandel verzameld met behulp van een schriftelijke enquete (n = 137). De data verkregen bij de electrotechnische groothandel en haar klanten werden geanalyseerd met behulp van Excel, SPSS, S-PLUS, LISREL, R, WINBUGS en UNSCRAMBLER.

Het onderzoeksmodel relateert marketingcapaciteiten aan de gepercipieerde kwaliteiten en bedrijfsresultaten. Om het model empirisch te onderzoeken werd eerst een viertal constructen ontwikkeld en gevalideerd: (1) markt-gerelateerde ondernemingscapaciteiten (outside-in en inside-out capabilities) (zie het eerste blok), (2) strategische marketing capaciteiten (outside-in capabilities) (bovenste gedeelte,

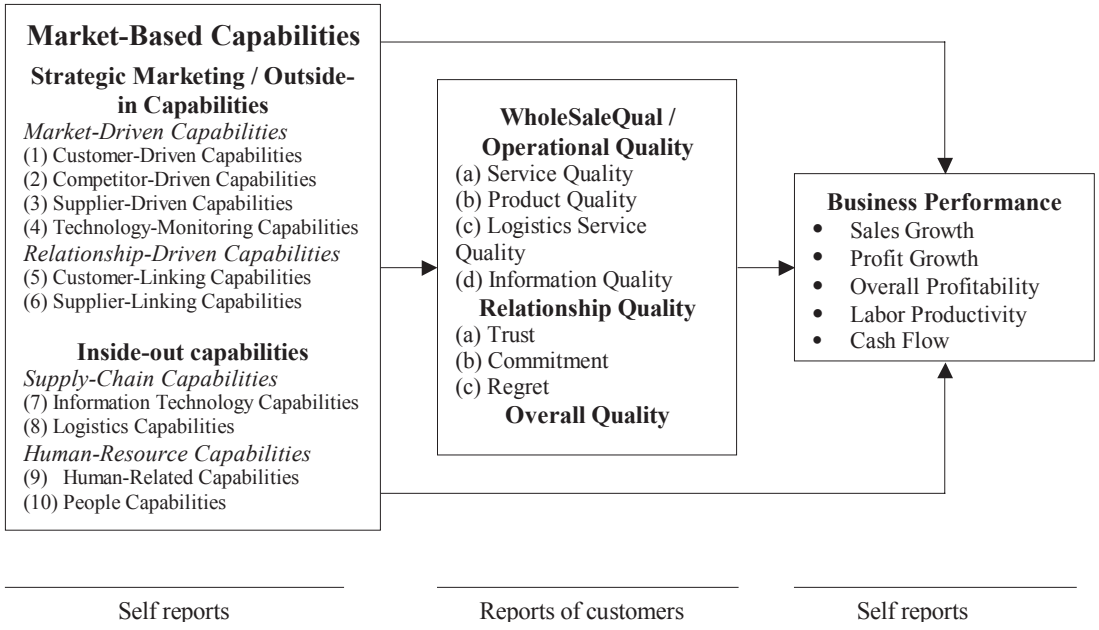

Figure 2: Onderzoeksmodel

eerste blok), (3) een kwaliteitsbarometer voor de groothandel (zie middelste blok) en (4) bedrijfsresultaten. In verschillende onderzoeken, gepresenteerd in de hoofdstukken in dit proefschrift, werden deze constructen gekoppeld, waarbij hoofdstuk 8 het meest complete model voorstelt (zie paragraaf 2).

Het doel van dit proefschrift is: (1) het ontwikkelen van meetinstrumenten met betrekking tot marketingcapaciteiten in brede zin (outside-in en inside-out) en gepercipieerde kwaliteiten en (2) het relateren van de marketingcapaciteiten aan de gepercipieerde kwaliteiten en bedrijfsresultaten. Bij het realiseren van doelstelling 2 zijn geavanceerde statistische methoden gebruikt, zoals partial least squares regression en een Bayesiaanse benadering van confirmatory factor analysis en (niet) lineare covariantie analyse.

2. Structuur

Dit proefschrift bestaat uit een achttal hoofdstukken. Om een goed (globaal) beeld te krijgen van de verrichte onderzoeken geven wij de gekozen titel en een summiere samenvatting van elk hoofdstuk.

Hoofdstuk 2 geeft een uitvoerige beschrijving van het fenomeen 'markt-gerelateerde ondernemingscapaciteiten.' Daarnaast wordt onderzocht welke capaciteiten de financiële resultaten van een onderneming beïnvloeden. Dit model heeft vier componenten: (1) marktgerichte capaciteiten, (2) relatiegerichte capaciteiten, (3) supply-chain capaciteiten, en (4) medewerkers-gerelateerde capaciteiten. De capaciteiten zijn met behulp van lineaire regressie gerelateerd aan de bedrijfsresultaten. De uitkomsten geven aan dat supply-chain en medewerkers-gerelateerde capaciteiten

een significante invloed hebben op de financiële resultaten. De eerste twee capaciteiten daarentegen zijn niet significant gerelateerd aan de financiële resultaten van een onderneming.

Hoofdstuk 3 maakt gebruik van de 'partial least squares' regressie methode om de in hoofdstuk 2 geschatte verbanden opnieuw (en gedetailleerder) te onderzoeken. Verschillende methoden zijn voorhanden om een groot aantal relaties, bij gebrek aan voldoende datapunten, te onderzoeken, zoals principale componenten regressie analyse (Massey, 1965), sliced inverse regression (Duan and Li, 1991; Li, 1991) en partial least squares regression (Höskuldsson, 1988). Recente onderzoeken in mathematical statistics geven aan dat partial least squares regression zich relatief goed gedraagt onder bepaalde omstandigheden, zoals nonlineariteit, multicollineariteit, kleine steekproef en relatief veel onafhankelijke en afhankelijke variabelen (Naik and Tsai, 2000). Daarom behandelen en implementeren wij in dit hoofdstuk de partial least squares regressie (PLSR) methode en wordt een vergelijking gemaakt tussen uitkomsten van PLSR en die van multivariate lineaire regressie gebaseerd op ordinary least squares. De PLSR uitkomsten geven globaal aan dat alle marktgerelateerde capaciteiten van een onderneming de bedrijfsresultaten positief beinvloeden.

In hoofdstuk 3 wordt een model ontwikkeld dat de mate van marktgerichtheid en relatiegerichtheid van een onderneming aangeeft. De factor analytische uitkomsten van het model ondersteunen de relatieve correctheid van het model. In hoofdstuk 5 worden de strategische marketing capaciteiten gerelateerd aan de financiële resultaten van een onderneming. Uitkomsten geven aan dat de strategische marketing capaciteiten een significante invloed hebben op de financiële prestaties van een onderneming. Een tweede uitbreiding van het vierde hoofdstuk (hoofdstuk 7) is: "Strategische Marketing Capaciteiten and Gepercipieerde Kwaliteit: Een Dyadische Benadering." In dit hoofdstuk worden de strategische marketing capaciteiten gerelateerd aan verschillende indicatoren van gepercipieerde kwaliteit (i.e., operational quality, relationship quality and overall quality). Groothandelaren die in het bezit zijn van sterke relatiegerelateerde capaciteiten hebben over het algemeen meer tevreden klanten dan zij die dit niet of minder bezitten.

In de hoofdstukken 4,5 en 7 is gebruik gemaakt van Bayesiaanse schattingsmethoden. De reden hiervoor is dat de Bayesiaanse statistiek, gebruik makend van Monte Carlo Markov Chain (MCMC) methoden, sterk wordt aanbevolen door (sommige) marketing academici (Rossi en Allenby, 2003). Een andere reden is dat deze methoden geen gebruik maken van de asymptotische theorie (Lee en Song, 2004). Verder wordt in hoofdstuk 5 gebruik gemaakt van latente variabele modellen.

Om de gepercipieerde kwaliteit van de groothandel te meten, wordt in hoofdstuk 6 een nieuw instrument ontwikkeld. In dit hoofdstuk wordt een model ontwikkeld bestaande uit vier verschillende componenten: (1) dienstenkwaliteit, (2) productkwaliteit, (3) logistieke dienstenkwaliteit, en (4) informatiekwaliteit. De uitkomsten van de confirmatory factor analyse geven aan dat het model een hele goede statistische fit heeft. Gebruik makend van PLS regressie wordt het model verder gevalideerd. De gegenereerde uitkomsten benadrukken de relevantie van informatiekwaliteit voor het ontwikkelen van klantsatisfactie.

Hoofdstuk 8 relateert (1) elementen van de marketing capaciteiten aan kwaliteitsperceptie en (2) kwaliteitsperceptie aan de financiële uitkomsten van een onderneming. In dit hoofdstuk staat het service-profit chain model centraal en wordt een uitbreiding van het model van Heskett en collega's (Heskett et al., 1994) voorgesteld. In dit model wordt de relatie tussen service capaciteiten en financiële uitkomsten uitgezet als een 'chain of effects.' Om het model te onderzoeken, is gebruik gemaakt van data verkregen van de groothandel en hun klanten. Verder, psychometrische onderzoeken volgend, schatten we mediatie middels bootstrap methoden. De uitkomsten onderstrepen de verwachtingen en de volgende relaties worden gevonden: organizational service capabilities → employee service capabilities → internal service outcomes → service relationships management → external service outcomes → financial performance.