

INTERNAL KNOWLEDGE EXPLOITATION –
THE ROLE OF SALES FORCE INTEGRATION IN NEW
PRODUCT DEVELOPMENT

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BMW	Bayerische Motoren Werke
bn.	Billion
cont.	Continued
df	Degrees of freedom
e.g.	Exempli gratia (for example)
et al.	Et alii (and others)
EU	European Union
GfK	Gesellschaft für Konsumforschung
H	Hypothesis
i.e.	Id est
IPK	Institut für Produktionsanlagen und Konstruktionstechnik
MIMIC	Multiple Indicators and Multiple Causes
mio.	Million
NPD	New Product Development
p.	Page
PPE	Property Plant Equipment
R&D	Research and Development
RBV	Resource-Based View of the Firm
ROI	Return On Investment
UK	United Kingdom
US, USA	United States (of America)

LIST OF SYMBOLS

%	Percent
€	Euro
\$	Dollar
β	Standardized beta coefficient/ Path coefficient
Δ	Change in
χ^2	Value of the chi-square distribution
n	Sample size
p	Level of significance
*	Level of significance
r	Correlation coefficient
R^2	Coefficient of determination
T	Value of the t-distribution
x	Multiplication sign
=	Equals sign
>	Greater than
\geq	Greater than or equal
<	Less than
&	And
/	Respectively

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Chapter 1:

General Introduction to the Topic

1.1 Relevance of New Product Development

“Innovation is what defines who wins and who loses.”

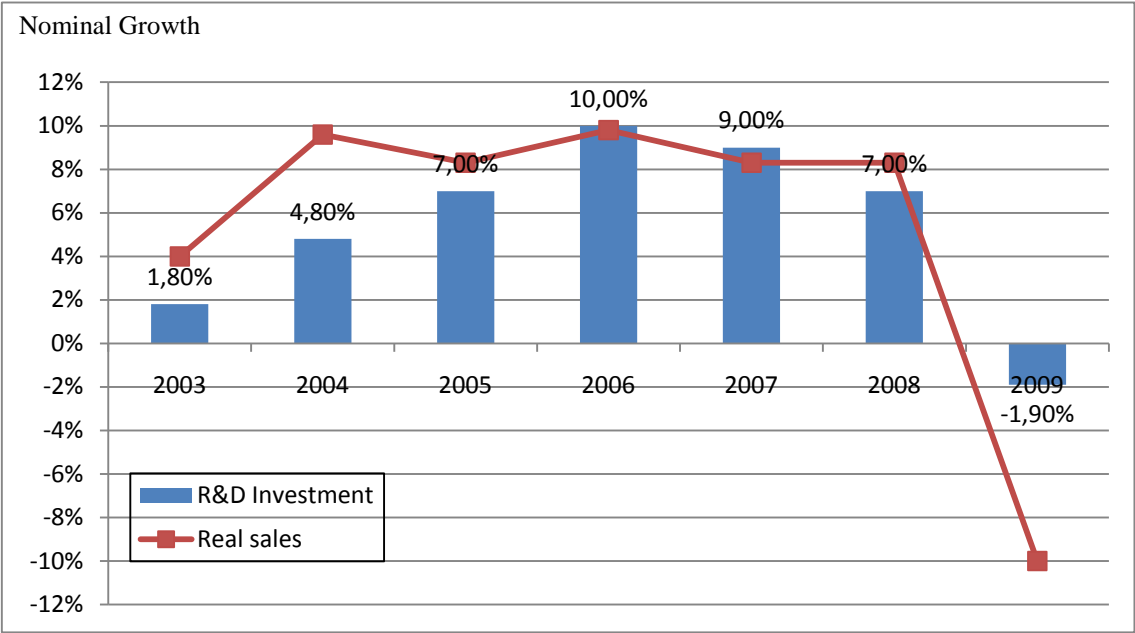
(Richard Lyons, Chief Learning Officer of Goldman Sachs, see Gassmann 2008, p.2).

This quote clearly points to the important role that new product development (NPD) plays in today's corporate practice. Fast technological progress, short product life cycles, as well as high levels of competitive intensity belong to the market characteristics that put constant pressure on companies to innovate (Bowman and Gatignon 1995; Griffin 1997; Montaguti, Kuester, and Robertson 2002; Reichwald, Ihl, and Seifert 2004). Only those firms that continually align their product portfolios with current customer needs and market conditions will be able to satisfy customers and compete in markets in the long term (Crawford and Di Benedetto 2005; Homburg, Kuester, and Krohmer 2009). In this regard, the continuous development and successful launch of new products represents a prerequisite for the survival and growth of individual firms, as well as for sustained organizational success (Amaldoss and Rapoport 2005; Pauwels et al. 2004; Prins and Verhoef 2007). The importance of successful NPD management is also reflected in the strong influence that new product performance outcomes have on corporate sales and profits (Griffin 1997; Meyer 2008; Sorescu and Spanjol 2008; Tellis, Prabhu, and Chandy 2009). For example, in 2008, new products accounted for

16.3 percent of the total turnover of German companies on average (see Rammer et al. 2011, p.2). Following this argumentation, it is not surprising that managers such as Richard Lyons consider the successful management of NPD processes to be one of the key challenges that companies need to master to ensure corporate success in the long term.

Large investments in innovation activities clearly underline the value that firms assign to the development of new products. Together, the ‘Scoreboard Companies’, which represent the world’s top 1400 firms based on their R&D spending, spent more than 400 billion Euros on innovation activities in 2009. Although the financial crisis and the global recession hit companies around the world very hard and caused a 1.9 percent decrease in R&D investment compared to 2008, corporate R&D spending remained at high levels. This circumstance highlights the strategic importance that firms attach to innovation activities and clearly suggests that the development of new products continues to represent a top priority for most companies (European Commission 2010). Figure 1-1 provides an overview of the R&D investment and net sales growth rates of the ‘Scoreboard Companies’.

Figure 1-1: One-year R&D Investment and Net Sales Growth of Scoreboard Companies



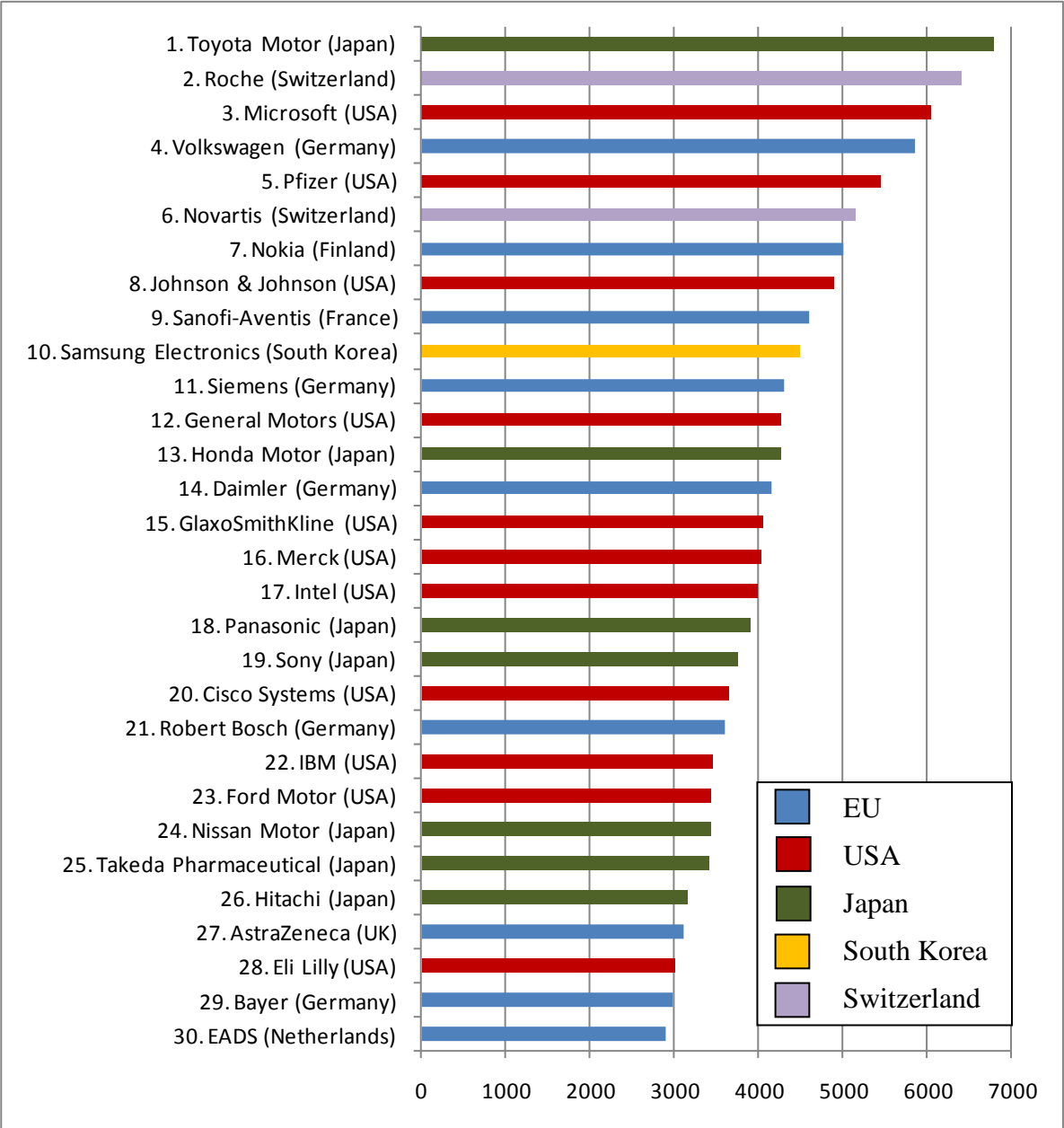
Source: European Commission (2004 – 2010)

The highest R&D intensities can be found in the pharmaceutical, chemical, automotive, healthcare, electronic, and computer industries. Therefore, it is not surprising that companies from these sectors belong to the top R&D investors. The Japanese automobile manufacturer Toyota leads the list of top investors in innovation activities (€6.77 bn.), closely followed by the Swiss pharmaceutical company Roche (€6.40 bn.), and the US-based computer giant Microsoft (€6.07 bn.). Volkswagen holds the fourth position in the ranking (€5.79 bn.), which makes the German car maker the top R&D investor within the European Union (EU). Together, five of the ten most innovation-intensive firms within the EU are headquartered in Germany. In addition to Volkswagen, top German R&D investors include Siemens, Daimler, Robert Bosch, and Bayer. Figure 1-2 provides an overview of the world's top 30 companies based on their R&D spending.

Despite the managerial appreciation of innovation activities, which is reflected in large R&D investments, new product failure rates remain at consistently high levels (Kaufman, Jayachandran, and Rose 2006; Wieseke, Homburg, and Lee 2008). Recent studies have referred to new product failure rates that lie in the range of 30 to 90 percent depending on the industry and product category (Business Week 2009; Fraunhofer IPK 2009; GfK 2006a,b; Gourville 2005, 2006). This means that a multitude of NPD projects turn out to be unprofitable during their life cycle or are even terminated before they are brought to market (Bauer and Fischer 2000). New product failures can result in tremendous financial losses in the short term and have already forced numerous companies into bankruptcy. Well-known examples of new product failures include the Ford Edsel that incurred losses in the range of US \$250 to \$350 million because this car model did not meet the needs of American consumers and consequentially sold only 84,000 times (Haig 2006; Sivadas and Dwyer 2000). Chiquita lost US \$30 million with frozen juice bars that did not meet consumers' taste (Haig 2006). More recently, the US-based computer giant Microsoft flopped with its Windows Vista

software. Although the product was designed to solve the technical problems and security issues of prior operating systems, customers found Vista unusable and often downgraded to its predecessor Windows XP (McIntyre 2009).

Figure 1-2: Ranking of the World’s Top 30 Companies by their Total R&D Investment in 2010 (in million Euros)



Source: European Commission (2010)

1.2 New Product Success Factors and Market Information Sources for New Product Development

1.2.1 New Product Success Factors

Driven by the high importance of new products in facilitating corporate profitability, academic research has extensively studied the role of factors that influence new product success. The meta-analysis of Henard and Szymanski (2001) has summarized insights regarding new product success factors and has investigated the effect of 24 proposed determinants based on 41 empirical studies. Table 1-1 provides an overview of the predictors of new product success as identified by the authors who have grouped the factors into four basic categories. The bold-typed success factors represent the dominant drivers of new product performance based on the results of the meta-analysis.

Table 1-1: Predictors of New Product Success

Product Characteristics	Firm Strategy Characteristics	Firm Process Characteristics	Marketplace Characteristics
Product advantage Product meets customer needs Product price Product technological sophistication Product innovativeness	Marketing synergy Technological synergy Order of entry Dedicated human resources Dedicated R&D resources	Structured approach Predevelopment task proficiency Marketing task proficiency Technological proficiency Launch proficiency Reduced cycle time Market orientation Customer input Cross-functional integration Cross-functional communication Senior management support	Likelihood of competitive response Competitive response intensity Market potential

Source: Henard and Szymanski (2001)

Although the meta-analysis of Henard and Szymanski (2001) has not identified 'market orientation' as a dominant driver of new product success, recent research results have emphasized the particular importance of a firm's market orientation in facilitating favorable new product performance outcomes. Especially, the meta-analyses of Grinstein (2008) and Kirca, Jayachandran, and Bearden (2005), which have analyzed the effect of market orientation on innovation consequences and performance, have revealed that market orientation is a key driver of new product success. Market orientation refers to the ability of companies to adequately identify current and future customer needs along with other environmental factors (e.g., governmental regulation, technology, competitors) that may influence those needs (Jaworski and Kohli 1993; Kohli and Jaworski 1990; Ottum and Moore 1997). A sufficient understanding of customer wants and market requirements subsequently allows companies to develop new products that provide superior benefits to customers and that, therefore, achieve higher levels of success in the market (Atuahene-Gima 1996; Henard and Szymanski 2001; Li and Calantone 1998). A firm's market orientation is generally reflected in its market information processing capabilities, which include the acquisition, dissemination, and use of market insights (Kohli and Jaworski 1990; Ottum and Moore 1997; Veldhuizen, Hultink, and Griffin 2006). Whereas acquisition and dissemination activities help companies to identify and understand customer needs, the use of these insights supports firms in the creation of superior new products with strong market potential. Thus, the identification of market orientation as a key driver of new product success emphasizes the need for companies to process valuable market insights in the context of NPD processes. For the purpose of market information acquisition, it is of utmost importance that companies integrate individuals with specific market insights into the development process of new products and to source market information from stakeholders inside and outside the company (e.g., Chesbrough 2006).

The following section provides a short overview of the internal and external sources that are most widely used by NPD managers for the generation of market insights during NPD processes. In addition, we refer to recent studies in this area that have mainly focused on the external sources of market information.

1.2.2 Company-internal Sources of Market Information

The company-internal sources of market information that are most frequently used in the context of NPD processes include the marketing and market research departments which are found to be either separate or combined entities in corporate practice. Marketing departments are generally long-term oriented and have a strategic focus on the management of customer segments and product portfolios. Therefore, the marketing function can provide strategic market information with a strong product focus (Ernst, Hoyer, and Rübstaamen 2010; Homburg and Jensen 2007). In addition to that, market research activities, which include customer surveys and observations can complement strategic marketing information with current insights on customer requirements and competitive strategies (Frishammar and Hörte 2005; Homburg, Kuester, and Krohmer 2009; von Hippel 1988). Furthermore, the company's sales force has been considered as a valuable source of unique market insights. Direct and in-depth interactions with various market participants allows salespeople to obtain information on customer needs and current market trends (Homburg, Wieseke, and Bornemann 2009; Liao and Chuang 2004; Pelham and Lieb 2004). Also, it is important to note that more and more companies engage in the establishment of cross-functional research teams. The combination of complementing market insights of different team members facilitates companies' understanding of customer needs and market requirements. Other company-internal sources of market information which have been reported in the literature include the upper and top

management, CRM systems, as well the departments of operations research, purchasing, engineering, and customer services (see Table 1-2).

1.2.3 Company-external Sources of Market Information

With regard to company-external sources of market information, a considerable number of firms rely on commercial market research providers which are instructed to generate deeper insights into customer wants and competitive activities in the companies' target markets (Hauschildt 2004). In addition, there is an increasing tendency in corporate practice to integrate customers, suppliers, retailers, and distributors into the development process of new products. Whereas customers provide first-hand information on their needs, suppliers can often help to resolve technical issues (Homburg, Kuester, and Krohmer 2009). Additionally, suppliers, but also retailers and distributors can complement information provided by customers (Hauschildt 2004; Luo, Kannan, and Ratchford 2007; Ottum and Moore 1997). Furthermore, management consultancies and other industry experts are able to provide information on future trends and the market potential of new product ideas (Cooper 2002; Klandt 2005). Finally, secondary sources such as trade journals, press releases, booklets of competitors, and reports published by universities and public authorities may reveal valuable insights on innovation activities in the external market environment that can be applied to own NPD projects (Cooper 2002; Frishammar and Hörte 2005). For example, BMW was inspired by product solutions from the toy industry when it was developing its new i-Drive system, which allows car drivers to control secondary vehicle systems such as air conditioners, audio systems, and navigation systems (Gassmann and Zeschky 2007).

Table 1-2 provides an overview of common internal and external sources that managers use in order to generate market insights in the context of NPD processes.

Table 1-2: Overview of Market Information Sources Used in NPD

Company-internal Sources	Company-external Sources
Marketing & Market research	Customers (e.g., lead users)
Sales/ Salespeople	Suppliers
Cross-functional research teams	Distributors/ Retailers
Upper/ Top management	Competitors
Operations research	External consultants/ Experts
Purchasing	Market research providers
CRM systems	Press/ Media
Engineering	Public authorities/ Administrative bodies
Customer service/ Customer relations	Universities

Sources: Cooper (2002); Hauschildt (2004); Leiponen and Helfat (2010)

1.2.4 External versus Internal Sources of Market Information: Some Empirical

Evidence

Recent empirical research has mainly focused on the integration of external market information sources into NPD processes. This trend can be partly explained by an increasing research interest in the ‘open innovation’ paradigm that advocates the opening of the innovation processes of firms to include external stakeholders (Chesbrough 2003, 2006; Lichtenthaler 2011).

Customers and suppliers belong to the external sources of market intelligence that have been most often discussed in the literature. For example, Gruner and Homburg (2000) have advocated communication efforts with customers – particularly with lead users – when developing new products. Their empirical results have shown that the intensity of customer interaction in the early and late stages of the NPD process has a positive impact on new

product performance outcomes. In a similar vein, Gales und Mansour-Cole (1995) have demonstrated that customer integration occurs more often in the realm of successful NPD projects rather than with unsuccessful ones. In addition, the authors have provided evidence that the frequency of customer communication attenuates the negative impact that project uncertainty exerts on new project success. However, research has also warned against a company's reliance on customer information when designing new products. This warning is principally based on the argument that customers are unable to think out of the box and rarely suggest product solutions that go beyond currently existing offerings (Christensen 1997; van der Panne, van Beers, and Kleinknecht 2003). Customers' inability to abstract from existing product offerings consequentially leads to the development of incrementally new products at the expense of more radical innovations with potentially higher prospects of success (Grunert 2005; Martin 1995).

With a particular focus on business-to-business markets, Song and Thieme (2009) have investigated whether supplier involvement in the generation of market information leads to increased new product performance outcomes. Their findings have shown that the effectiveness of supplier insights in achieving higher levels of new product success is contingent upon the product's innovation degree and the timing of knowledge integration into the NPD process. Particularly, the gathering of supplier information exerts a positive impact on the success of incremental new products across all phases of the NPD process. In the case of radical innovations, supplier involvement is only beneficial in the latest phase of the NPD process. In a similar vein, Ragatz, Handfield and Petersen (2002) have analyzed the effect that supplier integration has on new product performance outcomes under the condition of technological uncertainty. Their results have demonstrated a positive relationship between supplier integration and new product success in terms of time, quality, and development costs.

Consequentially, the authors have advocated the consideration of supplier information for NPD purposes.

Whereas the importance of external market information sources has been strongly emphasized in recent studies, there is less empirical work on the role that internally-generated market knowledge plays for successful NPD projects. Particularly, research is relatively scarce on company-internal stakeholders that maintain close contacts with customers (e.g., complaint managers, salespeople) and therefore, own unique market insights (Atuahene-Gima 1997; Ernst, Hoyer, and RübSaamen 2010; Le Bon and Merunka 2006). This is surprising given that the (market) information that is generated by company-internal parties can be regarded as idiosyncratic resources that are hard for competitors to observe and act upon. These resources that reside within organizations have thus been emphasized as particularly valuable and have been considered as the foundation of sustained competitive advantages and organizational success (e.g., Barney 1991; Wernerfelt 1984). In addition, empirical research has shown that addressing these internal sources in market launch is strongly and positively related to new product success (Kuester, Homburg, and Hess 2012).

1.3 Focus and Goals of the Dissertation

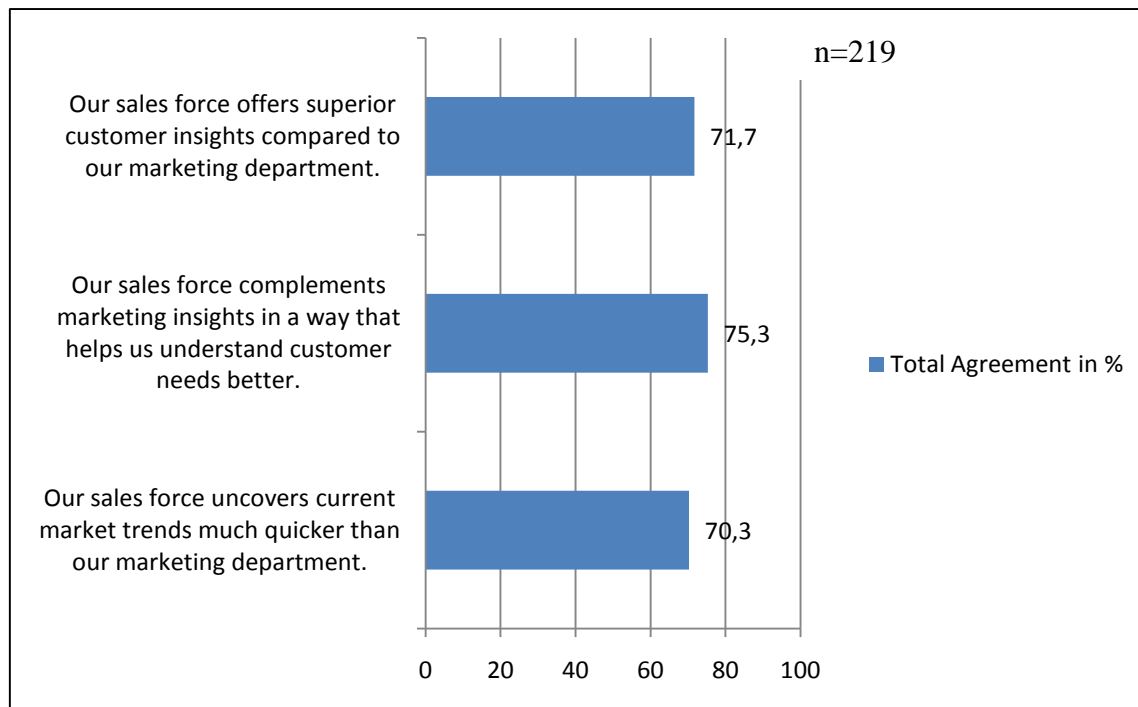
This dissertation project focuses on the company's sales force as a firm-internal resource of market intelligence. Operating at the frontline of the organization, salespeople have the most frequent, direct, and in-depth interaction with customers (Liao and Chuang 2004). This closeness to customers allows salespeople in an exceptional way to establish personal relationships with customers and "a familiarity with their needs and wants" (Evans and Schlacter 1985, p.49; Pelham and Lieb 2004). As a result, salespeople generate unique customer insights that other stakeholders within the company may not hold (Homburg, Wieseke, and Bornemann 2009). In many cases, salespeople can be considered a company's

only link to the customer, which implies that they have an exclusive access to valuable customer data (Chonko, Tanner Jr., and Smith 1991). Additionally, working ‘in the field’ leads to other points of contact not only with customers but also with distributors, retailers, and competitors. This puts salespeople “in a vantage position to feel the pulse of the market” (Liu and Comer 2007, p.565). Given their boundary-spanning position between the company and the market, salespeople are able to make their insights directly and quickly available to firm-internal recipients with little additional effort (Ahearne et al. 2010; Le Bon and Merunka 2006; Schwepker Jr. and Good 2004). In this regard, salespeople serve as both a generator and a communicator of recent market insights and can thus be considered as “a conduit through which customer information will flow directly to relevant decision makers within the organization” (Gordon et al. 1997, p.34; Chonko, Tanner Jr., and Smith 1991).

In summary, salespeople seem to be extremely well suited for the purpose of gathering valuable insights on customers, competitors, and the market environment to complement market insights that reside within organizations in important ways. This view has been empirically supported by Homburg and Jensen (2007) who have shown that the sales force generally has superior market knowledge compared to marketing. In the context of this dissertation project, we asked 219 managers who have been personally involved in NPD processes to evaluate the usefulness of sales force information for NPD purposes. These results confirm that sales force information complements the market knowledge that resides within marketing departments in important ways. Roughly three out of four managers responding to our questions have agreed that their sales force “offers superior customer insights compared to our marketing department” and “complements marketing insights in a way that helps us understand customer needs better”. As salespeople communicate with customers on a continuous (e.g., day-to-day, weekly) basis, they have also been found to

“uncover current market trends much quicker than our marketing department” (see Figure 1-3).

Figure 1-3: Importance of Sales Force Information in NPD



Based on these results, it appears to be an effective and efficient strategy to integrate salespeople as a source of market information into NPD processes. Nevertheless, compared to other market information sources, the sales force is still an underutilized resource of market intelligence (Cross et al. 2001; Liu and Comer 2007; Pass, Evans, and Schlacter 2004). This view is supported by descriptive results of our manager survey that asked respondents about the internal and external market information sources that are generally used in the context of NPD. Table 1-3 shows the top 15 sources utilized by the companies in our sample. Whereas R&D, the upper and top management, and marketing are most often integrated into NPD processes, sales and salespeople are less frequently considered.

Table 1-3: Involvement of Internal and External Parties in NPD

Parties	Involvement of Parties	
	Total number (n=219)	Percentage
1. Research & Development	159	72.6%
2. Upper/ Top management	156	71.2%
3. Marketing	125	57.1%
4. Production/ Manufacturing	115	52.5%
5. Operations research	115	52.5%
6. Customers	114	52.1%
7. Sales/ Salespeople	111	50.7%
8. Customer service/ Customer relations	110	50.2%
9. Engineering	107	48.9%
10. Purchasing	98	44.7%
11. Suppliers	91	41.6%
12. Distributors/ Retailers	87	39.7%
13. Finance	84	38.4%
14. Accounting	65	29.7%
15. Investors/ Capital providers	59	26.9%

In addition to companies that pay relatively little attention to salespeople as a resource of market intelligence in the context of NPD projects, academic research has largely neglected the role of sales force information for developing successful new products. Although previous studies have appreciated the sales force as a valuable, efficient, and reliable source of market information (Cross et al. 2001; Le Bon and Merunka 2006; Pass, Evans, and Schlacter 2004), empirical research on the effectiveness of sales force integration in achieving superior new product performance outcomes is rather scarce. Only recently, some authors have begun to

break ground. Ernst, Hoyer, and Rübsaamen (2010) have investigated cooperation activities between the sales, marketing, and R&D functions in the NPD context. In particular, their results have shown that interactions between sales and R&D and between sales and marketing exert a significant, positive effect on NPD project performance beyond the effect of marketing-R&D cooperation. Thus, these findings indicate that the integration of salespeople during NPD processes can be the basis for more successful new product endeavors. However, there is no research that has investigated the ways in which sales force integration affects new product success. Additionally, the role of contingency factors in sales force integration effectiveness has been neglected in previous research. The objective of this dissertation project is to fill these research gaps.

First of all, we try to resolve the question whether the integration of salespeople and the consideration of their specific market insights support companies in their goal to increase new product success both at the project and at the corporate level. Therefore, our first research question is as follows:

Research question 1a: Does sales force integration represent a driver of new product success at the project level?

Research question 1b: Does sales force integration represent a driver of new product success at the corporate level?

Research has shown that the effectiveness of new product success factors largely depends on contingency factors (e.g., Balachandra and Friar 1997; Henard and Szymanski 2001). Context-specific circumstances can strongly influence and even change the direct effect of success factors on new product performance. Therefore, the second research question refers to

the role of contingency factors that moderate the effectiveness of sales force integration in achieving higher levels of new product success at the project and at the company level.

Research question 2a: Which roles do contextual factors play with regard to sales force integration effectiveness in achieving new product success at the project level?

Research question 2b: Which roles do contextual factors play with regard to sales force integration effectiveness in achieving new product success at the corporate level?

Previous research has identified numerous success factors in the realm of NPD. Some of these determinants can be thought of as outcomes of sales force integration. New product advantages and the internal adoption of new products by salespeople belong to the factors that have been identified as drivers of new product performance (Henard and Szymanski 2001; Hultink and Atuahene-Gima 2000). As these factors equally represent an expected outcome of sales force integration, it is interesting and relevant to resolve the question whether new product advantages and the new product adoption of salespeople serve as mediators of the relationship between sales force integration and new product success. Research questions 3a, 3b, and 3c address these issues:

Research question 3a: Does new product advantage mediate the relationship between sales force integration and new product success at the project level?

Research question 3b: Does new product advantage mediate the relationship between sales force integration and new product success at the corporate level?

Research question 3c: Does the adoption of a new product by salespeople mediate the relationship between sales force integration and new product success at the project level?

1.4 Structure of the Dissertation

This dissertation consists of four chapters. Chapter 1 elaborates on the practical and academic relevance of NPD and provides a general overview of new product success factors. In this context, we have emphasized that the integration of external and internal market information sources during NPD processes represents a prerequisite for the development of new products that are successful in the market. In the following, the company's sales force has been identified as a potentially important, firm-internal resource of market information that is still underutilized in corporate practice and under-researched in the academic literature. Based on this research gap, various research questions have been identified. To resolve these research questions, we conducted two studies that are presented in Chapter 2 and Chapter 3 of this dissertation.

The first study is presented in Chapter 2. Focusing on the new product project level, this study investigates the effect that sales force integration exerts on new product success via two separate routes. Particularly, we posit that sales force integration leads to the development of superior new products as perceived by customers, which should subsequently lead to improved new product performance outcomes. The study also considers the internal adoption of new products by the sales force as a potential outcome of sales force integration, which, in turn, is associated with higher levels of new product success. Furthermore, the study focuses

on contextual factors that influence the relationship between sales force integration and new product advantages and the effect that the new product adoption of salespeople exerts on new product success. Thus, the study that is presented in Chapter 2 of this dissertation addresses research questions 1a, 2a, 3a, and 3c.

The second study – which is presented in Chapter 3 – investigates the effect of sales force integration on new product success at the corporate level. Thus, we are interested to explore whether companies that generally, i.e., across all new product projects, integrate the sales force, bring more successful new products to the market than companies that do not or do so to a lesser extent. In addition to the direct relationship between sales force integration and corporate new product success, the study analyzes the role of new product advantage as a potential mediator of the underlying relationship. Moreover, this study considers the moderating influence of several contextual factors on the relationship between sales force integration and new product success at the company level. Therefore, research questions 1b, 2b, and 3b are addressed by this study.

Finally, in Chapter 4, this dissertation concludes with a summary of the key findings garnered by the empirical studies and discusses general implications for managers and academic research.

Chapter 2:

Sales Force Integration in New Product Development – A Project-Level Analysis

Abstract

This study focuses on the distinct role of sales force integration in generating improved new product performance outcomes. Drawing on the resource-based view of the firm, the authors argue that the company-internal processing of the market information provided by salespeople represents a critical resource that allows for the development of successful new products via new product advantages and the adoption of new products by salespeople. Data pertaining to 219 new product projects from various industries provide empirical evidence that the intensity of sales force integration in the context of new product development significantly affects new product success beyond the effect of marketing integration. The study also demonstrates that information quality and timing influence the effectiveness of sales force integration in achieving superior new product offerings. In addition, the relationship between the adoption of new products by salespeople and new product success is contingent upon a new product's degree of innovativeness. The authors provide implications for decision makers in new product development and discuss avenues for further research.

2.1 Introduction

Previous studies have commonly acknowledged the effectiveness of market information processing activities in contributing to a better understanding of customer needs, the development of superior new products, and higher new product success rates (e.g., Baker and Sinkula 1999; Li and Calantone 1998). This research indicates the importance of integrating market insights from stakeholders inside and outside of a company for successful new product development (NPD). Recent academic work has advocated the integration of external market information sources, such as customers and suppliers, into the NPD process (Chesbrough 2006; Gruner and Homburg 2000; Song and Thieme 2009). With regard to internal information sources, the extant literature has largely concentrated on the roles of marketing and research and development (R&D) and the integration of their complementary insights for the effective development of new products (Ernst, Hoyer, and Rübsaamen 2010; Olson et al. 2001).

However, prior empirical research has tended to neglect the distinct role of a company's sales force as an important internal resource of market intelligence (Ahearne et al. 2010; Le Bon and Merunka 2006; Pass, Evans, and Schlacter 2004). This lack of attention has arisen primarily because previous studies in the realm of innovation management have not differentiated between the sales and marketing functions, although they are separate departments with different orientations and competences (Ernst, Hoyer, and Rübsaamen 2010; Homburg and Jensen 2007; Wieseke, Homburg, and Lee 2008). In contrast with marketing, which mainly owns strategic market information and has a strong product focus, sales forces can provide more specific insights with respect to customer needs and competitive activities (Ernst, Hoyer, and Rübsaamen 2010; Le Bon and Merunka 2006). These insights are attributable to the frontline operations of salespeople and their direct interactions with market participants, which allow them to absorb unique insights that extend beyond the knowledge of

marketing and other firm-internal stakeholders (Homburg, Wieseke, and Bornemann 2009; Liao and Chuang 2004). In support of this view, Homburg and Jensen (2007) have found that the sales force has deeper knowledge regarding customers and competitors compared with marketing professionals. In addition, interviews with 35 NPD managers in the exploratory stage of this research have revealed that sales force information complements the market insights of marketing departments in important ways.

Despite the appreciation of the sales force as a valuable source of market information, research in this field is rather scarce. Some authors have only recently begun to investigate this area of research. With a distinct focus on the sales force, Ernst, Hoyer and Rübsaamen (2010) have investigated cooperation activities between the sales, marketing, and R&D functions in the different phases of the NPD process. In particular, their results have shown that interactions between sales and R&D and between sales and marketing exert a significant, positive effect on NPD project performance beyond the effect of marketing-R&D cooperation. The authors have also proven that sales-R&D cooperation and sales-marketing cooperation are maximally effective in the early stages of the NPD process. Thus, these findings indicate that the integration of the sales force, especially in early NPD process phases, can be the basis for more successful new product endeavors. However, there is no research that has investigated the ways in which sales force integration affects new product success. Additionally, the role of contingency factors in sales force integration effectiveness has been neglected in previous research.

The objective of our study is to address these issues. Specifically, we contribute to a more comprehensive understanding of the distinct role of salespeople in NPD by investigating two separate routes through which sales force integration affects new product success. First, our research demonstrates that the consideration of market insights from salespeople can assist firms in creating and launching new products that customers perceive as superior to

competing offerings and that thus generate a competitive advantage. Second, we determine the effect of sales force integration on the adoption of new products by salespeople. Both new product advantages and salespeople's new product adoption subsequently increase new product performance. Our findings are robust against the influence of marketing integration and thus firmly establish sales force integration as a key driver of new product success.

Supplementing the main effect views, we additionally investigate the role of contextual factors to gain a more fine-grained understanding of the conditions under which sales force integration is particularly useful. We provide evidence that the effectiveness of sales force integration in achieving new product advantages varies across NPD stages and quality levels of information provided by salespeople. In addition, product newness is shown to influence the effect of salespeople's new product adoption on new product success.

2.2 Conceptual Framework

2.2.1 Conceptual Definition of Sales Force Integration

Our study aims to obtain a deeper understanding of the company-internal handling and appreciation of the market insights of salespeople when developing new products, which implies a detailed consideration of distinct information processing activities undertaken by NPD project members. Based on this rationale, our study conceives sales force integration as an explanatory combination of the three key information processing activities: acquisition, dissemination, and use (Jaworski and Kohli 1993; Kohli and Jaworski 1990). More precisely, we define sales force integration as the intensity with which the market insights of salespeople are gathered, shared, and used internally within a company in the scope of new product-related decision making. There is a particular emphasis on the intensity aspect of this definition, as companies differ greatly in the extent to which they process market information (Kohli and Jaworski 1990). In addition, following Cooper and Kleinschmidt (1986), it is less

important whether an activity is applied in an innovation; the importance lies in how intensely this activity is incorporated. The question of whether sales force integration is beneficial for new product performance outcomes should, therefore, be a question of intensity.

2.2.2 The Resource-Based View of the Firm as a Theoretical Framework

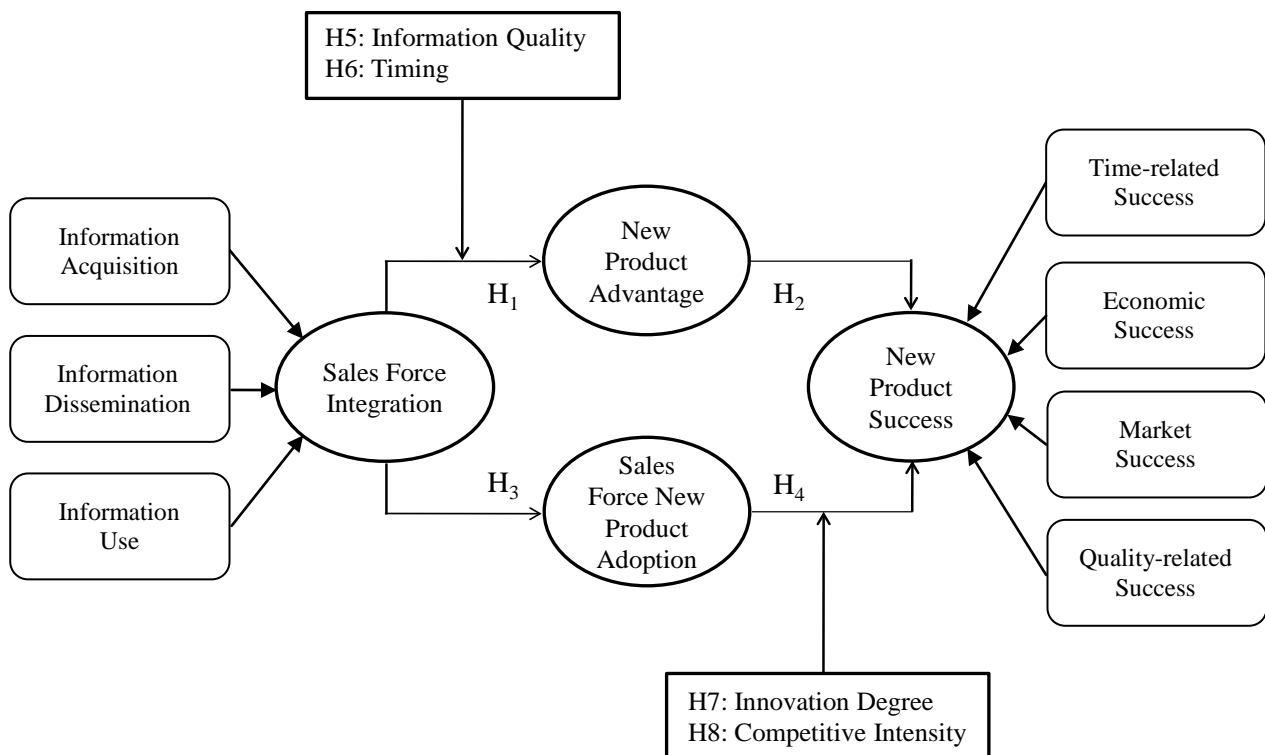
The resource-based view of the firm (RBV) serves as the theoretical framework of our study. The RBV postulates that a firm's competitive advantage depends on the internal resources that it owns and controls (Wernerfelt 1984). Resources that are valuable, rare, and difficult to imitate can generate a sustained competitive advantage, as these resources enable organizations to increase the efficiency and effectiveness of their business activities continuously, which subsequently leads to sustained corporate success (Barney 1991; Wernerfelt 1984).

We regard sales force integration as a *valuable* resource because salespeople provide unique information regarding customer needs and competitive activities that complements the internal market knowledge of companies in important ways (Ernst, Hoyer, and Rübsaamen 2010; Homburg and Jensen 2007). In addition, the abilities of firms to process these insights represent *valuable* firm-specific capabilities that are associated with effective and efficient decision making in the NPD context (Moorman and Miner 1997). Sales force integration is a *rare* resource because salespeople are an underutilized source of market intelligence (Cross et al. 2001; Pass, Evans, and Schlacter 2004). Finally, sales force integration is *difficult to imitate* because the sales force insights and processing capabilities of a firm are unique to each company and are difficult, if not impossible, to obtain from external company stakeholders (Li and Calantone 1998; Zahay, Griffin, and Fredericks 2004).

2.3 Hypothesis Development

The conceptual framework for our study focuses on the effect of sales force integration on new product success via new product advantages and new product adoption by salespeople. We additionally investigate several contextual factors that potentially influence these underlying relationships. Figure 2-1 presents an overview of our conceptual model, including the constructs under investigation.

Figure 2-1: Conceptual Model



2.3.1 Hypotheses on Main Effects

Relationship between Sales Force Integration and New Product Advantages:

New product advantages refer to the superior and unique benefits that customers obtain from a new product; therefore, such advantages constitute a desired outcome of the NPD process (Cooper 1979; Li and Calantone 1998; Song and Parry 1997a). Empirical research on innovation success factors has commonly acknowledged a strong positive relationship between a company's market information processing capabilities and the relative advantages of the resulting new products. For example, Atuahene-Gima (1996) has found a significant relationship between the market information processing capabilities of firms and their new product advantages. In addition, Li and Calantone (1998) have provided evidence that the acquisition, interdepartmental sharing, and integration of customer and competitor knowledge exert a positive effect on a new product's competitive superiority in the software industry.

Drawing on these research findings, we argue that the processing of sales force information strongly determines new product advantages. This contention is in line with the RBV, which considers sales force integration as a critical, firm-level resource that facilitates the establishment of competitive advantages if its potential is effectively realized. Thus, companies that demonstrate strong capabilities with regard to gathering, sharing, and ultimately using sales force insights in the scope of new product-related decision making will be better able to develop new products that create value that is superior to that of competing firms in the eyes of customers (Atuahene-Gima 1996; Barney 1991; Wernerfelt 1984). Therefore, we hypothesize as follows:

H1: Sales force integration has a positive effect on new product advantages.

Relationship between New Product Advantages and New Product Success:

Rogers (2003) has emphasized that the adoption of a new product by customers largely depends on its relative advantage over competing product offerings. This claim is based on the rationale that customers are more likely to purchase new products when these products offer superior features and unique benefits that cannot be found in products that already exist in the market. Products that better match customer needs and that offer a higher benefit-to-cost ratio are more likely to be adopted by users and are, therefore, more prone to be successful in the marketplace (Maidique and Zirger 1983). Equally, the RBV considers the link between competitive advantages and success as a logical consequence emanating from the exploitation of firm-internal resources (Barney 1991; Wernerfelt 1984).

In support of theoretical considerations, the empirical literature on innovation success factors has consistently identified product advantage as a key determinant of new product success (Henard and Szymanski 2001; Song and Parry 1997a). Following Cooper (1979), the predominant role of new product advantages in achieving new product success is logical because it is through superior product offerings that organizations can obtain unique selling positions in markets, which, in turn, provide the basis for earning superior returns. Thus, we posit the following hypothesis:

H2: New product advantages have a positive effect on new product success.

Relationship between Sales Force Integration and New Product Adoption by the Sales Force:

Within the innovation adoption literature, most studies have focused solely on the adoption of new products by customers and thus have largely neglected the role of salespeople as internal customers (Thompson and Sinha 2008; Wieseke, Homburg, and Lee 2008). This neglect is surprising, given the decisive role of salespeople in bringing new products to market (Ernst,

Hoyer, and Rbsaamen 2010). Likewise, new product adoption by the sales force receives only limited attention in corporate practice, although salespeople frequently reject new products for various reasons (e.g., lack of new product knowledge, additional selling efforts) (see Ahearne et al. 2010; Atuahene-Gima 1997; Wieseke, Homburg, and Lee 2008). Because new product rejection is strongly associated with the dysfunctional behavior of salespeople toward a new product, there is a particular need to facilitate the adoption of new products by the sales force (Atuahene-Gima 1997; Wotruba and Rochford 1995).

Past research has considered a firm's commitment to innovation to be one of the most predominant factors that determine employee behavior, including new product adoption (Atuahene-Gima 1997; Scott and Bruce 1994). In our view, sales force integration represents a form of company commitment for the following reason. Firms that invest resources into the processing of the market information provided by the sales force send a clear signal that they value the market information retrieval of salespeople and demonstrate their overall support for NPD projects. Such behavior encourages the adoption of new products by the sales force for two reasons. First, salespeople feel more confident in selling new products that have experienced higher levels of company commitment and support (Atuahene-Gima 1997). Second, sales force integration leads to the development of new products that reflect customer needs that have been previously identified by the sales force, which subsequently improves the customer demand expected by salespeople. According to expectancy theory and previous empirical results, higher levels of expected customer demand positively influence the new product adoption behavior of salespeople and their efforts devoted to new product success (Vroom 1964; Wieseke, Homburg, and Lee 2008).

On the basis of these observations, we expect that sales force integration plays an important role in facilitating the successful launch of a new product to a company's sales force. Therefore, we hypothesize as follows:

H3: Sales force integration has a positive effect on new product adoption by the sales force.

Relationship between New Product Adoption by the Sales Force and New Product Success:

Drawing on the RBV, we can regard the new product adoption of salespeople as a source of competitive advantages that assist firms in achieving new product-related goals. This argument is based on the assumption that salespeople represent a first line of customers, whose personal level of new product adoption largely determines their performance with regard to a new product (Atuahene-Gima 1997). In support of this view, previous studies have indicated that highly committed salespeople devote greater efforts to achieving new product-related goals, and such increased efforts support selling performance, timely market launches, and rapid diffusion of new products in the market (Ahearne et al. 2010; Hultink and Atuahene-Gima 2000). In this regard, the adoption of a new product by the sales force serves as an important indicator of its acceptance in the marketplace (Wieseke, Homburg, and Lee 2008).

Motivational theories suggest that the relationship between internal adoption and improved performance follows a straight pattern. Higher degrees of commitment result in higher levels of motivation to lead a new project to success (Atuahene-Gima 1997; Mowday, Porter, and Steers 1979). As a consequence, employees work harder and more efficiently on projects and demonstrate enhanced performance in their tasks (Brown and Peterson 1994). This improved performance ultimately leads to an increase in the quality and efficiency of projects and to improved project outcomes (Maignan, Ferrell, and Hult 1999; Song and Parry 1997b). Therefore, we posit the following hypothesis:

H4: New product adoption by the sales force has a positive effect on new product success.

2.3.2 Exploring the Role of Moderating Factors

In addition to the main effect framework, we consider sales force information quality and the timing of sales force integration to be potential moderators of the relationship between sales force integration and new product advantages. The exploration of information quality is particularly relevant, as the processing of low-quality information can adversely affect project outcomes (Sharma and Lambert 1994). The examination of timing builds on the argument that sales force information is not equally effective across NPD process phases.

Information Quality:

NPD processes are characterized by high levels of uncertainty (Hoeffler 2003; Salomo, Weise, and Gemuenden 2007). For example, ambiguity exists with regard to the quality standards that new products are intended to meet, their potential in the market, and the costs that are associated with their development (Montaguti, Kuester, and Robertson 2002; Nambisan 2002). To reduce these multi-faceted types of uncertainty, NPD managers are supposed to engage in the processing of high-quality information (i.e., unbiased, accurate, and relevant information that is directly useful for a specific task without the need for clarification or further refinement) (Maltz and Kohli 1996; Moenaert and Souder 1990). The importance of high-quality information is based on the argument that accurate and unbiased information best reduces uncertainty, whereas unclear and irrelevant information may increase rather than reduce uncertainty (Hultink et al. 2011; Zimmer, Henry, and Butler 2007). Therefore, information must exhibit a sufficient level of quality to effectively support managers in their NPD-specific work tasks, which include the development of superior products as perceived by customers.

Although the importance of information quality in reducing uncertainties seems to be intuitive, only a few studies have addressed the role of information quality empirically. In a

study of 209 business services firms, Zahay et al. (2004) have proven that information quality exerts a significant and direct influence on sales, income growth, and overall firm performance. In addition, the authors have suggested a moderating effect of information quality on the relationship between information processing activities and the development of customer relationships. As new product advantages can be regarded to be valuable outcomes of sales force integration that support customer relationships on the basis of superior product offerings, we suggest that higher levels of information quality strengthen the relationship between sales force integration and new product advantages.

A moderating influence of information quality has been recently supported by Hultink et al. (2011), who have found that market information processing activities exert a positive effect on new product performance only in situations in which high-quality data are available. In addition, previous study findings that have related inaccurate and unclear customer information to unfavorable selling performances and project outcomes support our argument that the development of superior new products is largely contingent upon sales force information quality (Lambert, Marmorstein, and Sharma 1990; Sharma and Lambert 1994). Therefore, we hypothesize as follows:

H5: Higher-quality information provided by salespeople is associated with stronger effects of sales force integration on new product advantages.

Timing:

In the scope of this study, we consider that the NPD process involves several distinct phases that can be subsumed into the three generic stages of predevelopment, development, and commercialization (Ernst, Hoyer, and Rübсаamen 2010; Veldhuizen, Hultink, and Griffin 2006). Scholarly work has indicated that different information types and sources are required in different phases of the NPD process (Ernst, Hoyer, and Rübсаamen 2010; Frishammar and

Ylinenpää 2007). In this context, particular importance has been assigned to the early integration of customer insights and competitor information. This importance is based on the rationale that specific market insights are particularly useful in the predevelopment stage, which aims to identify market potential and generate high-level new product ideas (Troy, Hirunyawipada, and Paswan 2008; Veldhuizen, Hultink, and Griffin 2006).

Given that salespeople are recognized as valuable resources of market information that consists of unique insights regarding customers and competitors (Ernst, Hoyer, and Rübсаamen 2010; Pass, Evans, and Schlacter 2004; Pelham and Lieb 2004), salespeople contribute the type of information that is especially critical in this earliest phase of the NPD process. Therefore, we consider sales force integration to be most valuable in the predevelopment stage in which specific market insights allow for the generation of promising new product concepts that have a strong chance of outperforming competing offerings when such new concepts materialize as marketable products (Frishammar and Ylinenpää 2007; Zahay, Griffin, and Fredericks 2004).

This argument is in keeping with previous studies that have placed particular importance on a firm's predevelopment activities for the achievement of new product advantages and success (e.g., Henard and Szymanski 2001; Veldhuizen, Hultink, and Griffin 2006). In particular, Ernst, Hoyer, and Rübсаamen (2010) have found that cooperation activities between sales and marketing and between sales and R&D exert the greatest effect on NPD project performance when such activities are undertaken in the earliest stage of the NPD process. This leads us to the following hypothesis:

H6: The relationship between sales force integration and new product advantages will be stronger when more intense sales force integration occurs in the predevelopment stage of the NPD process.

Academic scholars have previously suggested that new product adoption by the sales force does not necessarily result in higher new product performance outcomes, due to adoption barriers and other influencing factors (Anderson and Robertson 1995). Thus, there is a particular need to investigate contingency factors that potentially influence the underlying relationship. Our study investigates a new product's innovation degree and competitive intensity as potential moderators because product rejection rates are higher for radical new products (Lee and O'Connor 2003; Veryzer 1998) and in hostile competitive environments (Atuahene-Gima 1997).

Innovation Degree:

Previous research has shown that the effectiveness of various new product success factors is highly contingent upon a new product's innovation degree (i.e., whether it is an incremental product or a radical new product) (Olson et al. 2001; Salomo, Weise, and Gemünden 2007). Product newness is an important factor that must be considered in the scope of our study because it influences the perception, evaluation, and adoption of new products by customers and thus its ultimate success in the market (Moreau, Lehmann, and Markman 2001; Veryzer 1998). Compared with incremental innovations, radical new products generally evoke higher levels of risk and uncertainty as perceived by customers. This tendency is a result of customers' generally limited knowledge about and experience with highly innovative products (Mick and Fournier 1998). In addition, as radical innovations often include newer technologies and more complex features, these products are more difficult to understand for customers who tend to overlook their credible advantages over existing product offerings (Lee and O'Connor 2003). This limitation potentially increases the risks and uncertainties that are associated with highly innovative products and ultimately leads to greater resistance to the adoption of radical products compared with that of incremental new products (Veryzer 1998).

Communication with customers has been proposed to be an appropriate strategy with which to overcome new product adoption barriers (Castaño et al. 2008; Lee and O'Connor 2003). As salespeople operate at the frontlines of companies and are responsible for selling their new products, they usually engage in conversations with customers. In this context, explanations regarding how new products work, illustrations of their features, and recommendations for their use can effectively ease customer anxieties, facilitate new product adoption, and support favorable new product performance outcomes (Chandy et al. 2001; Lee and O'Connor 2003). As uncertainty levels increase with higher degrees of product newness, the successful management and reduction of uncertainties through customer education is more important as a product's innovativeness increases (Castaño et al. 2008; Hoeffler 2003). Thus, the adoption of new products by salespeople should be more important and effective for highly innovative products for which perceived uncertainties are particularly high and the efforts of salespeople to convince customers are critically important for increasing new product adoption and performance. Therefore, we posit the following hypothesis:

H7: Higher innovation degrees of new products are associated with stronger relationships between the new product adoption of salespeople and new product success.

Competitive Intensity:

Customer resistance to new product adoption is likely to increase in markets that are characterized by high levels of competitive intensity, which refers to the extent and aggressiveness of competitive activities in the markets in which a new product is introduced (Atuahene-Gima 1997; Kuester, Homburg, and Robertson 1999; Kumar, Subramanian, and Yauger 1998). This likelihood is based on the rationale that customers can choose from a wide range of competing product offerings in markets in which many suppliers must exert significant efforts to attract each customer (Kumar, Subramanian, and Yauger 1998). As a

consequence, the commitment of salespeople toward an innovation and their efforts to convince customers of the new product's benefits are more important and effective in such hostile environments. In addition, salespeople perceive their job of selling new products as more challenging and intrinsically rewarding in highly competitive environments, and such perceptions should increase their persuasive power and selling performance (Atuahene-Gima 1997; Hultink and Atuahene-Gima 2000). Building on these arguments, we posit the following hypothesis:

H8: Higher levels of competitive intensity are associated with stronger relationships between the new product adoption of salespeople and new product success.

2.4 Methodology

2.4.1 Data Collection and Sample

To obtain the data that are necessary to test our conceptual model, we developed a survey that targeted competent and qualified managers as key informants who have been personally involved in the NPD processes of their firms within the last three years. In the survey, we asked each respondent to select a specific new product that was developed and introduced by his or her company within that time period. Only the respondents who indicated that they were highly experienced with at least one recently completed new product project and who additionally occupied an influential management-level position (e.g., marketing, product, or R&D managers) qualified for the study. To control for a potential memory bias, we requested that managers choose a new product that is representative of the typical new product offerings of their companies. In addition, we communicated to participants that they do not need to refer to a successful new product project. Using a commercial database, we contacted 1,215 managers in the US, the UK, and Australia. The final sample size yielded 219 complete and

usable questionnaires and an effective response rate of 18.0 percent. Managers who answered the survey represented a broad range of industries, had already worked for 12.05 years in their positions, and had been involved in 5.74 NPD projects.

2.4.2 Measures

The latent constructs of our conceptual model represent either reflective or formative specifications and were almost exclusively measured on the basis of multi-item scales. A pretest of the questionnaire among 44 marketing, product, and R&D managers prior to the main study was undertaken to verify the understandability, completeness, and structure of the questionnaire and the measurement quality of indicators (Hunt, Sparkman, and Wilcox 1982). The pretest results led to minor changes in the wording of particular items and to the shortening of several explanations provided in the questionnaire.

Sales force integration: The construct of sales force integration is based on the concept of behavioral market orientation and is thus conceived as an explanatory combination of the three key market information processing activities: acquisition, dissemination, and use (Kohli and Jaworski 1990). Therefore, the focal independent variable of our research model is represented as a higher-order, formative construct that is caused by its indicators (MacCullum and Browne 1993). Following Diamantopoulos and Winklhofer (2001), we engaged in the four steps of formative index construction. First, we specified the domain of the content of sales force integration as the extent to which market information stemming from salespeople is processed internally within a company in the scope of a particular new product project. In the second step, we selected the formative indicators that capture the key information processing capabilities that the extant literature has commonly identified as the acquisition, dissemination, and use of information (Baker and Sinkula 1999; Jaworski and Kohli 1993;

Kohli and Jaworski 1990). Each of these formative indicators was measured with reflective items on 7-point Likert scales that were adapted from the market orientation scale proposed by Jaworski and Kohli (1993). In the third step, we tested the formative index for multicollinearity by calculating variance inflation factors. Our analyses indicated an unambiguous differentiation between the indicators, as the highest variance inflation factor for the formative index was 3.099 and was, therefore, below the critical threshold of 3.3 (Petter, Straub, and Rai 2007). Finally, we calculated a multiple indicators and multiple causes (MIMIC) model to assess the external validity of the formative index (Hauser and Goldberger 1971). The reflective items showed significant correlations with the three formative indicators. Moreover, the variance explained in the focal construct was exceptionally high ($R^2 = .82$), and this result indicates a strong joint predictive power of our formative indicators and a comprehensive measurement of the formative index (Chin 1998).

New product success: The latent dependent variable of new product success is also determined by several indicators that represent a formative measurement approach (Diamantopoulos and Winklhofer 2001; MacCullum and Browne 1993). The domain of content that new product success is intended to capture was specified as the achievement of internally communicated company goals that are associated with new product projects (Etzioni 1964). We identified four generic new product success dimensions that are related to a company's new product success in terms of time, economic viability, market acceptance, and quality (Rodríguez, Pérez, and Gutiérrez 2008; Sivadas and Dwyer 2000; Xie, Song, and Stringfellow 1998). The calculation of the variance inflation factors indicated that multicollinearity did not cause major problems given that the highest variance inflation factor for the formative index was 2.756 (Petter, Straub, and Rai 2007). Finally, the MIMIC model results showed high correlations between reflective items and formative indicators and a high

proportion of variance explained in the focal construct ($R^2 = .82$). Thus, this model supported the validity of the formative index.

Appendix A-1 provides more detailed information regarding our formative construct measurements.

Mediator variables: We followed the approach of Cooper and Kleinschmidt (1987) for the assessment of *new product advantages*, which refer to a new product's superiority over competing product offerings as perceived by customers. In accordance with Atuahene-Gima (1997), we conceptualized *new product adoption by the sales force* as a two-dimensional construct consisting of 'commitment' and 'effort'. To reduce the complexity of the model, we employed an item parceling approach (Hall, Snell, and Foust 1999). After calculating the arithmetic mean of the respective items for each of the two dimensions, the two arithmetic means were used as formative indicators for the measurement of the construct.

Moderator variables: The measurement scale of Zimmer, Henry, and Butler (2007) served as the basis for assessing the construct of *information quality*, which refers to the value of sales force information in the NPD process. We gauged the moderating construct of *timing* on a 7-point intensity scale for each of the three NPD process phases. Moreover, *innovation degree* was measured on the 7-point differential scale that has been suggested by Booz, Allen and Hamilton (1982); this scale reflects a product's innovation degree from a company/ market perspective on a spectrum between marginally innovative and highly innovative products. Finally, we built on the measurement approach of Jaworski and Kohli (1993) for assessing the construct of *competitive intensity*, which relates to the level of competitive activities in a new product's target markets.

Controls: We considered several control variables in our analyses. To assess the influence of sales force integration on new product success beyond the effect of *marketing integration*, we controlled for the level of marketing information processing in the NPD process. With *industry* and *firm size*, we additionally included two constructs that have previously been considered in the literature as potential determinants of new product success (e.g., Baker and Sinkula 1999; DeLuca and Atuahene-Gima 2007). Finally, as an extension of learning theory, we expect that a manager's level of experience with NPD projects has an effect on new product performance outcomes. Therefore, we incorporated *NPD experience* as a further control variable.

Appendix A-2 provides more detailed information regarding the measurement reliabilities of the mediator, moderator, and control variables investigated in our study.

2.5 Data Analysis and Results

2.5.1 Analytical Method

We tested the hypotheses regarding the structural relationships with partial least squares (PLS) structural equation modeling, due to the conceptualization of our focal independent and dependent variables as formative constructs (MacCallum and Browne 1993). In contrast with the variance-based PLS algorithm, the suitability of covariance-based methods is limited for analyzing formative constructs (Chin 1998; Williams, Edwards, and Vandenberg 2003). For example, covariance-based structural equation models are univocally identified only if each formative construct flows into at least two reflectively measured constructs; otherwise, parameter estimates are ambiguous (MacCallum and Browne 1993). In addition, covariance-based methods are inappropriate for use when endogenous variables are measured formatively (Chin 1998). In this case, it is impossible to differentiate between the variances explained by

structural relationships as opposed to formative indicators. As these restrictions do not apply to PLS, we decided to use this most widely accepted variance-based approach.

2.5.2 Test of Hypotheses and Results

We first calculated a model that included the constructs from our conceptual framework and firm size, industry, and NPD experience as control variables. Moderating factors and marketing integration were initially excluded from this model, which explains 70.7% of the variance in the dependent variable of new product success. Our analyses reveal strong links between the main effects proposed in our model. We find a significant positive relationship between sales force integration and new product advantage ($\beta = .504$; $p < .01$), which in turn positively affects new product success ($\beta = .675$; $p < .01$). In addition, sales force integration exerts a significant positive effect on the new product adoption of salespeople ($\beta = .717$; $p < .01$), which subsequently improves new product success ($\beta = .219$; $p < .01$). These findings support Hypotheses 1 to 4 of our conceptual model.

To investigate whether the effect of sales force integration on new product success can be explained by new product advantages and salespeople's new product adoption, we followed the procedure for testing mediations that has been proposed by Baron and Kenny (1986). The authors have referred to three conditions that must all be fulfilled to prove the existence of full mediation. The first condition requires that the exogenous variable (sales force integration) and the proposed mediator (new product advantage or new product adoption by the sales force) both have significant effects on the dependent variable (new product success) when these effects are investigated independently of one another. The second condition claims that the exogenous variable significantly affects the proposed mediator. Finally, the third condition requires that the inclusion of the mediator variable into the model renders the direct relationship between the exogenous and the dependent variable as insignificant. Because all

three conditions hold true in the mediator analyses of new product advantage and new product adoption by the sales force, we conclude that both constructs fully mediate the relationship between sales force integration and new product success.

With regard to firm size, industry, and NPD experience, we do not find a significant relationship between any of these controls and new product success, and the control variables do not significantly contribute to a further explanation of the dependent variable ($\Delta R^2 = .002$). This result lends support to the effectiveness of sales force integration as a key driver of new product success. To assess the influence of sales force integration on new product success beyond the effect of marketing integration, we calculated an additional model that controlled for marketing integration in NPD. The results show that the relationship between sales force integration and new product success remains highly significant when marketing integration is controlled ($\beta = .478$; $p < .01$). In contrast, marketing integration does not significantly influence new product success when sales force integration acts as a control ($\beta = -.055$; $p > .10$). These findings strongly support recent calls in the literature for a distinct investigation of marketing and sales functions in the NPD context (Ernst, Hoyer, and RübSaamen 2010). These results further highlight the particular value of the specific market insights of salespeople, which complement the strategic information held by marketing departments in important ways (Homburg and Jensen 2007).

To test our proposed moderating effects, we created interaction terms by case-wise multiplication of the underlying construct scores for the predictor and moderator variables. In the next step, both the moderating latent variable and the interaction term were included into the PLS path model for the assessment of moderating effects. In compliance with Hypothesis 5, we find that higher levels of information quality strengthen the positive relationship between sales force integration and new product advantages ($\beta = .163$; $p < .05$). Moreover, in support of Hypothesis 6, our results corroborate the importance of an early integration of the

market information provided by salespeople in the NPD process. Specifically, we find that high levels of sales force integration in the predevelopment stage significantly strengthen the effect on new product advantages ($\beta = .173$; $p < .05$). Interestingly, the moderating effect of timing is insignificant if sales force information is considered in the development stage ($\beta = .018$; $p > .10$), whereas high intensities of sales force integration in the commercialization stage even exert a negative moderating influence on new product advantages ($\beta = -.193$; $p < .05$). In accordance with Hypothesis 7, we find that the link between the new product adoption of salespeople and new product success is stronger for more radical new products ($\beta = .108$; $p < .05$). Finally, our results fail to support Hypothesis 8. Although the results point toward the proposed direction, competitive intensity does not significantly strengthen the relationship between new product adoption and new product success ($\beta = .068$; $p > .10$).

Table 2-1 provides an overview of the path coefficients, t-values, and significance levels of our hypothesized relationships.

2.5.3 Further Measure Validation Using Additional Data

We followed two separate approaches to test the validity of our subjective performance measures derived from multi-item scales. First, we asked each participating manager to disclose figures that refer to his or her new product's sales growth, market share, and return on investment (ROI). Overall, 93% of the respondents provided us with this type of data. Subsequent correlation analyses showed highly significant positive correlations between the subjective measures of economic new product success and sales growth ($r = .39$, $p < .01$), market share ($r = .35$, $p < .01$), and ROI ($r = .30$, $p < .01$).

Table 2-1: Test of Main Effects, Moderating Effects, and Controls

Hypothesis	Independent Variable	Dependent Variable	Beta	T-Value
H1	Sales force integration	New product advantage	.504***	7.522
H2	New product advantage	New product success	.675***	9.098
H3	Sales force integration	Sales force new product adoption	.717***	16.786
H4	Sales force new product adoption	New product success	.219***	3.045
			Endogenous Constructs	Construct R²
			New product advantage	.254
			Sales force new product adoption	.514
			New product success	.707
Hypothesis	Independent Variable	Dependent Variable	Beta	T-Value
H5	Sales force integration x Information quality	New product advantage	.163**	1.727
H6	Sales force integration x Timing (Predevelopment)	New product advantage	.173**	1.929
	Sales force integration x Timing (Development)	New product advantage	.018	.223
	Sales force integration x Timing (Commercialization)	New product advantage	-.193**	2.041
H7	Sales force new product adoption x Innovation degree	New product success	.108**	2.098
H8	Sales force new product adoption x Competitive intensity	New product success	.068	.850

*** $p < .01$, ** $p < .05$, * $p < .10$

We additionally collected objective financial data from financial databases (e.g., CompuStat) and annual reports that were accessible on the websites of the firms. We were able to identify 36 companies (16.4%) in our sample for which objective performance data were publicly available. We collected information regarding the total asset value, sales volume, and net sales/PPE of the firms, as these firm-level performance figures are strongly influenced by the success of a company's new products. Because we asked managers to refer to a specific new product that was launched within in the last three years and that is typical for their companies, the new product chosen can be regarded as a reflection of all new products that the companies have brought to market within that time frame. Therefore, data were collected for the last three consecutive years, which allowed us to calculate average indices for the three performance indicators. Correlation analyses between the subjective measures of economic new product success and objective performance data showed significant positive correlations for all three objective indicators ($r = .27, p < .05$, for net sales/PPE; $r = .22, p < .10$, for sales volume; $r = .21, p < .10$, for total asset value). Given that subjective performance data refer to new products and objective data were collected at the company level, we consider these correlations to be sufficiently high in our study context. In addition, model recalculations with objective performance indicators as dependent variables supported the strong link between sales force integration and performance outcomes.

Considered together, the results of our validation analyses indicate that our respondents are reliable key informants for the topic under investigation and thus support our decision to use subjective performance measures (Homburg, Klarmann, and Schmitt 2010).

2.5.4 Tests for Common Method Bias

The data for the measurement of both independent and dependent variables were collected by means of the same survey instrument and stem from the same data source. For this reason,

there is a possibility that a common method bias potentially threatens the validity of our results. Podsakoff et al. (2003) have identified social desirability as one of the most prevalent sources of common method bias. Therefore, we exercised utmost care in designing the survey to encourage respondents to provide answers that are real reflections of the truth rather than results of their social acceptability. In particular, we refrained from informing managers of the study's objective and emphasized that there were no right and wrong answers and no statements that we were specifically seeking. In addition, we instructed participants to refer to actual situations rather than ideal situations. Finally, we emphasized that all of the data provided would be treated with complete confidentiality and would be published only on an aggregate level to ensure that no inferences could be drawn with regard to specific respondents.

We additionally conducted several statistical tests to assess whether common method bias exists in our data set. First, we conducted the Harman single-factor test (Podsakoff et al. 2003). The results of the exploratory factor analysis identified 12 factors that showed eigenvalues greater than 1 and that together accounted for 80% of the total variance. As required, the strongest factor did not explain the majority of the variance (32%). In addition, we did not find an overarching factor in the unrotated factor loading matrix. Subsequently, we conducted the single-common-method-factor test (Podsakoff et al. 2003). The results from the confirmatory factor analysis showed that the goodness of fit of the single-factor model in which all manifest variables are explained through one common method factor ($\chi^2 = 1,091.9$; $df = 372$; $\chi^2/df = 2.935$) was significantly worse than the goodness of fit of the actual research model that included all constructs ($\Delta\chi^2 = 444.0$; $\Delta df = 167$; $p < .01$). This result clearly indicates that one common method factor cannot sufficiently account for the correlations between the observed variables. Finally, we applied the marker variable technique proposed by Lindell and Whitney (2001). We chose innovation degree as the marker variable and new

product success as the key dependent variable. The correlation between these two constructs ($r = .08$) was used to correct the correlation matrix for common method bias. The statistical significance of our structural relationships did not subsequently change; thus, this result is a clear indicator that common method bias does not distort our findings.

2.6 Discussion

New product failure rates remain at consistently high levels, which implies that the development of successful new products continues to represent a critical challenge for many companies (Kaufman, Jayachandran, and Rose 2006; Wieseke, Homburg, and Lee 2008). To encourage higher success rates, previous research has emphasized the need for integrating inside and outside sources of market knowledge in the scope of NPD projects (Chesbrough 2006; Henard and Szymanski 2001). One internal source of valuable market insights that has gained only limited attention in the literature is the sales forces of companies (Ernst, Hoyer, and Rübsaamen 2010). Our study provides deeper insights regarding the usefulness of sales force integration during the NPD process. Data pertaining to 219 new product projects across various industries show that firms can considerably improve new product performance outcomes by incorporating sales force information into NPD processes. As sales force integration has a positive influence on new product performance beyond the effect of marketing integration, our results firmly establish sales force integration as a key driver of new product success.

We find that sales force integration influences new product success via two separate routes. First, considerations of salespeople's market insights assist companies in developing new products that are more likely to meet customer requirements and thus are perceived as superior by customers. This relative product advantage subsequently translates into favorable new product performance outcomes, including enhanced market acceptance and improved

economic performance. Apart from that, sales force integration positively affects new product adoption by salespeople. Higher degrees of commitment and effort with regard to new products support, in turn, new product success on various dimensions.

The empirical confirmation of this second route supports the view that the incorporation of sales force information in NPD processes increases the confidence of salespeople in selling new products and their motivation to contribute to the success of the innovations. This finding seems to be intuitive and can be explained by expectancy theoretical considerations that suggest a strong connection between the beliefs of salespeople in the market potential of new products and their behavioral efforts to support the performance of such products (Vroom 1964; Wieseke, Homburg, and Lee 2008). However, recent insights from institutional economics theory suggest an opposite effect for the following reason: salespeople who believe in a new product's superiority and success will exert less effort to sell the new product based on the conviction that the product will sell itself independent of their efforts. Although this line of argument has been supported empirically (Ahearne et al. 2010), it does not hold true in the scope of our study for at least two reasons. First, there is a predominant motivational force that emanates from the managerial appreciation of the market insights of the sales force that form the basis for new product creations. Second, when salespeople observe that their insights are reflected in new products that are ready to market, they have a strong emotional attachment to these new products. This attachment in turn serves as additional encouragement for devoting efforts to a new product and its performance in the market. Given the positive link between the new product adoption of salespeople and new product success, our results additionally confirm the assumption that salespeople represent a first line of customers whose adoption of the new product largely determines its acceptance in the marketplace (Atuahene-Gima 1997).

As related to our main effect views, our basic structural relationships are highly contingent upon several contextual factors. Referring to the relationship between sales force integration and new product advantages, our results show that high levels of information quality strengthen sales force integration effectiveness. This result lends support to the view that the information that is provided by salespeople must be accurate and relevant to reduce complexities and to support managers in making effective decisions with regard to new product projects (Sharma and Lambert 1994; Zimmer, Henry, and Butler 2007). Thus, we argue that the processing of market information alone does not guarantee success. The argument that information must be of sufficient quality to support the creation of new products that customers will perceive as superior has been empirically supported by our results and represents a major finding of this study.

Moreover, phase-specific investigations of the NPD processes of companies support theoretical considerations and case study findings that have highlighted the importance of considering customer feedback and competitive activities in the early phases of the NPD process (Judson et al. 2006; Troy, Hirunyawipada, and Paswan 2008). In particular, our results emphasize that the customer and competitor information stemming from salespeople is especially valuable in the predevelopment stage of the NPD process. In this most information-intensive phase, sales force insights obviously support the identification of product concepts that have significant potential to outperform competing product offerings when launched into the market. Conversely, we find that high levels of sales force integration at the latest phase of the NPD process considerably weakens its positive effect on new product advantages. Although this effect was not hypothesized, it does not seem surprising. Whereas sales force integration in the commercialization phase may lead to the pursuit of effective market launch strategies (Ernst, Hoyer, and Rübbsaamen 2010), such integration is unlikely to increase customer value perceptions of a new product. This notion is based on the contention that

changes in new product designs and features toward the end of the NPD process cannot fully reflect sales force insights, as the development phase is already completed and new products are ready to be manufactured and sold. Furthermore, if the insights of salespeople conflict with the intended value proposition of a new product, their consideration at late stages may adversely affect a new product's marketing concept and thus reduce rather than improve customer value perceptions. Our argument that sales force integration is particularly useful in the early stages of the NPD process complements the finding by Ernst, Hoyer, and Rübsaamen (2010) that cooperation activities between the sales function and the marketing and R&D departments have stronger effects on new product performance at earlier rather than later NPD process phases.

With regard to the relationship between the new product adoption of salespeople and new product success, our results reveal a moderating effect of a new product's innovation degree. This finding supports the view that the absence of an appropriate communication strategy may cause customers to perceive innovations as providing risks and uncertainties rather than advantages over existing product offerings (Lee and O'Connor 2003). Particularly in the case of radical innovations for which perceived uncertainties are high, the efforts that salespeople expend on these new products assist in conveying previously unrecognized new product benefits to customers (Ahearne et al. 2010). As a result, customer perceptions of new products improve along with intended and actual adoption behaviors (Smith and Park 1992). This result leads to the conclusion that a company's sales force serves as a valuable communication vehicle that translates customer risk perceptions into recognitions of superior and differential gains derived from new product adoption; therefore, the sales force assists in supporting the market acceptance of radical innovations (Ahearne et al. 2010; Lee and O'Connor 2003).

In contrast, our results fail to support the suggested moderating effect of competitive intensity. This finding might be explained by the neutralization of two opposing effects. The efforts of salespeople to persuade customers of the value of new products should be more effective in highly competitive markets in which customers can choose from multiple suppliers and salespeople relish the challenge of selling new products (Brown and Peterson 1994; Hultink and Atuahene-Gima 2000). However, strong competition should increase the uncertainty of salespeople regarding a new product's market potential, which may subsequently limit their persuasive power with regard to the innovation (Wieseke, Homburg, and Lee 2008).

2.7 Managerial Implications

In recent years, many companies have followed the implications drawn from research findings that have advocated the opening of the NPD processes of firms to include external stakeholders (Chesbrough 2006). However, knowledge exchanges with customers and other companies have led to the diffusion of internal company information to competitors (Trott and Hartmann 2009) and the loss of intellectual property (Dahlander and Gann 2010). In our view, companies that integrate their sales force as a source of market knowledge into their NPD processes can realize the advantages associated with an open innovation strategy without fearing its pitfalls. Our study's findings confirm that the sales force complements internal company knowledge in important ways, thereby facilitating the development of superior new products that show high levels of market acceptance and economic performance. The crucial difference between the integration of external stakeholders and the integration of the sales force is that the market insights observed by salespeople are unique to a firm. Such information is communicated only to internal company recipients; therefore, knowledge

dissemination to competitors is prevented, and the competitive advantages garnered from such information are protected.

This study should indicate to managers that sales force integration represents a critical resource that promotes competitive advantages and improved new product performance outcomes if it is effectively leveraged. Therefore, NPD managers should actively attempt to gain sales force information at the beginning of each NPD project in which specific market insights are particularly valuable for the identification of market potential and promising new product concepts. To ensure high-quality sales force insights, we believe that it is essential to clearly advise salespeople regarding the types of information that are considered useful and relevant for creating superior new product offerings. In this context, continuous training on questioning and listening skills will increase the proficiency of salespeople in providing high-quality information (Le Bon and Merunka 2006; Sharma and Lambert 1994). In the next step, companies must develop and implement systems that allow for an effective exchange of the knowledge generated by the sales force between all departments that are involved in the NPD process. Depending on the organizational structure and the size of a firm, information sharing can be facilitated through regular, scheduled meetings between NPD project members of various functions or computer-based information systems that provide access to the latest insights provided by salespeople. Finally, information must be interpreted and applied to new products to ensure that their functions and designs meet the customer requirements that have been previously identified by salespeople.

Another key implication of this study for managers is that the adoption of new products by salespeople is a strong indicator of new product acceptance by the market. As the adoption behavior of salespeople largely depends on their expectations of a new product's demand (Wieseke, Homburg, and Lee 2008), managers are advised to communicate internally the benefits of innovations and provide trainings that assist the sales force in gaining a deep

appreciation of a firm's new product offerings (Kuester, Homburg, and Hess 2012). Salespeople who internalize crucial advantages of the new product will be more convinced by its market acceptance and will, therefore, devote greater efforts to supporting its success.

Finally, we recommend that salespeople, in turn, highlight new product benefits when communicating with customers and prospects. This recommendation is based on the argument that increased customer value perceptions of a new product facilitate the reduction of adoption barriers. In the case of highly innovative products, salespeople should complement rational lines of argument with emotional appeals because customers may experience difficulty in processing functional information regarding radical new products of which they have little knowledge (Lee and O'Connor 2003). Emotional appeals evoke positive feelings regarding a new product and generally support both intended and actual new product adoption behaviors (Castaño et al. 2008; Krishnamurthy and Sujana 1999).

Although we have clearly identified sales force integration as a key driver of new product success, a large number of firms continue to disregard sales force information when developing new products. Thus, salespeople are still an underutilized resource of market intelligence that offers companies great potential for differentiation (Cross et al. 2001; Pass, Evans, and Schlacter 2004).

2.8 Limitations and Suggestions for Further Research

This study provided deeper insights regarding the relationship between sales force integration and new product performance outcomes. However, based on the criterion of parsimony, we limited our conceptual model to several key constructs of particular theoretical and practical importance. Therefore, there is scope to consider other mediating and moderating factors that potentially influence the relationships under investigation and that could thus complement our findings in important ways. For example, the leadership styles and control systems of sales

managers may influence the relationship between the new product adoption of salespeople and new product success because variation in supervisory control can attenuate or strengthen the efforts of the sales force regarding new products (Ahearne et al. 2010; Hultink and Atuahene-Gima 2000).

In addition, the specific factors that prevent companies from leveraging their sales force as a valuable source of market information are still unclear; therefore, the identification of sales force integration barriers is a fruitful area for further research endeavors. One such barrier may be the time and effort that salespeople require to communicate their market insights to other internal company departments that are involved in new product-related decision making. In this respect, the information retrieval task of salespeople may be seen as conflicting with their primary duty of selling a firm's products (Le Bon and Merunka 2006). Therefore, we propose that future studies seek to determine the optimal amount of time that salespeople should invest in each of these tasks to support their firm's overall product performance outcomes in the best possible way.

Finally, we suggest a communication approach that combines both functional benefits and emotional appeals to promote the market acceptance of radical new products. However, we have not conducted empirical testing to determine which communication approach is the most effective for radical as opposed to incremental new products. Future research may address this research gap.

Appendix A-1: Measures of Formative Indices

Sales Force Integration

		Alpha = .930	AVE = .742	Composite Reliability = .945	
Information Acquisition	In the course of the NPD project, NPD project members...				Loadings
	...conducted a great deal of in-house market research by gathering sales force information pertaining to the market.				.832
	...intensely collected market information through the company's sales force.				.878
	...frequently generated intelligence regarding the firm's competitors through our sales force.				.870
	...were able to detect fundamental shifts in our industry by interviewing the sales force on a regular basis.				.849
	...periodically gathered sales force information to review the likely effect of changes in our business environment on customers.				.840
	...collected a lot of information regarding competitive moves by accessing the knowledge of the company's sales force.				.896
		Alpha = .910	AVE = .736	Composite Reliability = .933	
Information Dissemination	In the course of the NPD project,...				Loadings
	...NPD project members spent a great deal of time sharing sales force insights regarding the future needs of customers with other functional departments that were involved in the NPD project.				.859
	...documents that provided sales force information pertaining to our customers circulated periodically across all departments that were involved in the NPD project.				.847
	...there was intense communication among NPD project members concerning sales force intelligence pertaining to market developments.				.858
	...NPD project members informed one another at length when the sales force provided them with important information regarding competitors.				.868
	...NPD project members intensely exchanged sales force information pertaining to environmental changes.				.857
		Alpha = .935	AVE = .754	Composite Reliability = .949	
Information Use	In the course of the NPD project, market information stemming from the company's sales force...				Loadings
	...was frequently used in making decisions regarding the new product.				.867
	...was periodically used in evaluating the new product.				.829
	...had a strong effect on decisions related to the new product.				.870
	...was strongly accounted for when making decisions regarding the new product.				.884
	...was frequently used to improve the new product.				.872
	...was strongly integrated in decision processes related to the new product.				.888

Notes: Items were measured on 7-point Likert scales, with 7 indicating total agreement. Measurement scales were adapted from Jaworski and Kohli (1993).

Appendix A-1: Measures of Formative Indices (cont.)

New Product Success

		Alpha = .922	AVE = .763	Composite Reliability = .941	
Time-related Success	The new product...				Loadings
	...was developed within the expected time frame.				.898
	...was launched on schedule or ahead of the original schedule.				.818
	...was brought to market within a time frame that pleased our top management.				.887
	...met important deadlines.				.893
	...met time-to-market objectives.				.870
		Alpha = .910	AVE = .787	Composite Reliability = .937	
Economic Success	The new product...				Loadings
	...attained profitability goals.				.880
	...attained return-on-investment (ROI) goals.				.908
	...attained market share goals.				.889
	...attained unit sales goals.				.871
		Alpha = .906	AVE = .780	Composite Reliability = .934	
Market Success	The new product...				Loadings
	...contributed to strengthening our relationships with customers.				.833
	...had a high level of customer acceptance.				.913
	...caused a high level of customer satisfaction.				.911
	...fit very well with market demands.				.874
		Alpha = .907	AVE = .729	Composite Reliability = .931	
Quality-related Success	The new product...				Loadings
	...delivered excellent technical performance.				.830
	...performed well in terms of functionality and features.				.863
	...met or exceeded quality goals.				.879
	...had a very appealing design.				.808
	...satisfied customer needs in terms of quality.				.887

Notes: Items were measured on 7-point Likert scales, with 7 indicating total agreement.

Measurement scales for time-related, economic, and market success were adapted from Rodríguez, Pérez, and Gutiérrez (2008).

The measurement scale for quality-related success was adapted from Gruner and Homburg (2000).

Appendix A-1: Measures of Formative Indices (cont.)**Reflective Measures of Sales Force Integration and New Product Success**

Sales Force Integration	Alpha	AVE	Composite Reliability
	.914	.795	.939
When developing the new product, ...			Loadings
...the integration of market information from the company's sales force was intense.			.848
...sales force insights with regard to market trends and developments were strongly considered.			.909
...we paid very close attention to the market information provided by our sales force.			.893
...sales force intelligence with regard to market developments was frequently considered.			.914
New Product Success	Alpha	AVE	Composite Reliability
	.938	.842	.955
The new product met or exceeded its targets in terms of overall success.			Loadings
The overall success of the new product was satisfactory.			.909
The new product succeeded in achieving its main objectives.			.928
We were pleased with the overall success of the new product.			.915
			.920

MIMIC Model Results

Formative Index	Formative Indicators	Beta	T-Value	R²
	Information acquisition	.209***	2.817	
Sales Force Integration	Information dissemination	.185***	3.067	.821
	Information use	.564***	6.806	
	Time-related success	.049	.954	
New Product Success	Economic success	.230***	3.865	.822
	Market success	.276***	4.043	
	Quality-related success	.445***	6.535	

*** $p < .01$, ** $p < .05$, * $p < .10$

Appendix A-2: Measurement Scales of Mediator/ Moderator/ Control Variables

New Product Advantage (adapted from Cooper and Kleinschmidt 1987)	Alpha	AVE	Composite Reliability
	.918	.752	.938
According to customers, the new product...			Loadings
...offered unique benefits that were not found in competing products.			.865
...was clearly superior to competing products.			.884
...offered more value for its money than competing products.			.865
...solved a problem they had with competing products.			.826
...offered performance that was superior to that of competing products.			.895
Sales Force Commitment (based on Atuahene-Gima 1997)	Alpha	AVE	Composite Reliability
	.903	.721	.928
Our sales force...			Loadings
...had a positive attitude toward the new product.			.818
...felt highly responsible for achieving objectives for the new product.			.845
...showed a strong commitment toward the new product.			.886
...felt emotionally attached to the new product.			.802
...strongly believed in the success of the new product.			.890
Sales Force Effort (based on Atuahene-Gima 1997)	Alpha	AVE	Composite Reliability
	.929	.824	.949
Our sales force...			Loadings
...devoted a great deal of effort to the new product.			.898
...spent a significant amount of time on the new product project.			.907
...showed strong efforts in achieving objectives for the new product as compared with our existing products.			.914
...worked hard on the implementation of the new product project.			.913
Information Quality (adapted from Zimmer, Henry, and Butler 2007)	Alpha	AVE	Composite Reliability
	.923	.812	.945
The market information provided by the sales force during the development process of the new product...			Loadings
...was of high quality.			.897
...was valuable for the development of the new product.			.911
...fully met our requirements with regard to quality.			.898
...represented a great benefit in the NPD process.			.898
Competitive Intensity (adapted from Jaworski and Kohli 1993)	Alpha	AVE	Composite Reliability
	.813	.725	.888
			Loadings
Competition in our industry is intense.			.860
Price competition is predominant in our industry.			.819
Our competitors are strong and formidable.			.875

Appendix A-2: Measurement Scales of Mediator/ Moderator/ Control Variables (cont.)**Innovation Degree** (Booz, Allen, and Hamilton 1982)

Please evaluate the degree of innovativeness of the new product in comparison with already existing product offers in the market. (Please select only one option.)

The new product represented a / an ...						
Imitation of competitive products	Repositioning	Product line extension	Modification	New-to-the-company product	New-to-the-industry product	New-to-the-world product
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Timing

In the development process of the chosen new product, market information stemming from the company's sales force was used in the predevelopment stage/ development stage/ commercialization stage (1 = 'not intensely at all' and 7 = 'very intensely').

Marketing Integration	Alpha	AVE	Composite Reliability
	.908	.787	.925
When developing the new product, ...			Loadings
...the integration of market information from the marketing department was intense.			.878
...marketing insights with regard to market trends and developments were strongly considered.			.905
...we paid very close attention to the market information provided by our marketing function.			.865
...the intelligence of marketing with regard to market developments was frequently considered.			.901

Firm Size

Please indicate the number of employees working in your company/ SBU as an average over the last three years.

Industry

Please specify the industry in which your company/ SBU operates.

NPD Experience

How many years of work experience do you have in your current position?

Chapter 3:

Sales Force Integration in New Product Development: Investigating Its Impact on Corporate New Product Success

Abstract

This study focuses on the role that sales force integration plays for companies' improved new product performance outcomes. Drawing on the resource-based view of the firm, the authors argue that the company-internal processing of market information provided by salespeople represents a critical resource for the development of successful new products. Data pertaining to 269 companies from various industries provide empirical evidence that sales force integration represents a key driver of corporate new product success. In addition to a positive, direct effect that sales force integration exerts on new product performance, the results identify new product advantage as a partial mediator of the underlying relationship. This finding supports the view that the processing of sales force insights promotes the creation and launch of superior new products as perceived by customers, which subsequently translates into higher levels of new product success at the company level. The study also demonstrates that information quality, timing, and environmental turbulence influence the effectiveness of sales force integration in improving the performance of firms' new products. The authors provide implications for decision makers in the realm of new product development and reveal potential for future research projects.

3.1 Introduction

The results of the study described in Chapter 2 of this dissertation have shown that leveraging sales force information during new product development (NPD) processes supports firms in developing successful new products. In this context, it is important to note that these findings are based on project-level investigations given that each respondent referred to one particular new product that had been recently developed at his or her company. Having established sales force integration as a key driver of new product success at the project level, it is the next logical step to explore whether this research result can be transferred to the corporate level. Thus, the following study takes on a company-level perspective and investigates the effect that sales force integration has on corporate new product success (i.e., the performance of all new products that firms have developed within a certain time frame). By extending the view to the overall organizational level, our study stands out from previous research in this field that has largely examined the effect of market information processing activities at the project level (e.g., Ernst, Hoyer, and Rübbsaamen 2010; Ottum and Moore 1997).

Drawing on the resource-based view of the firm (RBV) that conceives sales force integration as a critical, firm-level resource in the NPD context, our study focuses on the effect that sales force integration exerts on corporate new product success, both directly and indirectly via new product advantages. The route via new product advantages illustrates that the processing of market information provided by salespeople supports firms in the development and launch of new products that customers perceive as superior to competing product offerings and that, in turn, generate competitive advantages. Superior new products subsequently lead to higher performance levels of companies' new products.

Supplementing this main effect view, we also investigate the role of several contextual factors that influence the relationship between sales force integration and corporate new product success. This allows for a deeper understanding of the conditions under which sales

force integration is particularly useful for achieving overall organizational new product success. In the first instance, we analyze whether the impact of sales force integration varies across NPD stages and quality levels of information provided by the sales function. The analysis of information quality as a moderator provides more profound insights on the role of accuracy of sales force information and on the question whether unclear and biased insights can modify the impact emanating from sales force integration (Hultink et al. 2011; Sharma and Lambert 1994). The question of timing is especially relevant in view of prior studies that have pointed to the importance of different types and sources of information in different phases of the NPD process (Ernst, Hoyer, and Rübsummen 2010; Frishammar and Ylinenpää 2007).

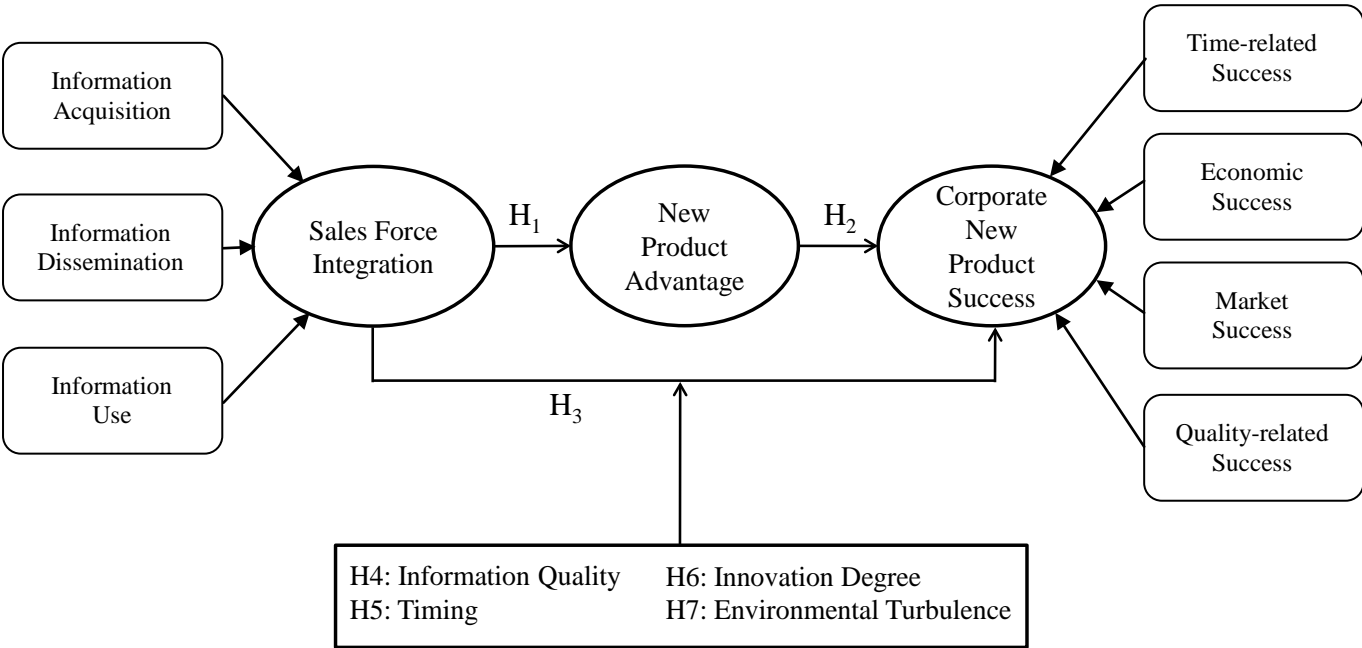
Subsequently, our study emphasizes the moderating roles of product innovativeness and the turbulence that exists in the firms' target market. The consideration of product newness provides a better understanding of the usefulness of sales force insights for reducing information deficits that are generally higher in the case of radical as opposed to incremental new products (Atuahene-Gima 1995; Song and Thieme 2009). Finally, the investigation of environmental turbulence is based on the rationale that information processing activities are considered particularly effective when competitive intensities are high and customer needs change frequently (Jaworski and Kohli 1993; Kirca, Jayachandra, and Bearden 2005; Kumar, Subramanian, and Yauger 1998).

3.2 Conceptual Development

Building on the RBV, the conceptual framework for our study turns its attention to sales force integration as a key factor that drives corporate new product success, both directly and indirectly via new product advantages. We additionally investigate several contextual factors that potentially influence the direct relationship between sales force integration and overall

organizational new product success. Figure 3-1 presents an overview of our conceptual model, including the constructs under investigation.

Figure 3-1: Conceptual Model



3.2.1 Hypotheses on Main Effects

Relationship between Sales Force Integration and New Product Advantages:

New product advantages refer to the superior and unique benefits that customers obtain from new products and are thus a desired outcome of NPD processes (Cooper 1979; Li and Calantone 1998; Song and Parry 1997a). Empirical research on innovation success factors has commonly acknowledged a strong positive relationship between a company’s market information processing capabilities and the relative advantages of resulting new products. For

example, Veldhuizen, Hultink, and Griffin (2006) have shown for 166 Dutch high-tech firms that the acquisition of customer information and the use of market information in the commercialization phase of the NPD process are significantly related to the competitive advantages of new products. In addition, Atuahene-Gima (1996) has found a significant relationship between the market information processing activities of companies and their new product advantages. With a specific focus on the software industry, Li and Calantone (1998) have provided evidence that the acquisition, inter-departmental sharing, and integration of customer and competitor knowledge exert a positive effect on new products' competitive superiority.

Although these studies have investigated new product advantages at the project level, we argue that the processing of unique market insights provided by the sales function will strongly determine customer value perceptions of all new products that companies develop. This contention is consistent with the RBV, which considers sales force integration as a critical, firm-level resource which facilitates the establishment of competitive advantages if its potential is effectively realized. Therefore, companies that demonstrate strong capabilities with regard to gathering, sharing, and ultimately using sales force insights in the scope of new product-related decision-making will generally be better able to develop new products that create value that is superior to that of competing firms as perceived by customers (Atuahene-Gima 1996; Barney 1991; Wernerfelt 1984). Therefore, we propose the following hypothesis:

H1: Sales force integration has a positive effect on new product advantages.

Relationship between New Product Advantages and Corporate New Product Success:

Rogers (2003) has emphasized that the adoption of new products by customers largely depends on their relative advantages over competing product offerings. This claim is based on the rationale that customers are more likely to purchase new products when these products

offer superior features and unique benefits that cannot be found in products that already exist in the market. Products that better match customer needs and that offer a higher benefit-to-cost ratio are more likely to be adopted by users and are, therefore, more prone to be successful in the marketplace (Maidique and Zirger 1983).

In support of theoretical considerations, the empirical literature on innovation success factors has consistently identified product advantage as a key determinant of new product success (Cooper and Kleinschmidt 1995; Langerak, Hultink, and Robben 2004; Song and Parry 1997a). In particular, the meta-analysis of Henard and Szymanski (2001) that identified 11 dominant drivers of new product success has found that new product advantage is the factor that is most strongly related to new product performance. Following Cooper (1979), the predominant role of new product advantages in achieving new product success is logical as it is through superior product offerings that organizations can obtain unique selling positions in markets, which, in turn, provide the basis for earning superior returns. Thus, we posit the following hypothesis:

H2: New product advantages have a positive effect on corporate new product success.

Relationship between Sales Force Integration and Corporate New Product Success:

Empirical research on innovation success factors has equally pointed to a direct relationship between market information processing activities and new product performance both at the project and at the corporate level. For example, project-level investigations of Ottum and Moore (1997) have shown that the gathering, sharing, and use of market information exert a direct, positive effect on the financial and the customer success of new products. Similarly, Wei and Morgan (2004) have provided empirical evidence that market information processing capabilities significantly improve the performance of new products at the corporate level. Additionally, Baker and Sinkula (1999) have proven a direct, positive relationship between

market orientation – which they conceptualize as market intelligence generation, dissemination, and responsiveness – and new product success on the business unit level.

Considered together, these empirical findings reveal that new product performance is strongly and directly influenced by the market information processing activities of organizations. Drawing on this causal relationship and the representation of salespeople as valuable sources of unique market insights, we propose that the processing of sales force information directly affects the success of new products developed by companies. Therefore, we hypothesize as follows:

H3: Sales force integration has a positive effect on corporate new product success.

3.2.2 Exploring the Role of Moderating Factors

In addition to the main effect framework, our study also considers several contextual factors to potentially moderate the relationship between sales force integration and corporate new product success. In the first instance, we investigate two factors that relate to the information that is provided by salespeople. These factors include the quality of information and the timing of its incorporation into NPD processes. The exploration of information quality is particularly relevant as the processing of low-quality information has been previously found to adversely affect project outcomes (Sharma and Lambert 1994). In addition, the examination of timing aims at resolving the question in which phases of the NPD process market information should be best incorporated in order to achieve the most favorable new product outcomes (Ernst, Hoyer, and Rübsaamen 2010; Veldhuizen, Hultink, and Griffin 2006; Zahay, Griffin, and Fredericks 2004).

Subsequently, we analyze the roles of the innovation degree of new products and the turbulence that companies face in the markets in which new products are introduced. We expect a moderating effect of product innovativeness as the need for information processing

activities has been considered to be a function of product newness (Olson et al. 2001; Song and Thieme 2009). Finally, the investigation of environmental turbulence as an industry-specific moderator is based on the assumption that environmental influences determine the necessity of market-oriented behaviors (Jaworski and Kohli 1993; Kohli and Jaworski 1990).

Information Quality:

Academic scholars have commonly acknowledged that NPD processes are characterized by high levels of uncertainty (Hoeffler 2003; Salomo, Weise, and Gemuenden 2007). For example, ambiguity exists with regard to the quality standards that new products are intended to meet, their potential in the market, as well as the costs that are associated with their development (Montaguti, Kuester, and Robertson 2002; Nambisan 2002). For example, Segway – the world’s first two-wheeled, self-balancing, electric vehicle – is considered a failure because it has not met the needs of customers who principally prefer walking over using the Segway for short distances (Kemper 2003; Pinegar and Cohen 2004). Also, Sony’s games console ‘PlayStation 3’ has failed to meet its financial goals due to an innovation process that incurred much higher costs than expected (Siklos 2009). To reduce these types of uncertainty, it has been suggested that decision makers in the realm of NPD engage in the search for and processing of high-quality information because accurate and unbiased information best reduces uncertainty (Hultink et al. 2011; Moenaert and Souder 1990). In contrast, unclear and irrelevant information may increase rather than reduce uncertainty (Zimmer, Henry, and Butler 2007). This leads to the conclusion that information must exhibit a sufficient level of quality to effectively support managers in the development of successful new products.

Although the importance of information quality in achieving favorable project outcomes seems to be intuitive, only a few studies have addressed the role of information quality

empirically. In a study of 209 business services firms, Zahay et al. (2004) have proven that information quality exerts a significant and direct influence on sales, income growth, and overall firm performance. In addition, this study has suggested a moderating effect of information quality on the relationship between information processing activities and customer-based performance. The research by Hultink et al. (2011) is the first empirical work that has investigated the moderating role of information quality in the NPD context. In their study of 152 Dutch NPD projects, the authors have found that market information processing activities exert a positive effect on new product performance only in situations in which high-quality data are available. Translating these insights to our study context leads to the conclusion that the development of successful new products is largely contingent upon the quality of information that salespeople feed into NPD processes. This view gains additional support by previous studies of Sharma and Lambert (1994) and Lambert, Marmorstein, and Sharma (1990). With a specific emphasis on the market intelligence of salespeople, these studies have emphasized that inaccurate sales force information can have adverse effects on the quality of strategic plans, selling performances, and corporate success.

Following these findings, we propose that the quality of information provided by salespeople in the scope of NPD projects strongly influences the effectiveness of sales force integration in achieving company-wide new product success. Therefore, we posit the following hypothesis:

H4: Higher-quality information provided by salespeople is associated with stronger effects of sales force integration on corporate new product success.

Timing:

In the scope of this study, we consider that NPD processes involve several distinct phases that can be subsumed into the three generic stages of predevelopment, development, and

commercialization (Ernst, Hoyer, and Rübsaamen 2010; Veldhuizen, Hultink, and Griffin 2006). There are various studies that have discussed the issue of when market information should be best incorporated in the NPD process to facilitate the most favorable new product performance outcomes (e.g., Veldhuizen, Hultink, and Griffin 2006; Zahay, Griffin, and Fredericks 2004). Previous works have indicated that different types and sources of information are required in different phases of the NPD process to achieve higher levels of new product success (Ernst, Hoyer, and Rübsaamen 2010; Frishammar and Ylinenpää 2007). In this context, particular importance has been assigned to the early integration of customer insights and competitor information into the NPD process. This importance is based on the argument that specific market insights are particularly useful in the predevelopment stage, which aims to identify market potential and generate high-level new product concepts (Crawford and Di Benedetto 2005; Troy, Hirunyawipada, and Paswan 2008).

Given that salespeople are recognized as valuable resources of market information that consists of unique insights regarding customers and competitors (Ernst, Hoyer, and Rübsaamen 2010; Pass, Evans, and Schlacter 2004; Pelham and Lieb 2004), the sales force contributes the kind of information that is especially critical in this earliest phase of the NPD process. Therefore, we consider sales force integration to be most valuable in the predevelopment stage in which specific market insights allow for the generation of high-level new product ideas that have a strong chance of success when such ideas materialize as marketable products (Frishammar and Ylinenpää 2007; Zahay, Griffin, and Fredericks 2004).

This view is in line with previous studies that have placed particular importance on a firm's predevelopment activities for the achievement of new product success (e.g., Henard and Szymanski 2001; Montoya-Weiss and Calantone 1994; Veldhuizen, Hultink, and Griffin 2006). Particularly, the study undertaken by Ernst, Hoyer and Rübsaamen (2010) has found that cooperation activities between the sales function and the marketing and R&D

departments exert the greatest effect on NPD project performance when such activities are undertaken in the earliest stage of the NPD process. This leads us to the following hypothesis:

H5: The relationship between sales force integration and corporate new product success will be stronger when more intense sales force integration occurs in the predevelopment stage of the NPD process.

Innovation Degree:

Previous research has indicated that the effectiveness of market information processing activities in the context of NPD projects is highly contingent upon a new product's innovation degree (i.e., whether it is an incremental product or a radical new product) (Olson et al. 2001; Salomo, Weise, and Gemünden 2007). This proposition is based on the general assumption that the development process of radical as compared to incremental new products involves much higher degrees of uncertainty, particularly with regard to the new product's market potential, quality, and customer acceptance (Atuahene-Gima 1995; Song and Thieme 2009). Following the information processing theory, these uncertainties result from information gaps between the information that exists in a company and the information that is necessary for the successful implementation of NPD projects (Galbraith 1977). These gaps are thought to increase the more radical the innovation because the knowledge that is needed for the optimal implementation of NPD projects is likely to be less sufficient in the case of radical new products than for incremental innovations. As a consequence, there is a greater need for firms that develop radical new products to process information on customers, competitors, and the overall market environment to fill information gaps and to subsequently find solutions for new product-related ambiguities (Atuahene-Gima 1995; Tidd, Bessant, and Pavitt 2001).

Drawing on the information processing theory and the RBV, we argue that sales force integration is particularly effective in the case of radical new products where resources in the

form of market information are most valuable for uncertainty reduction. More precisely, the consideration of market knowledge stemming from the sales force will allow firms for a more extensive and faster knowledge adoption, thereby satisfying the increasing information requirements implied by radical new product developments.

In summary, sales force integration seems to be an adequate strategy that allows for the compensation of information deficits in the scope of NPD. This strategy seems to be most promising in the context of radical innovations where information deficits are most prevalent. Therefore, we hypothesize as follows:

H6: The more radical a new product the stronger the relationship between sales force integration and corporate new product success.

Environmental Turbulence:

It has been previously suggested by academic scholars that the effectiveness of information processing activities during NPD is particularly contingent upon environmental influences (Jaworski and Kohli 1993; Kohli and Jaworski 1990). Among the various conditions that potentially moderate the effect of market orientation on business and product performance, competitive intensity and market turbulence belong to the environmental factors that have been most often cited in the literature (Harris 2001; Kirca, Jayachandra, and Bearden 2005; Kumar, Subramanian, and Yauger 1998; Slater and Narver 1994). Thus, in the context of our study, environmental turbulence refers to an industrial setting that is characterized by rapidly changing market conditions and high levels of competition.

Competitive intensity relates to the extent and aggressiveness of competitive activities in the markets in which new products are introduced (Atuahene-Gima 1995). Numerous academic scholars have argued that the acquisition, dissemination, and use of valuable market insights are more important in the case of highly competitive environments than in markets in

which competition is weak (Atuahene-Gima 1995; Harris 2001; Kohli and Jaworski 1990). This argument is based on the rationale that companies have to quickly react to competitive moves in markets in which many suppliers fight hard for every customer (Kumar, Subramanian, and Yauger 1998; Kuester, Homburg, and Robertson 1999). In such hostile environments, the crucial first step is to acquire current market information on a continuous basis, which allows for an early detection of competitive actions (Atuahene-Gima 1995; Gatignon and Xuereb 1997). These competitive moves can be subsequently counteracted by the development of new products that outperform competitive alternatives on the basis of a superior match between product features and customer needs, thereby preventing customers from switching to competitors (Kohli and Jaworski 1990; Kumar, Subramanian, and Yauger 1998). In contrast, there is less need for market information processing in calm environments where competitive activities are rather low and companies can be successful even with minimal product adjustments (Kumar, Subramanian, and Yauger 1998). Given that superior market insights provide the basis for quick responses to competitive attacks, we expect that sales force integration is more effective in highly competitive markets compared to less competitive environments.

Market turbulence represents the second dimension of our environmental turbulence construct and typically refers to the change in the composition of customers and the volatility of their product preferences (Han, Kim, and Srivastava 1998; Kohli and Jaworski 1990; Slater and Narver 1994). In highly turbulent markets, there is an increased risk that a firm's product offerings move away from customer needs over time, which may result in higher levels of customer fluctuation. Under these conditions, it is imperative that firms process superior market insights to uncover changing customer preferences and to quickly adjust product offerings to match these most current needs (Kohli and Jaworski 1990). In contrast, moderate degrees of market information processing are sufficient in less turbulent markets in which a

more stable composition of customers and slow-changing preferences do not require a great adaptation of product portfolios (Homburg and Pflesser 2000; Slater and Narver 1994). Therefore, we propose that sales force integration, which allows for a quick identification of market changes, is more effective in highly turbulent markets than in more stable environments.

In summary, we expect that the effect of sales force integration on corporate new product success is strengthened under more turbulent environmental conditions as the processing of market insights for the identification of competitive moves and customer needs seems to be more important when firms are faced with an unstable set of customers, quickly changing product preferences, and more aggressive competitors (Atuahene-Gima 1995; Homburg and Pflesser 2000; Kirca, Jayachandra, and Bearden 2005; Kohli and Jaworski 1990). Thus, we postulate the following hypothesis:

H7: The higher the environmental turbulence the stronger the relationship between sales force integration and corporate new product success.

3.3 Methodology

3.3.1 Data Collection and Sample

We collected data at the company level, given that the main goal of our study is to investigate in how far sales force integration in NPD processes affects the overall success of all new products that a company has brought to market within a certain time frame. To obtain the data that are necessary to test our conceptual model, we developed a survey that targeted competent and qualified managers as key informants (Kumar, Stern, and Anderson 1993). Particularly, we asked participants about their job position and whether they have been personally involved in NPD projects that had been undertaken by their firm within the last

three years. In the survey, we asked each respondent to refer to all new products that had been developed and introduced by his or her company within that time period. Only the respondents who indicated that they were highly experienced with NPD processes and who additionally occupied an influential management-level position (e.g., marketing, product, or R&D managers) qualified for the study.

Using a commercial database, we contacted 1,431 managers in the US, the UK, and Australia and asked them to participate in the study. The final sample size yielded 269 complete and usable questionnaires and an effective response rate of 18.8 percent. Managers who participated in the survey represented a broad range of industries (including engineering & construction, electronics, food & beverages, chemicals, etc.) and mainly held positions in the company that are generally associated with NPD projects (e.g., marketing, R&D, product, or production management). On average, managers had already worked for 11.58 years in their position and had been involved in 5.39 NPD projects. Table 1 provides an overview of the composition of our final sample.

Table 3-1: Distribution of Final Sample

Sample Distribution by:					
Position of Respondents	%	Annual Sales Volume (US\$)	%	Number of Employees	%
Product manager	22.7%	< 100.000	42.3%	< 200	39.4%
Production manager	12.3%	100.000 < 1 mio.	10.0%	200 < 500	16.4%
Marketing manager	11.2%	1 mio. < 10 mio.	21.5%	500 < 1.000	10.0%
Sales manager	8.9%	10 mio. < 100 mio.	14.3%	1.000 < 2.000	9.3%
R&D manager	8.2%	≥ 100 mio.	12.0%	2.000 < 5.000	7.8%
General management	18.6%			5.000 < 10.000	8.2%
Other	18.2%			≥ 10.000	8.9%

3.3.2 Measures

As the aim of this study is the investigation of the effect that sales force integration exerts on the success of companies' new products in general, all constructs were measured at the company level. This means that we did not focus on a particular new product, but on all new products that had been developed by a company within the last three years. This sampling of new products allowed for a relatively precise reflection of a company's new product portfolio, potentially including new products of various degrees of innovativeness (Booz, Allen, and Hamilton 1982). The latent constructs of our conceptual model represent either reflective or formative specifications and were mostly measured on the basis of multi-item scales. A pretest of the questionnaire among 44 marketing, product, and R&D managers prior to the main study was undertaken to verify the understandability, completeness, and structure of the questionnaire and the measurement quality of indicators (Hunt, Sparkman, and Wilcox 1982). The pretest results led to minor changes in the wording of indicators and to the shortening of several explanations provided in the questionnaire.

Sales force integration: The construct of sales force integration is based on the concept of behavioral market orientation and is thus conceived as an explanatory combination of the three key market information processing activities: acquisition, dissemination, and use (Kohli and Jaworski 1990). Therefore, the focal independent variable of sales force integration is represented as a higher-order, formative construct that is caused by its indicators (MacCullum and Browne 1993). Following Diamantopoulos and Winklhofer (2001), we engaged in the four steps of formative index construction. First, we specified the domain of the content of sales force integration as the extent to which market information stemming from salespeople is processed internally within a company in the scope of NPD projects. In the second step, indicator specification, we selected the formative indicators that capture a firm's information

processing capabilities that the extant literature has commonly identified as the acquisition, dissemination, and use of information (Baker and Sinkula 1999; Jaworski and Kohli 1993; Kohli and Jaworski 1990; Ottum and Moore 1997). Each of these formative indicators was measured with reflective items on 7-point Likert scales that were adapted from the market orientation scale proposed by Jaworski and Kohli (1993). In the third step, we tested the formative index for multi-collinearity by calculating variance inflation factors. Our analyses indicate an unambiguous differentiation between the indicators as the highest variance inflation factor for the formative index was 2.553 and was, therefore, below the critical threshold of 3.3 (Petter, Straub, and Rai 2007). Finally, we calculated a multiple indicators and multiple causes (MIMIC) model to assess the external validity of the formative index (Hauser and Goldberger 1971). For this purpose, we included four reflective items for the measurement of sales force integration, which allowed us to estimate a MIMIC model that specified both formative and reflective indicators of our focal construct and tested them simultaneously (Bollen 1989). The reflective items showed significant correlations with the three formative indicators. An investigation of the magnitude of the weights of our formative indicators showed that each dimension significantly contributed to the explanation of the focal construct. Moreover, the variance explained in the focal construct was exceptionally high ($R^2 = .83$). It is particularly this high R-square value that indicates a strong joint predictive power of our formative indicators and a strong content and nomological validity of the formative index (Chin 1998; Herrmann, Huber, and Kressmann 2006).

Corporate new product success: Research on innovation success factors has implied that new product success consists of several dimensions (Harmancioglu, Droge, and Calantone 2009; Langerak, Hultink, and Robben 2004; Rodríguez, Pérez, and Gutiérrez 2008), meaning that “[n]either practitioners nor academics [should] use just a single measure of new product

success” (Hultink and Robben 1995, p.395). Thus, the latent dependent variable of corporate new product success is also determined by several indicators that represent a formative measurement approach (Diamantopoulos and Winklhofer 2001; MacCullum and Browne 1993). The domain of content that corporate new product success is intended to capture was specified as the achievement of internally communicated company goals that are associated with new product projects (Etzioni 1964). We identified four generic new product success dimensions that are related to a company’s new product success in terms of time, economic viability, market acceptance, and quality (Rodríguez, Pérez, and Gutiérrez 2008; Sivadas and Dwyer 2000; Swink 2000; Xie, Song, and Stringfellow 1998). Time-related success refers to the degree of the temporal effectiveness of NPD, i.e., the speed with which new products are developed (Rodríguez, Pérez, and Gutiérrez 2008). Economic success relates to the degree to which new products realize their predefined financial goals (Rodríguez, Pérez, and Gutiérrez 2008). Market-related success describes the degree to which customer relationships are strengthened and new products are accepted in the market (Rodríguez, Pérez, and Gutiérrez 2008). Quality-related success finally refers to the extent to which new products perform well in terms of functionality and technical performance (Gruner and Homburg 2000). Multi-collinearity did not cause major problems given that the highest variance inflation factor for the formative index was 2.679 and was, therefore, below the critical threshold of 3.3 (Petter, Straub, and Rai 2007). Finally, we included four reflective items for the latent variable, which enabled us to estimate a MIMIC model for testing the external validity of the formative index (Hauser and Goldberger 1971). Our analyses showed that the reflective items correlated significantly with the four formative indicators. The weights of the formative indicators demonstrated that each dimension significantly contributed to the explanation of the focal construct. Also, the high proportion of variance explained in the focal construct ($R^2 = .78$) supported the validity of the formative specification of corporate new product success.

Appendix B-1 provides more detailed information regarding our formative construct measurements.

Mediator and moderator variables: The measurement scale of Cooper and Kleinschmidt (1987) was slightly modified for the assessment of *new product advantages*, which refer to the superiority of new products over competing product offerings as perceived by customers. The measurement scale of Zimmer, Henry, and Butler (2007) served as the basis for assessing the construct of *information quality*, which relates to the value of sales force information in NPD processes. We gauged the moderating construct of *timing* on a 7-point intensity scale (1 = ‘not intensely at all’ and 7 = ‘very intensely’) for each of the three NPD process phases (predevelopment, development, and commercialization). Moreover, *innovation degree* was measured on the basis of the 7-point differential scale that has been proposed by Booz, Allen and Hamilton (1982). This scale reflects a product’s degree of innovativeness from a company and/ or market perspective on a spectrum between marginally innovative (‘imitation’) and highly innovative (‘new-to-the-world product’) products. Finally, we built on the measurement approach of Jaworski and Kohli (1993) for the assessment of the construct of *environmental turbulence*, which consists of the two dimensions ‘competitive intensity’ and ‘market turbulence’. *Competitive intensity* refers to the level of competitive activities in the target markets of new products. *Market turbulence* relates to the volatility of customers and their preferences. To reduce the complexity of the model, we employed an item parceling approach (Hall, Snell, and Foust 1999). This means that we calculated the arithmetic mean over the respective items for each of the two dimensions. The two arithmetic means were then used as formative indicators for the measurement of environmental turbulence.

Controls: We considered several control variables in our analyses. To assess the influence of sales force integration on corporate new product success beyond the effect of *marketing integration*, we controlled for the level of marketing information processing in NPD processes. Analogous to sales force integration, marketing integration refers to the company-internal processing of marketing insights in the development process of new products. With *industry* and *firm size*, we additionally included two constructs that have been previously considered in the literature as potential determinants of new product success (e.g., Baker and Sinkula 1999; DeLuca and Atuahene-Gima 2007). Finally, as an extension of learning theory, we expect that a manager's level of experience with NPD projects has an effect on the performance of a company's new products. Therefore, we incorporated *NPD experience* as an additional control variable.

Appendix B-2 provides more detailed information with regard to the measurement reliabilities of the mediator, moderator, and control variables investigated in our study.

3.4 Data Analysis and Results

3.4.1 Analytical Method

We tested the hypotheses regarding the structural relationships with partial least squares (PLS) structural equation modeling due to the conceptualization of our focal independent and dependent variables as formative constructs (MacCallum and Browne 1993; Ringle, Wende, and Will 2005). In contrast with the variance-based PLS algorithm, the suitability of covariance-based methods such as LISREL or AMOS is very limited for analyzing formative constructs on both the measurement and the structural level (Herrmann, Huber, and Kressmann 2006). For example, covariance-based structural equation models are univocally identified only if each formative construct flows into at least two reflectively measured

constructs; otherwise, parameter estimates are ambiguous (MacCallum and Browne 1993; Williams, Edwards, and Vandenberg 2003). In addition, covariance-based methods are inappropriate for use when endogenous variables are measured formatively (Chin 1998). In this case, the variance of the formative endogenous variable is explained by both its formative indicators on the measurement level and by all antecedent constructs on the structural level. As a result, it is impossible to clearly identify how much of the variance in the endogenous variable is explained by structural relationships or by formative indicators (Herrmann, Huber, and Kressmann 2006). As these restrictions do not apply to PLS, we decided to use this most widely accepted variance-based approach.

3.4.2 Test of Hypotheses

We first calculated a model that included the constructs from our conceptual framework and firm size, industry, and NPD experience as control variables. Moderating factors and marketing integration were initially excluded from this model, which explained 54.4% of the variance in the dependent variable of corporate new product success. Our analyses reveal a positive direct relationship between sales force integration and corporate new product success ($\beta = .344$; $p < .01$). In addition, sales force integration exerts a significant and positive effect on new product advantages ($\beta = .475$; $p < .01$), which in turn, positively affect corporate new product success ($\beta = .498$; $p < .01$). In summary, these findings support Hypotheses 1, 2, and 3 of our conceptual model.

To investigate whether the effect that sales force integration exerts on corporate new product success can be explained by new product advantages, we followed the procedure for testing mediations that has been proposed by Baron and Kenny (1986). The authors refer to three conditions that must all be fulfilled to prove the existence of mediation. The first condition holds true because the exogenous variable (sales force integration) ($\beta = .611$; $p <$

.01) and the proposed mediator (new product advantage) ($\beta = .666$; $p < .01$) both have significant effects on the dependent variable (corporate new product success) when these effects are investigated independently of one another. Our results also support the second condition as there is a significant relationship between the exogenous variable (sales force integration) and the proposed mediator (new product advantage) ($\beta = .481$; $p < .01$). For proving the existence of full mediation, the third condition requires that the relationship between the exogenous variable (sales force integration) and the dependent variable (corporate new product success) becomes insignificant when the proposed mediator (new product advantage) is integrated into the research model. As the main effect remains significant after including the mediator variable into the model ($\beta = .357$; $p < .01$), we conclude that new product advantage does not fully mediate the relationship between sales force integration and corporate new product success. However, as the relationship between the independent and the dependent variable is considerably weaker in case when new product advantage is integrated into the PLS path model than if this is not the case ($\beta = .357 < \beta = .611$), we prove the existence of partial mediation.

With regard to firm size, industry, and NPD experience, we do not find a significant relationship between any of these controls and corporate new product success. Also, the control variables do not significantly contribute to a further explanation of the dependent variable ($\Delta R^2 = .008$). This result lends support to the effectiveness of sales force integration as a key driver of new product success at the company level and to the robustness of our hypothesized relationships. To assess the influence of sales force integration on corporate new product success beyond the effect of marketing integration, we calculated an additional model that controlled for marketing integration in NPD. The results show that the relationship between sales force integration and corporate new product success remains highly significant when marketing integration is integrated into the model as an additional, potential

determinant of new product success ($\beta = .607$; $p < .01$). In contrast, marketing integration does not significantly influence corporate new product success when sales force integration is simultaneously considered as an antecedent of new product performance ($\beta = -.031$; $p > .10$). These findings strongly support recent calls in the literature for a distinct investigation of marketing and sales functions in the NPD context (Ernst, Hoyer, and Rübsaamen 2010). These results further highlight the particular value of the specific market insights of salespeople, which complement the strategic information held by marketing departments in important ways (Homburg and Jensen 2007).

To test our proposed moderating effects, we applied the construct score procedure suggested by Chin, Marcolin, and Newsted (1996) which allows for the creation of interaction terms by case-wise multiplication of the underlying construct scores for the predictor and moderator variables. In the next step, both the moderating variable and the interaction term were included into the PLS path model for the assessment of moderating effects. In accordance with Hypothesis 4, we find that higher levels of information quality strengthen the positive relationship between sales force integration and the success of companies' new products ($\beta = .119$; $p < .05$). Moreover, in support of Hypothesis 5, the results of our analysis demonstrate the importance of an early integration of salespeople's market information in NPD processes. Specifically, we find that high levels of sales force integration in the predevelopment stage significantly strengthen the effect on corporate new product success ($\beta = .130$; $p < .05$). In contrast, the moderating effect of timing is insignificant if sales force information is considered in the development and commercialization stage, respectively ($\beta = .032$; $p > .10$; $\beta = -.003$; $p > .10$). Hypothesis 6 could not be supported. Although the results point toward the proposed direction, innovation degree does not significantly strengthen the relationship between sales force integration and corporate new product success ($\beta = .031$; $p > .10$). Finally, the effectiveness of sales force integration in achieving improved new product

performance significantly increases with higher levels of environmental turbulence ($\beta = .113$; $p < .05$). This finding is in support of Hypothesis 7.

Overall, our results show that companies can considerably increase corporate new product performance by acquiring, sharing, and using the market knowledge of salespeople in the context of new product-related decision making. This influence can be partly explained by new product advantages that result from sales force integration. In addition, we find evidence that the relationship between sales force integration and new product success at the company level is highly contingent upon three context-specific factors, which include information quality, timing, and environmental turbulence.

Table 3-2 provides an overview of the path coefficients, t-values, and significance levels of our hypothesized relationships.

Table 3-2: Test of Main Effects, Moderating Effects, and Controls

Hypothesis	Independent Variable	Dependent Variable	Beta	T-Value
H1	Sales force integration	New product advantage	.475***	7.030
H2	New product advantage	Corporate new product success	.498***	6.025
H3	Sales force integration	Corporate new product success	.344***	4.342
			Endogenous Constructs	Construct R²
			New product advantage	.226
			Corporate new product success	.544
Hypothesis	Independent Variable	Dependent Variable	Beta	T-Value
H4	Sales force integration x Information quality	Corporate new product success	.119**	1.805
H5	Sales force integration x Timing (Predevelopment)	Corporate new product success	.130**	1.914
	Sales force integration x Timing (Development)	Corporate new product success	.032	.486
	Sales force integration x Timing (Commercialization)	Corporate new product success	-.003	.052
H6	Sales force integration x Innovation degree	Corporate new product success	.031	.476
H7	Sales force integration x Environmental turbulence	Corporate new product success	.113**	1.926

*** $p < .01$, ** $p < .05$, * $p < .10$

3.4.3 Further Measure Validation Using Additional Data

We followed two separate approaches to test the validity of our subjective performance measures derived from multi-item scales. First, we asked each participating manager to disclose economic hard facts in addition to the subjective measures of corporate, economic new product success. Particularly, we were looking for sales growth and return-on-investment (ROI) figures of the new products that companies had launched within the last three years. Overall, 88% of the respondents provided us with this type of data. Subsequent correlation analyses showed highly significant and positive correlations between the subjective measures of corporate, economic new product success and sales growth ($r = .32, p < .01$) and ROI ($r = .27, p < .01$).

We additionally collected objective financial data from financial databases (e.g., CompuStat) and annual reports that were accessible on the websites of the firms. We were able to identify 42 companies (15.6%) of our sample for which objective performance data were publicly available. We gathered information with regard to total asset value, sales volume, and net sales/PPE, as these firm-level performance figures are strongly influenced by the success of companies' new products. Data were collected for the last three consecutive years. This allowed us to calculate average indices for all three performance indicators over the last three years, which corresponds to the time frame of our subjective measures of corporate new product success. Correlation analyses between the subjective measures of corporate, economic new product success and objective performance data showed significant positive correlations for all three objective indicators ($r = .27, p < .05$, for net sales/PPE; $r = .26, p < .10$, for sales volume; $r = .24, p < .10$, for total asset value). Given that subjective performance data refer to the performance of new products only and objective data relate to corporate success in general, we consider these correlations to be sufficiently high in our study context. In addition, model recalculations with objective performance indicators as

dependent variables supported the strong link between sales force integration and performance outcomes.

Considered together, the results of our validation analyses indicate that our respondents are reliable key informants for the topic under investigation and support our decision to use subjective performance measures (Homburg, Klarmann, and Schmitt 2010).

3.4.4 Tests for Common Method Bias

The data for the measurement of both independent and dependent variables were collected by means of the same survey instrument and stem from the same data source. For this reason, there is a possibility that the effect strength of individual variables is over- or underestimated. In such a case, an unwanted common method bias could potentially threaten the validity of our results (Klarmann 2008; Podsakoff et al. 2003). Podsakoff et al. (2003) identify social desirability as one of the most prevalent sources of common method bias that cannot only distort the answers of respondents but also “mask the true relationships between two or more variables” (p.881). Therefore, we attached great importance to our survey design to encourage respondents to provide answers that are real reflections of the truth rather than results of their social acceptability. In particular, we refrained from informing managers of the study’s objective and emphasized that there were no right and wrong answers and no statements that we were specifically seeking. In addition, we instructed participants to refer to actual situations rather than ideal situations. Finally, we emphasized that all of the data provided would be treated with complete confidentiality and would be published only on an aggregate level to ensure that no inferences could be drawn with regard to specific respondents.

We additionally conducted several statistical tests to assess whether common method bias exists in our data set. First, we conducted the Harman single-factor test to assess a potential common method bias (see Jayachandran et al. 2005; Podsakoff et al. 2003; Ramani and

Kumar 2008). The results of the exploratory factor analysis identified 11 factors that showed eigenvalues greater than 1, and that together accounted for 82% of the total variance. As required, the strongest factor did not explain the majority of the variance (31%). In addition, we did not find an overarching factor in the unrotated factor loading matrix. Subsequently, we conducted the single-common-method-factor test that compares a single factor model in which all manifest variables are explained through one common method factor with the actual research model (Podsakoff et al. 2003). The results from the confirmatory factor analysis showed that the goodness of fit of the single-factor model ($\chi^2 = 587.8$; $df = 247$; $\chi^2/df = 2.38$) was significantly worse than the goodness of fit of the research model that included all constructs ($\Delta\chi^2 = 476.1$; $\Delta df = 185$; $p < .01$). This result clearly indicates that one common method factor cannot sufficiently account for the correlations between the observed variables. Finally, we applied the marker variable technique proposed by Lindell and Whitney (2001) to test for potential common method bias. We chose timing as the marker variable and new product success as the key dependent variable. The correlation between these two constructs ($r = .04$) was then used to correct the correlation matrix for common method bias. The statistical significance of our structural relationships did not subsequently change, which is a clear indicator that common method bias does not distort our findings. Based on the results of the various statistical procedures, we conclude that common method bias is unlikely to negatively affect the validity of our results (see Frazier et al. 2009; Homburg, Klarmann, and Schmitt 2010).

3.5 Discussion

Building on our findings from Chapter 2 that have highlighted the importance of sales force integration in improving new product success at the project level, this study aimed at resolving the question whether the consideration of sales force information is equally

effective at the corporate level. Drawing on the RBV, we investigated in how far sales force integration determines the success of all new products that companies had developed over a three-year period. Our data set that comprises 269 companies from various industries provides empirical evidence that corporate new product performance can be significantly improved by considering sales force information during NPD processes. As sales force integration has a positive influence on corporate new product success beyond the effect of marketing integration, our results firmly establish sales force integration as a key driver of new product performance at the company level. Thus, the effectiveness of sales force integration in achieving higher levels of new product success, which is a key finding of our project-level study, can be confirmed at the corporate level.

Similar to our study findings on the project level, sales force integration exerts its impact on new product success via new product advantages at the corporate level. However, whereas new product advantage serves as a full mediator at the project level, the relationship between sales force integration and corporate new product success can only be partly explained by superior customer value perceptions of new products. Therefore, the direct relationship between sales force integration and new product performance is more emphasized at the company level than at the project level.

In addition to our main effect views, this study provides deeper insights regarding the role of contingency factors as influencers of the direct relationship between sales force integration and corporate new product success. Particularly, our results show that high levels of information quality strengthen the effectiveness of sales force integration in achieving improved new product performance outcomes at the company level. This finding lends support to the view that the information that is provided by salespeople must be accurate and relevant to reduce the complexities that are associated with NPD processes and to support managers in making effective decisions with regard to new product projects (Sharma and

Lambert 1994; Zimmer, Henry, and Butler 2007). In accordance with Hultink et al. (2011) who highlight the importance of high-quality data in facilitating favorable new product performance outcomes, we thus argue that the processing of market information alone does not guarantee success. The argument that information must be of sufficient quality to support the creation of successful new products is empirically supported by our results and represents a major finding of this study.

Moreover, phase-specific investigations of NPD processes provide evidence that timing significantly moderates the direct relationship between sales force integration and corporate new product success. Theoretical considerations and case study findings have already highlighted the importance of considering customer feedback and competitive activities in the early phases of the NPD process (Di Benedetto et al. 2003; Judson et al. 2006; Troy, Hirunyawipada, and Paswan 2008). Our study empirically supports this argument as it shows that the customer and competitor information provided by salespeople is especially valuable in the predevelopment stage of the NPD process. In this most information-intensive phase, sales force insights obviously support the identification of product concepts that have significant potential of success when such concepts materialize as marketable products. That sales force integration is particularly useful in the early stages of the NPD process complements the finding by Ernst, Hoyer, and RübSaamen (2010) that sales cooperation with marketing and R&D has the most significant impact on new product performance when such cooperation is undertaken in the earliest NPD process phase. Given that an early integration of sales force knowledge plays a crucial role for achieving improved new product performance outcomes, it is surprising that most previous studies have only looked at one specific NPD process phase or have investigated the entire process without differentiating the separate phases (e.g., Lilien et al. 2002).

Our results also support the moderating influence of environmental turbulence. When the external environment of companies is characterized by high levels of competitive intensity and market turbulence, the effect of sales force integration on corporate new product success is intensified. Although many previous studies have considered environmental turbulence to moderate the relationship between market information processing activities and resulting performance outcomes, most of them have failed to support a significant moderating influence (e.g., Jaworski and Kohli 1993; Kirca, Jayachandra, and Bearden 2005; Rose and Shoham 2002). Therefore, it is especially noteworthy that our study, in accordance with prior research, reestablishes the particular importance of information processing activities in the case of an environmental setting that is characterized by high degrees of uncertainty (Diamantopoulos and Hart 1993; Kirca, Jayachandra, and Bearden 2005).

In contrast, our results fail to support the view that sales force integration is more effective in the case of radical than in the case of incremental new products. This finding may be explained by the fact that most of the companies in our sample have already gathered considerable experience in the development of new products, which is indicated by the high number of NPD projects in which our respondents have already been involved in. Experience generally helps to compensate for information deficits which are most prevalent in the case of radical new products. Therefore, perceived levels of uncertainty, which generally vary as a function of product innovativeness, decrease and increasingly converge as experience grows. As differences in perceived uncertainty levels disappear, the need for market information processing activities for radical as compared to incremental new products converge. Therefore, we consider the relatively high level of managers' NPD experience to invalidate the moderating influence of product newness in our study context.

3.6 Managerial Implications

In recent years, many companies have followed the implications drawn from research findings that have advocated the opening of the NPD processes of organizations (Chesbrough 2003, 2006). Cooperation with external stakeholders such as customers, competitors, and suppliers have been promoted as they allow for an accumulation of internal company knowledge and enable firms to better and quicker identify market potential and customer needs (Lichtenthaler 2011). This should subsequently support the realization of NPD-related advantages such as a reduced time-to-market and an increased market acceptance of new products (Enkel, Gassmann, and Chesbrough 2009; Reichwald and Piller 2005). However, numerous companies that have implemented an open innovation approach had to experience the downsides of this strategy. Knowledge exchanges with customers and other companies led to the diffusion of internal firm knowledge to competitors and the loss of intellectual property (Dahlander and Gann 2010; Trott and Hartmann 2009). This made former competitive advantages ineffective in cases where competitors with stronger market positions and superior resources were better able to exploit market knowledge and new product ideas (Dahlander and Gann 2010).

In our view, companies that integrate their sales force as a source of market knowledge into their NPD processes can realize the advantages associated with an open innovation strategy without fearing its pitfalls. Our findings confirm that salespeople complement internal company knowledge with important ideas from the external market environment. This advance in knowledge allows for the development of new products that better meet customer needs and, therefore, offer a superior performance than competing products as perceived by customers. As a consequence, new products are better adopted by the market and show superior economic performance. The crucial difference between the integration of external stakeholders and the integration of the sales force is that the market insights observed

by salespeople are unique to a firm. Such information is communicated only to internal recipients within the organization. Thus, knowledge diffusion to competitors is prevented, and the competitive advantages garnered from such insights are more protected.

In order to fully leverage the benefits of sales force integration, we propose that decision makers in the NPD context monitor the quality of information that is provided by salespeople. This suggestion is derived from our finding that low-quality information does not help to reduce uncertainties and mitigates the positive effect of sales force integration on corporate new product success. We believe that it is essential that NPD managers clearly advise salespeople regarding the types of information that are considered useful and relevant for developing successful new products. In this context, continuous trainings on questioning and listening skills will increase the proficiency of salespeople in providing high-quality information (Le Bon and Merunka 2006; Sharma and Lambert 1994). In addition, we consider that it is vital that sales force insights are accounted for in the early phases of the NPD process in which they are particularly valuable for the identification of market potential and high-level new product concepts. In contrast, managers should note that sales force integration is far less effective at the later NPD process stages. Finally, we recommend that the companies that operate in highly turbulent environments listen most closely to the voice of their sales force. This recommendation is based on our research result that the market information provided by salespeople is most effective in industries that are characterized by rapidly changing customer preferences and high levels of competitive intensity.

Although our findings clearly identify sales force integration as an important driver of corporate new product success, descriptive results of our study show that there is a large proportion of companies that continue to disregard sales force insights when developing new products (see Table 3-3). This is in keeping with previous research that has referred to salespeople as a still underutilized resource of market intelligence (Cross et al. 2001; Liu and

Comer 2007; Pass, Evans, and Schlacter 2004). Thus, sales force integration in NPD offers companies a great opportunity for differentiation and the prospect of improved new product success rates.

Table 3-3: Involvement of Sources in NPD

Internal Parties	Direct Involvement		Indirect Involvement		No Involvement	
	Total number (n=269)	%	Total number (n=269)	%	Total number (n=269)	%
Research & Development	184	68.4%	57	21.2%	28	10.4%
Upper/ Top management	177	65.8%	67	24.9%	25	9.3%
Marketing	151	56.1%	83	30.9%	35	13.0%
Customers	141	52.4%	102	37.9%	26	9.7%
Sales/ Salespeople	134	49.8%	96	35.7%	39	14.5%
Production/ Manufacturing	132	49.1%	95	35.3%	42	15.6%
Customer service/ Customer relations	131	48.7%	93	34.6%	45	16.7%
Operations research	131	48.7%	80	29.7%	58	21.6%
Engineering	123	45.7%	73	27.1%	73	27.1%
Purchasing	115	42.8%	95	35.3%	59	21.9%
Suppliers	108	40.1%	109	40.5%	52	19.3%

3.7 Limitations and Suggestions for Further Research

This study provided deeper insights regarding the relationship between sales force integration and new product performance outcomes at the corporate level. However, for reasons of parsimony, we limited our conceptual model to several key constructs of particular theoretical and practical importance. Therefore, there is scope for additional mediating and moderating factors that potentially influence the relationships under investigation and that could thus

complement our findings. Especially, there may exist additional innovation success factors apart from new product advantage which are determined by sales force integration. To test these factors as mediators of the relationship between sales force integration and corporate new product success could potentially lead to the identification of additional routes through which sales force integration exerts its effect on new product performance at the company level.

In addition, it is still unclear which factors prevent companies from leveraging the sales force as a valuable source of market information, which makes the identification of sales force integration barriers a fruitful area for further research endeavors. One such barrier may be the time and effort that salespeople require to communicate their market insights to other internal departments that are involved in new product-related decision making. In this respect, the information retrieval task of salespeople may be seen as conflicting with their primary duty of selling a firm's products (Le Bon and Merunka 2006; Liu and Comer 2007). Therefore, we propose that future studies seek to determine the optimal level of time that salespeople should invest in each of these tasks to support their firm's overall product performance outcomes in the best possible way.

Finally, as the quality of information provided by salespeople significantly influences the effectiveness of sales force integration in achieving higher levels of corporate new product success, we advocate an investigation of the antecedents that determine an effective information retrieval of salespeople, which is reflected in their ability and motivation to recognize and differentiate between critical and irrelevant market insights (Liu and Comer 2007).

Appendix B-1: Measures of Formative Indices

Sales Force Integration

		Alpha = .913	AVE = .743	Composite Reliability = .935	
Information Acquisition	In the course of NPD projects, NPD project members...				Loadings
	...are able to detect changes in our customers' product preferences by gathering information from the sales force on a regular basis.				.825
	...intensely collect market information through the company's sales force.				.886
	...are able to detect fundamental shifts in our industry by interviewing the sales force on a regular basis.				.867
	...periodically gather sales force information to review the likely effect of changes in our business environment on customers.				.879
	...collect a lot of information regarding competitive moves by accessing the knowledge of the company's sales force.				.849
		Alpha = .920	AVE = .759	Composite Reliability = .940	
Information Dissemination	In the course of NPD projects,...				Loadings
	...departments that are involved in NPD projects frequently meet to discuss market trends and developments identified by the sales force.				.828
	...NPD project members spend a great deal of time sharing sales force insights regarding the future needs of customers with other functional departments that are involved in the NPD project.				.885
	...there is intense communication among NPD project members concerning sales force intelligence pertaining to market developments.				.885
	...NPD project members inform one another at length when the sales force provides them with important information regarding competitors.				.863
	...NPD project members intensely exchange sales force information pertaining to environmental changes.				.893
		Alpha = .952	AVE = .777	Composite Reliability = .961	
Information Use	In the course of NPD projects, market information stemming from the company's sales force...				Loadings
	...is frequently used in making decisions regarding new products.				.879
	...is periodically used in evaluating new products.				.817
	...has a strong effect on new product-related decisions.				.904
	...is regularly used in solving project-related problems.				.867
	...is strongly accounted for when making decisions regarding new products.				.920
	...is frequently used to improve new products.				.866
...is strongly integrated in new product-related decision processes.				.914	

Notes: Items were measured on 7-point Likert scales, with 7 indicating total agreement. Measurement scales were adapted from Jaworski and Kohli (1993).

Appendix B-1: Measures of Formative Indices (cont.)

Corporate New Product Success

		Alpha = .929	AVE = .778	Composite Reliability = .946	
Time-related Success	Generally, the new products in our company...				Loadings
	...were developed within the expected time frame.				.875
	...were launched on schedule or ahead of the original schedule.				.857
	...were brought to market within a time frame that pleased our top management.				.881
	...met important deadlines.				.906
	...met time-to-market objectives.				.892
		Alpha = .906	AVE = .780	Composite Reliability = .934	
Economic Success	Generally, the new products in our company...				Loadings
	...attained profitability goals.				.885
	...attained return-on-investment (ROI) goals.				.893
	...attained market share goals.				.872
	...attained unit sales goals.				.883
		Alpha = .895	AVE = .826	Composite Reliability = .934	
Market Success	Generally, the new products in our company...				Loadings
	...had a high level of customer acceptance.				.896
	...caused a high level of customer satisfaction.				.940
	...fit very well with market demands.				.890
		Alpha = .893	AVE = .701	Composite Reliability = .921	
Quality-related Success	Generally, the new products in our company...				Loadings
	...delivered excellent technical performance.				.821
	...performed well in terms of functionality and features.				.836
	...met or exceeded quality goals.				.866
	...had a very appealing design.				.804
	...satisfied customer needs in terms of quality.				.857

Notes: Items were measured on 7-point Likert scales, with 7 indicating total agreement.

Measurement scales for time-related, economic, and market success were adapted from Rodríguez, Pérez, and Gutiérrez (2008).

The measurement scale for quality-related success was adapted from Gruner and Homburg (2000).

Appendix B-1: Measures of Formative Indices (cont.)**Reflective Measures of Sales Force Integration and Corporate New Product Success**

Sales Force Integration	Alpha	AVE	Composite Reliability
	.923	.813	.946
			Loadings
When developing new products,879
...the integration of market information from the company's sales force is intense.			.905
...sales force insights with regard to market trends and developments are strongly considered.			.900
...we pay very close attention to the market information provided by our sales force.			.923
...sales force intelligence with regard to market developments is frequently considered.			
Corporate New Product Success	Alpha	AVE	Composite Reliability
	.940	.846	.957
			Loadings
Our new products met or exceeded their targets in terms of overall success.			.915
The overall success of our new products was satisfactory.			.926
Our new products succeeded in achieving their main objectives.			.926
We were pleased with the overall success of our new products.			.913

MIMIC Model Results

Formative Index	Formative Indicators	Beta	T-Value	R²
	Information acquisition	.183***	2.769	
Sales Force Integration	Information dissemination	.273***	3.811	.826
	Information use	.528***	7.893	
	Time-related success	.175***	3.474	
Corporate New Product Success	Economic success	.173***	2.895	.782
	Market success	.217***	3.762	
	Quality-related success	.431***	7.267	

***p < .01, **p < .05, *p < .10

Appendix B-2: Measurement Scales of Mediator/ Moderator/ Control Variables (cont.)

Timing

In the development process of new products, market information stemming from the company's sales force is used in the predevelopment stage/ development stage/ commercialization stage (1 = 'not intensely at all' and 7 = 'very intensely').

Marketing Integration	Alpha	AVE	Composite Reliability
	.899	.777	.917
When developing new products, ...			Loadings
...the integration of market information from the marketing department is intense.			.881
...marketing insights with regard to market trends and developments are strongly considered.			.885
...we pay very close attention to the market information provided by our marketing function.			.866
...the intelligence of marketing with regard to market developments is frequently considered.			.906

Firm Size

Please indicate the number of employees working in your company/ SBU as an average over the last three years.

Industry

Please specify the industry in which your company/ SBU operates.

NPD Experience

How many years of work experience do you have in your current position?

Chapter 4:

General Conclusion

4.1 Summary of Key Results

Previous studies have commonly appreciated the sales force as a valuable resource of market information (Cross et al. 2001; Le Bon and Merunka 2006; Pass, Evans, and Schlacter 2004). Nevertheless, empirical research has largely neglected to investigate the effectiveness of integrating sales force information in the NPD context in facilitating superior new product performance outcomes. Therefore, this dissertation project aimed at resolving the question whether sales force integration represents a key driver of new product success both at the new product project and at the company level. In addition to this overall research goal, we were particularly interested in the ways in which sales force integration may affect new product performance. Finally, the role of contingency factors in sales force integration effectiveness has not been examined by previous studies, which motivated us to identify context-specific factors that influence the effect of sales force integration on new product success.

Based on these research questions, we conducted two studies – one at the project level and one at the corporate level – which intended to close these research gaps. Study 1, which has been presented in Chapter 2 of this dissertation, has investigated the effectiveness of sales force integration in achieving new product success at the project level. Data pertaining to 219 new product projects have provided evidence that the consideration of sales force insights in the context of NPD processes significantly increases new product success via two separate routes. First, we have found that sales force integration supports the creation of new products

that are perceived as superior by customers compared to competitive offerings. These relative product advantages subsequently translate into higher levels of market acceptance and economic performance. Second, the consideration of sales force information exerts a positive effect on the adoption behavior of salespeople with regard to the new product. As a consequence, salespeople devote greater efforts in selling the new product to customers, which increases new product success rates. In addition to these main effects, we were able to identify several contextual factors that influence the effectiveness of sales force integration in achieving superior new product performance outcomes. Our results have demonstrated that the integration of sales force information is particularly useful at early stages of the NPD process in which specific customer and competitor insights are most critical for the identification of high-level new product concepts. In addition, we have found that the quality of sales force information plays a crucial role for generating new product advantages. Finally, sales force integration has been shown to be more effective in the case of radical new products that are frequently rejected by customers. Under such circumstances, salespeople's increased efforts to educate customers about the benefits of a new product are especially crucial to ease customer anxieties, thereby facilitating the adoption of new products by the market.

These research findings of Study 1 provide answers to research questions 1a, 2a, 3a, and 3c, which have been posed in the introductory chapter of this dissertation:

Research question 1a: Does sales force integration represent a driver of new product success at the project level?

Research question 2a: Which roles do contextual factors play with regard to sales force integration effectiveness in achieving new product success at the project level?

Research question 3a: Does new product advantage mediate the relationship between sales force integration and new product success at the project level?

Research question 3c: Does the adoption of a new product by salespeople mediate the relationship between sales force integration and new product success at the project level?

Having established sales force integration as a key driver of new product success at the project level, Study 2 addressed the question whether this research result can be transferred to the corporate level. That is why we changed our perspective in Chapter 3 to the overall organizational level and investigated the effect that sales force integration has on corporate new product success. We asked 269 managers that are involved in new product-related decision making to refer to the NPD projects that had been undertaken by their companies within the last three years. The analysis of our data has corroborated the strong impact that sales force integration has on new product performance outcomes at the company level. In addition to a positive, direct relationship between sales force integration and corporate new product success, we have found that new product advantages partially mediate the underlying relationship. Moreover, our results have emphasized the moderating influences of timing, information quality, and environmental turbulence. More precisely, sales force integration exerts an increased impact on corporate new product success when sales force insights are high in quality and when they are integrated in the earliest phase of the NPD process. In addition, the consideration of sales force information is particularly effective under environmental conditions that are characterized by high levels of competitive intensity and market turbulence. Considered together, these research findings provide answers to research questions 1b, 2b, and 3b:

Research question 1b: Does sales force integration represent a driver of new product success at the corporate level?

Research question 2b: Which roles do contextual factors play with regard to sales force integration effectiveness in achieving new product success at the corporate level?

Research question 3b: Does new product advantage mediate the relationship between sales force integration and new product success at the corporate level?

4.2 General Suggestions for Further Research

The studies that have been undertaken in the scope of this research project highlight the role of sales force integration as a key driver of new product success both at the project and at the corporate level. Importantly, we have revealed two ways in which sales force integration affects new product performance. In addition, we have found several moderating factors that influence the underlying relationship. Although our research findings provide important insights on the effective management of sales force information in the NPD context, there are still open questions that further research projects may address.

First of all, additional innovation success factors apart from new product advantage and the new product adoption of salespeople are potentially determined by sales force integration. To test these factors as mediators of the relationship between sales force integration and new product success could potentially lead to the identification of additional routes through which sales force integration exerts its effect on new product performance. In addition, previous research has proposed further contextual factors that may influence the effectiveness of key success factors in the realm of NPD. As our studies have concentrated on few contextual factors of particular practical relevance, we motivate academic scholars to examine the role of

additional moderating factors that potentially influence the relationships under investigation. Such analyses could potentially complement our research findings in important ways.

Having established sales force integration as a key driver of new product success both at the project and at the company level, the next item on the research agenda is to identify the antecedents of sales force integration. Previous research and descriptive results of our study have shown that many companies disregard sales force insights when developing new products. However, the specific factors that prevent companies from leveraging the sales force as a valuable resource of market information are still unclear. Therefore, we consider the identification of sales force integration barriers to be a seminal area for further research projects.

Finally, research attention should be drawn to the antecedents that determine an effective information retrieval of salespeople, which is reflected in their ability and motivation to recognize and differentiate between critical and irrelevant market insights (Liu and Comer 2007). We derive this suggestion from our research findings that have shown that the quality of information provided by salespeople significantly influences the effectiveness of sales force integration in achieving competitive product advantages and higher levels of new product success.

4.3 General Managerial Implications

The findings from this dissertation project should indicate to managers that sales force integration represents a critical resource that promotes new product advantages and improved new product performance outcomes if it is effectively leveraged. Therefore, we recommend that managers gather sales force information in the earliest phase of NPD projects in which salespeople's specific insights on customer needs and competitor activities are particularly valuable for the development and evaluation of high-level new product ideas and concepts. As

sales force information must be of sufficient quality to create superior new products with strong chances of success, we propose that members of the NPD team take the time to explain to salespeople which types of information they need in support of their NPD tasks. If clear instructions are combined with trainings on questioning and listening skills, companies can lay the foundations for salespeople to provide the type of information that is relevant for the development of successful new products (Le Bon and Merunka 2006; Sharma and Lambert 1994). However, our study results indicate that the acquisition of sales force information alone does not guarantee success. Therefore, companies need to develop systems that allow for an effective and efficient dissemination of sales force insights between all members of NPD project teams. Depending on the organizational structure and the size of a firm, information sharing can be facilitated through regular, scheduled meetings between NPD project members or through computer-based information systems that provide access to the latest insights provided by salespeople. Finally, sales force information must be interpreted and applied to new products to ensure that new product functions and designs reflect the customer needs that have been previously identified by salespeople.

In summary, our study's findings confirm that the sales force complements internal company knowledge in important ways, thereby facilitating the development of superior new products that show high levels of market acceptance and economic performance. As sales force insights are communicated exclusively in-house, knowledge dissemination to competitors is prevented, and the competitive advantages garnered from sales force information are protected. Despite these obvious advantages that result from sales force integration in the NPD context, salespeople represent a still underutilized resource of market intelligence. The present research clearly highlights that companies are well advised to bring in the expertise of the sales force for the purpose of developing successful new products.

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EIDESSTATTLICHE ERKLÄRUNG

Ich erkläre hiermit an Eides Statt, dass ich die vorliegende Arbeit selbständig und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe. Die aus fremden Quellen direkt und indirekt übernommenen Gedanken sind als solche kenntlich gemacht. Ebenso versichere ich, dass ich nicht die Hilfe einer kommerziellen Promotionsvermittlung/ -beratung in Anspruch genommen habe.

Die Arbeit wurde bisher in gleicher oder ähnlicher Form keiner anderen Prüfungsbehörde vorgelegt.

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“**Internal Knowledge Exploitation – The Role of Sales Force Integration in New Product Development**”

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