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The impacts of customer empowerment on new product and firm performance

Performance effects and contextual considerations of involving customers in new product development

Marketing

Master's thesis

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Abstract

This study explores the relationships between customer empowerment (CE), new product performance (NPP) and firm performance (FP) as well as important contextual factors influencing these relationships. CE is defined in this study as the extent which a firm provides its customers ways to (1) actively shape the nature of its transactions and (2) connect with the firm as well as with each other. First, extant research on CE and its performance impacts is reviewed, resulting in a total of ten research hypotheses that are integrated to form the theoretical framework of the study. The main hypotheses posit that customer empowerment has a positive relationship to performance on both the product and firm level. Additionally it is argued that this relationship may be stronger when 1) the surrounding market- and technological environment of a company is highly turbulent 2) a company is focused on producing services rather than tangible products and 3) a company is primarily involved with organizational (B2B) rather than consumer (B2C) customers.

The research hypotheses are empirically tested through moderated multiple regression (MMR) analysis. The research data is compiled from StratMark 2014 – a questionnaire charting marketing and strategy practices in Finnish companies – from which a research sample of 965 companies representing a wide range of industries and sizes was achieved. Before conducting the MMR, exploratory and confirmatory factor analyses were run to establish best possible reliability and validity of the constructs and entire model. Separate 7-stage hierarchical MMR analyses are then conducted for modelling new product and firm performance impacts.

The discovered results support the main hypotheses: a significant and positive relationship between customer empowerment and both performance measures is found. The proposed moderating effects of market turbulence (MT) and technological turbulence (TT) are also partially supported – TT positively moderates CE's effect on NPP and MT positively moderates CE's effect on FP. This suggests that opening a company's innovation process to customers is especially appropriate in turbulent environments. In contrast, the hypotheses regarding a company's focus towards services vs. products and B2B vs. B2C customers are not supported. This would tentatively indicate that empowering customers may be an equally valid strategy regardless of a company's offering.

Overall, the study provides important insights for both academics and practitioners involved with customer empowerment and new product development at large. For managers, the findings suggest that CE can be a profitable approach for new product development, and one that should be especially considered as a way to obtain information on customer needs in rapidly changing environments. For academia, the study sheds light on measurable CE performance impacts, which have scarcely been researched thus far. In addition it provides an improved understanding regarding some of the important contextual factors influencing this relationship. Further research is suggested to build on the found CE-Turbulence relationship and to verify whether a firm's offering truly does not play a role for CE applicability. Additional studies on operational-level CE practices are also called for, to further assess the practical requirements of successful CE implementation.

Keywords customer empowerment, co-creation, strategic orientation, new product development, firm performance, new product performance, market turbulence, technological turbulence

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1 INTRODUCTION

This chapter offers an introduction into the background, research questions, methodology, scope and most relevant concepts of this thesis. It also describes the overall structure and contents of the following chapters.

In the course of approximately fifty years, the customer has transformed from a passive receiver of corporate messages to an active player in the value creation process. Informed, networked and empowered consumers are increasingly "co-creating value with the firm" (Prahalad & Ramaswamy 2004, pp. 5), instead of only being the buyer of products and services produced by companies. Empowered consumers can for instance generate product ideas, screen and evaluate potential options as well as be a part of the actualization process of these prelaunch stages (Piller et al., 2011).

This continuing development of this "Free Consumer" (Zwick et al., 2008) has not however been viewed solely as a positive direction for companies. Consumer activity may at times manifest in defiant or oppositional consumption practices (Pongsakornrungsilp & Schröder, 2011), where consumers engage in "consumer resistance" (Dalli & Corciolani, 2008), "cultural hijacking" (Kozinets 2004) or "culture jamming" (Harold, 2004) in order to boycott or ridicule companies. Thus, consumers have tremendous power to create both opportunities and threats to corporate players (Pongsakornrungsilp & Schröder (2011, pp. 306),

Despite these risks there is a growing consensus that the changing role of the customer cannot be ignored, and that it can in fact be used as an asset (e.g. Prahalad & Ramaswamy, 2004; von Hippel 2005; Piller et al., 2011, Fuchs & Schreier, 2011). One of the prominent concepts that has emerged as a way of doing this is customer empowerment (CE), defined by Ramani & Kumar (2008, pp. 29) as the "extent to which a firm provides its customers avenues to (1) connect with the firm and actively shape the nature of transactions and (2) connect and collaborate with each other" in the context of new product and service development. The core hypothesis of this thesis is that customer empowerment can be adopted as a strategic orientation of a company in a way that enhances both product and firm level performance. Furthermore, this study strives to shed light on which specific contexts may be the most suitable for this suggested strategy by contrasting CE effectiveness in turbulent vs. stable environments, product vs. service focused firms and business-to-business vs. business-to-consumer focused firms.

1.1 Research Problem and Research Questions

Much of the research on empowering customers in new product and service development is of conceptual or case nature (e.g. Magnusson, 2003; Etgar, 2008; Buur & Matthews 2008; Brabham, 2010) and delving into performance impacts is scarce (Hoyer et al., 2010). The studies that do quantifiably study the effects of CE provide tentative support for its positive impacts but still leave much room for debate (see e.g. Gruner & Homburg, 2000; Ramani & Kumar, 2008; Fuchs & Schreier, 2011). In addition, little seems to be known regarding which settings are most appropriate for adopting a customer empowerment orientation. Accordingly, a number of researchers have voiced the need to address these shortcomings in prior research (e.g. Campbell & Cooper, 1999; Alam, 2002; Hoyer et. al., 2010). In this light, the two main research questions of this thesis are:

1. *How does a customer empowerment orientation impact the new product performance (NPP) and firm performance (FP) of a company?*

2. *Can certain contexts be found to moderate this impact, namely:*
    a. *a business-to-business (B2B) vs. business-to-consumer (B2C) focus*
    b. *a product vs. service offering focus*
    c. *market turbulence (MT)*
    d. *technological turbulence (TT)*

The first research question is aimed at the overall ambiguity regarding CE's performance impacts. A division into NPP and FP enables studying not only e.g. firm profitability and return on investment effects but also e.g. the profitability and launch speed of new products perspective. As stated, previous studies regarding both of these contexts are scarce and with much to build on. Firm-level performance effects have been researched with CE being only a sub-element of a larger strategic orientation (Ramani & Kumar, 2008) or from the perspective of changes in customer attitudes, not directly related to FP (Fuchs & Schreier, 2011). The found studies on the NPP impacts of CE exhibit an operational-level focus, looking into the perceived improved quality of co-created products in specific industries such as mobile services (e.g. Magnusson, 2003) and the machine industry (Gruner & Homburg, 2000). This thesis strives to expand on these studies by looking at company and product level impacts simultaneously and with a broad non-industry-specific approach.

The second research question and its sub-questions are directed at the more subtle perspective of when a CE orientation might be most successfully applicable. It is a complicated issue for both theoretical and empirical analysis, since no prior research with the specific goal of quantitatively estimating contextual factors' relevance for CE was found. From a number of studies, however, particularly interesting research gaps can be identified justifying the chosen contexts to research. For

instance, Hoyer et al. (2010) state that most extant CE research has been conducted in a B2B context, warranting a balancing look into the B2C side. On the other hand, whether different outcomes ensue in a service vs. product context is a common question in innovation literature at large (e.g. Damanpour, 1991; Alam & Perry, 2002; Nijssen et al., 2006) and one that is highly interesting and yet unanswered in terms of CE. And finally, when possible it is often enlightening to account for not only the company's offering focus but also the pace of environmental change. Again, the effects of market and technological turbulence have been researched in terms of innovation and customer interaction on a general level (e.g. Han et al., 1998; Hurley and Hult, 1998; Song et al., 2005) but not in terms of CE particularly. Therefore studying whether a CE orientation is particularly suitable for turbulent or stable environments is both challenging and intriguing.

1.2 Methodology and Scope

In practice the methodology of the thesis will follow two major steps: 1) a review of relevant literature regarding customer empowerment and the various contexts that may affect its suitability for a company and 2) an empirical, quantitative analysis of CE impacts on Finnish companies' new product performance (NPP) and firm performance (FP). The literature review will strive to outline and analyze the possible stimulators, impediments and outcomes of CE as well as how these might differ based on a company's focus and the environmental turbulence that surrounds it. This review concludes in the formulation of the theoretical framework of the thesis, containing a total of 10 research hypotheses.

The empirical part of the thesis, striving to answer the set of hypotheses, is based on data gathered from StratMark 2014 -survey. The bi-annual, national-level marketing and strategy questionnaire was sent electronically to 8773 managers in Finnish companies, of which 965 respondents completed the entire questionnaire for a response rate of 11%. The unit of analysis in the study is a company or a business unit within a larger company. It should be acknowledged that I was not personally involved in drafting or sending out the questionnaire, but rather was given the respondent data in its raw form to further develop and analyze.

The actual analysis is divided into three major parts: 1) preliminary analyses 2) confirmatory factor analyses (CFA) and 3) hierarchical moderated multiple regression (MMR) analyses. The preliminary analyses include the imputation of missing data, initial scale reliability tests and an exploratory factor analysis (EFA). Three CFAs are then conducted to ensure a reliable and valid model, with which to run the regression analysis. Importantly, in this stage items that weaken the construct are subjected to removal with the requirement that the variables retain their original character after the item trimming.

Finally, the hierarchical MMR analysis looks at the two research questions in its different model levels; first at the performance impact of CE and then at its potential moderators. For both factor and regression analyses, reliability and validity tests are conducted to ensure that the results do not suffer from any problems. In practice, for CFA the specific tests are for model fit, composite reliability, and discriminant and convergent validity, while for the MMR the conducted necessary tests are for detecting multicollinearity, heteroscedasticity and error term normality.

As the study is concerned with multiple broad theoretical discourses, certain perspectives must be left outside of analysis to keep the scope of the thesis manageable. Firstly, customer empowerment is here understood and studied as a strategic orientation, not as a combination of *strategic capabilities* (e.g. Day 1994), a set of *behaviors and activities* (e.g. Kohli & Jaworski 1990) or certain *resources* (e.g. Hunt & Morgan 1995). In essence, strategic orientations here concern the high-level aspects of a company culture, and as such their analysis does not contain process-level considerations. What this means in practice is that CE will not be analyzed on the level of individual activities, but rather as a culture and principle that a firm strives to live by. By this logic, it is also acknowledged that the link from CE to performance is not a direct one, as strategic orientations require successful implementation for value to the firm to be fully realized (e.g. Ketchen, 2007; Morgan et. al., 2009; Murray et al., 2011). However, as stated, it is not in the scope of this thesis to delve into the particularities of this implementation.

Secondly, analysis will be conducted on the specific levels of new product performance (NPP) and firm performance (FP), leaving out considerations regarding the broader discourse around "value co-creation" (e.g. Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2004; Payne et al., 2008). Thirdly, NPP is here defined as a measure including both products and services. This does not mean that differences between the two are not acknowledged, but rather their analysis in one parameter makes analysis more straightforward. Finally, it should be noted that in addition to theoretical considerations, the data with which the empirical work is conducted sets its own possibilities and limitations. The StratMark 2014 data is quite expansive and reliable in most respects: a very diverse set of companies in terms of size and industry are represented, and the questionnaire has been thoroughly tested before to ensure its usability. However, it should be noted that all findings are of course limited to the Finnish context.

1.3 Key concepts and definitions

Customer Empowerment (CE). As already previously described, CE is here defined as the "extent to which a firm provides its customers avenues to (1) connect with the firm and actively shape the nature of its transactions and (2) connect and collaborate with each other" (Ramani & Kumar, 2008, pp. 29). And as already elaborated, CE is here considered a *strategic orientation*; "[a set of] directions implemented by a firm in order to create the proper behaviors for the continuous superior performance of the business" (Gatignon & Xuereb, 1997, pp. 3). Customer empowerment is here used interchangeably with the following concepts found in relevant literature: co-creation, co-production, co-development, co-innovation, customer integration, participatory innovation, collaborative innovation, customer NPD, and joint development. Of these, the main synonym used for CE in this thesis is co-creation.

New Product Development (NPD), New Service Development (NSD) and New Product Performance (NPP). While there are separate research streams for service and product innovation, NPD and NPP are here used as concepts encompassing both products and services. This is however not to be confused with the commonly used "assimilation approach" (Nijssen et al., 2006), which argues that due to their similarities the concepts developed in a product context can be applied directly into a service context. In contrast, certain inherent differences between services and products are acknowledged: Services are intangible, simultaneous, heterogeneous, perishable and co-produced with customers (Fitzsimmons & Fitzsimmons, 2000), and in service innovation "it is not the service itself that is produced but the pre-requisites for the service" (Edvardsson & Olsson, 1996, p. 1476). In essence, it has been found that service innovation is more about the development of new procedures and concepts than new core technologies (Preissl, 2000).

Market Turbulence (MT) and *Technological Turbulence (TT).* MT is defined broadly as rapid changes in customers and their preferences (Kohli and Jaworski, 1990; Slater & Narver, 1994), constant buyer entry and exit from the market and fast cycles of introductions of new products and services (Hult et al., 2004). TT refers to the rate of technological advances within an industry – when it is high, breakthrough innovations have room to grow, life cycles of existing products are shortened, the competitive advantage of established firms is eroded and other new firms are propelled forward (Zhou et al., 2005, pp. 47). In contrast, an industry with low technological turbulence is characterized by slower innovation cycles and more difficulty for emerging products and companies to break through the offerings of existing players.

1.4 Structure

Chapter 2 constitutes the literature review part of the thesis. First the relevant academic works around customer empowerment and its related concepts are reviewed to form an understanding of what CE is and what it is not in the context of this study. Next, a closer look is taken at CE performance impacts studies, resulting in a combined table of foreseeable pros and cons related to CE orientation. These pros and cons are then further analyzed to formulate additional hypotheses regarding how a business-to-business vs. business-to-consumers and services vs. products offering focus might further moderate CE impacts. Lastly, other known determinants of firm and new product performance, particularly company size and market position, are shortly reviewed.

In *Chapter 3* the hypotheses formulated in chapter 2 are combined and conceptualized into the theoretical framework of the thesis, depicting the theorized linkages of the various constructs. *Chapter 4* describes the methodological choices of the study and the rationale behind them. The various stages of the analyses conducted in this thesis are described from data collection and preparation to the operationalization of variables, factor analyses and the hierarchical regression analyses as well as validity and reliability testing.

Chapter 5 presents the results of the conducted analyses, as well as their interpretation in terms of the research hypotheses. This includes the aforementioned scale reliability, factor and regression analyses as well as their respective reliability and validity tests. Before the analyses, descriptive statistics are also given to provide a broad picture of the characteristics of companies involved in the study in terms of industry, size, market position and business focus. *Chapter 6* discusses the key conclusions of the study as well as their managerial and theoretical implications. Lastly, identified limitations and suggestions for further research are given.

2 CUSTOMER EMPOWERMENT ORIENTATION

2.1 Understanding customer empowerment

2.1.1 Related concepts and forming a definition

Customer empowerment is an interesting concept, in that it has been researched under a great many names (Greer & Lei, 2012). This is perhaps due to its inherently broad nature; producer-consumer co-operation. The subject is of interest to a variety of sciences and the degree and scope of co-operation can vary drastically. Greer & Lei (2012) have conducted an excellent literature review of what they refer to as collaborative innovation with customers (CIC), one of the many interchangeably usable terms for customer empowerment. Building on their work with an additional extensive review of CE-related literature, a (non-exhaustive but comprehensive) list of potential synonyms for CE contains: co-production, co-creation, co-development, co-innovation, collaborative innovation, customer NPD, joint development, participatory innovation customer participation, customer involvement, and working consumers. Next, the most important nuances of these will be shortly discussed.

In innovation management literature *customer participation* is sometimes understood simply as the degree to which a customer is involved in a company's innovation process (Fang 2008). However in the broader marketing literature it is often used to mean co-operation with producers at large, not only regarding new products (e.g. Bendapudi & Leone 2003). *Participatory innovation* on the other hand is an industrial innovation literature -born term used to describe the co-innovation of products and services (Buur & Matthews 2008). The concept strives to combine lead-user, participatory design and design anthropology practices into a superior integrated method. *Value co-production* has been presented as "the inclusion of consumers in the processes where value is created around products and brands" (Arvidsson 2008, pp. 326). It was originally used to point out the flaws of the industrial view of value production (e.g. Ramirez 1999) and gained general acceptance after its conception.

However, during the 2000s, numerous scholars remarked of its negative connotations to a goods-based logic and ultimately replaced co-production with the term *co-creation* (e.g. Lusch & Vargo 2006; Payne, et al., 2008). Recently a lively debate has revolved around the ethics of using "customer labor" for the advantage of the company. Through this debate the term "working consumers" was born, implying that companies utilize the know-how and resources of consumers without giving them appropriate compensation in return (e.g. Zwick et al., 2008; Cova & Dalli, 2009).

In addition to the concepts treated as synonyms, there are a number of closely related, if not entirely synonymic, concepts that need to be acknowledged. *Open innovation*, coined and popularized by Henry Chesbrough (2003), is perhaps the most familiar. The concept suggests a contrasting approach to the traditional closed innovation process, implying that "firms can and should use external as well as internal ideas, and both internal and external paths to market --" (Chesbrough 2003, pp 24). Open innovation clearly advocates a similar integration of customers as customer empowerment but focuses on external experts that complement the companies' resources, whereas CE encompasses all levels of customer co-operation in NPD.

Customers as innovators is a lesser known, yet compelling theory developed by Thomke and Hippel (2002). It suggests that to decrease the costs of understanding complex and fast-changing consumer needs and increase speed to market, customers should be given tools to innovate for themselves. This theory also recognizes the potential of customer collaboration and empowerment, but is mostly applicable only for specific types of companies, whose products need extensive customization and many iterations between the customer and supplier. Lastly, there is the *lead-user* approach constructed by von Hippel (1986), where identifying and integrating trendsetting customers is key. The reason lead-user practices should at least partially be separated from those of empowerment, is that lead users may act and innovate completely separately from the company in e.g. virtual communities (von Hippel, 2005)

Taking into the consideration the abovementioned numerous relative concepts, it is apparent that customer empowerment can be understood from a wide variety of angles. However in this thesis, it is understood simply and broadly as the involvement of customers into a company's new product development process. A more elaborate definition is provided by Ramani & Kumar (2008, pp. 29), and serves as a basis for all further analysis in this thesis:

> *"[The] extent to which a firm provides its customers avenues to (1) connect with the firm and actively shape the nature of transactions and (2) connect and collaborate with each other by sharing information; praise; criticism; suggestions; and ideas about its products, services, and policies.*"

2.1.2 Conceptualizing CE

Having a vast amount of different interpretations and definitions, it is not surprising that the same applies to the conceptualizations of customer empowerment. Even when we use the previously determined definition of considering CE only from a NPD standpoint, there are still many alternative interpretations as to how the concept's practices should be categorized. Although operative CE activities are not the focus of this thesis, they are worth a brief review.

A good base for a CE-practices overview is provided by Kaulio's framework (1998), which categorizes CE into seven activities/methodologies utilizable during five NPD phases. These are quality function deployment (QFD), user-oriented product development, concept and beta testing, the lead user method, consumer idealized design and participatory ergonomics, which are relevant for the specification, concept development, detailed design and prototyping phases of a company's new product development process.

Regardless of good initial insight, Kaulio's (1998) framework is not exhaustive. Its chief problems is simply its age; with the fast pace of the digital revolution, many ways of customer interaction are now common that did not exist at all 16 years ago. A more comprehensive and modern conceptualization, complementing and building on that of Kaulio's (1998), is one constructed by Piller et al., (2011). They categorize customer empowerment (referred to as co-creation) practices on a three-dimensional matrix looking at the degree of collaboration, degree of task freedom and innovation stage. Using this classification, the authors suggest eight different CE practices, appropriate for the front and back end of the innovation process.

However, more than the types of practical activities related to customer empowerment, this thesis is concerned with its effects and causes. Therefore, perhaps the most appropriate framework for the chosen context is that of Hoyer et al., (2010), which conceptualizes the stimulators, impediments and outcomes of co-creation in NPD both from the company and customer perspective (see figure 1). Particularly relevant for this thesis are the outcomes and impediments of CE for a company, namely: efficiency and effectiveness gains, increased complexity, fit with customer needs, relationship building, engagement and satisfaction, secrecy concerns, sharing intellectual property, information overload and production infeasibility. These are taken as a basis for later chapters where CE impacts on performance are evaluated at length.

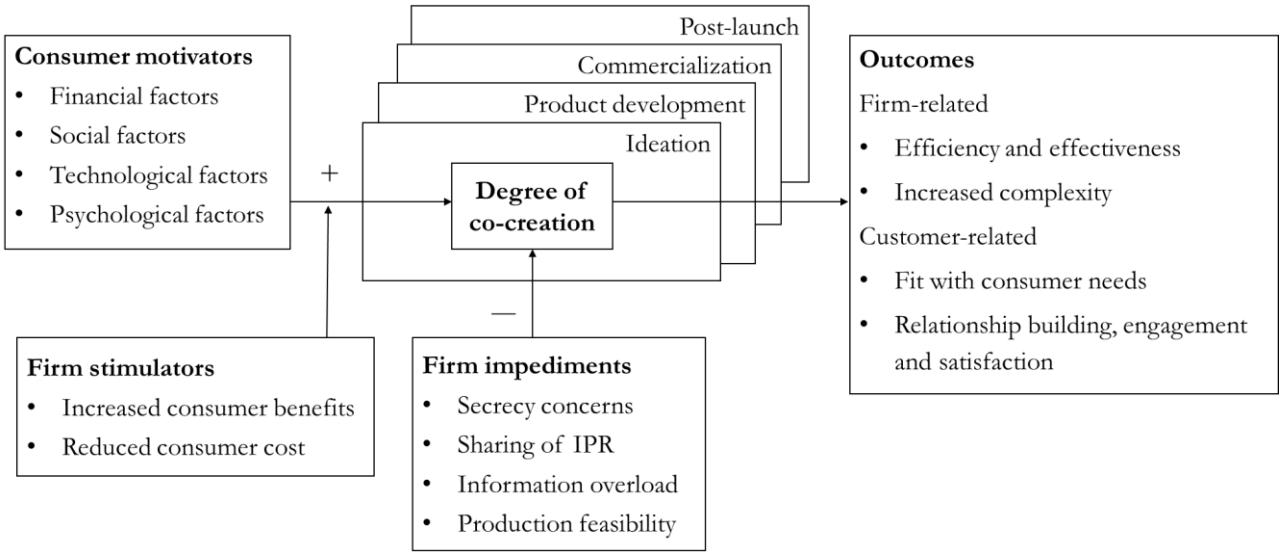

Figure 1 A framework for co-creation in NPD: stimulators, impediments and outcomes (Hoyer et al. 2010)

2.1.3 CE as a strategic orientation

The final part of defining the customer empowerment concept is clarifying its nature in this thesis as a strategic orientation (SO). This thesis uses Gatignon & Xuereb's (1995, pp. 78) definition of strategic orientations as the reflection of "strategic directions implemented by a firm to create the proper behaviors for the continuous superior performance of the business". However, for a proper understanding of what strategic orientations are and what they are not, a look needs to be taken at the overall SO discourse, which is as broad as the palette of strategic directions a company can take.

According to the definition used in this thesis, what defines CE and all other strategic orientations is that they are not *strategic capabilities* (e.g. Day 1994), a set of *behaviors and activities* (e.g. Kohli & Jaworski 1990) or certain *resources* (e.g. Hunt & Morgan 1995). Strategic capabilities can be understood as "complex bundles of skills and accumulated knowledge, exercised through organizational processes that enable firms to coordinate activities and make use of their assets" (Day 1994, pp. 38). Strategic orientations, on the other hand, are about the high-level aspects of a company culture, and their analysis does not contain process-level considerations. Furthermore, it is important to acknowledge that the link of CE to performance is not a direct one, as strategic orientations require complementary organizational capabilities for their value to be fully realized (e.g. Ketchen, 2007; Morgan et. al., 2009; Murray et al., 2011).

To understand the CE as a strategic orientation more deeply, other major SOs acknowledged in literature should be reviewed. These can be argued to include at least market orientation, customer

orientation, competitor orientation, innovation orientation, entrepreneurial orientation, technological orientation, learning orientation and interaction orientation (see e.g. Kohli & Jaworski 1990; Noble et al., 2002, Siguaw et al., 2006; Calantone et al., 2002; Ramani & Kumar 2008). The basic proclamation has been that successful *market orientation* can grant sustainable competitive advantage to a company and superior value to its customers (e.g. Slater & Narver 1994; Day 1994; Hurley & Hult 1998). Narver and slater (1990) – the first to develop a measure for MO's influence on performance – define MO as an organizational culture consisting of three components: customer orientation, competitor orientation and interfunctional coordination.

Customer orientation has since been further developed to mean "an employee's tendency or predisposition to meet customer needs" (Brown et al., 2002, pp. 111), whereas *competitor orientation* emphasizes the monitoring, managing, and outflanking of competitors (Zhou et al., 2009). *Innovation orientation* is an organizational culture in which strategies and actions are directed foremost toward specific innovation-enabling competencies and processes (Siguaw et al., 2006, pp. 556). Closely related is *learning* orientation, where activities related to creating and using knowledge to build competitive advantage are at the forefront (Calantone et al., 2002, pp. 516).

In addition, attention has been called to *Technological orientation (TO)* and *Entrepreneurial orientation (EO)*. TO refers to firms with a culture and ability to acquire considerable technological advancements for use in new product development (Gatignon & Xuereb, 1997) whereas EO signifies a combination of innovativeness, proactiveness, and risk-taking on a firm level (e.g. Wiklund & Shepherd 2003). Finally a recent but relatively recognized orientation is one created by Ramani & Kumar (2008), coined as *Interaction Orientation* (INTOR). It stresses the importance of customer interaction, empowerment and value management. Indeed, the INTOR construct's CE component serves as the base for the definition of customer empowerment orientation in this thesis, as well as the development of its construct.

2.2 Hypothesis development: CE as means of improved performance

Coming closer to the research question of this thesis, extant literature on the performance effects of CE will now be reviewed. Ultimately, based on the review, hypotheses are suggested regarding how CE will affect firm and new product performance, and how the relationship may be moderated by contextual factors. First, however, the connection between NPP and FP will shortly be discussed to form a rationale for their proposed identical connection with CE.

2.2.1 New product performance as a facilitator of firm performance

As a starting point for hypothesis development, it is suggested that the link between new product and firm performance is a strongly positive one, since the long term success of a firm has been shown to be related to a firm's ability to innovate. This has been the case in a wide range of academic literature including strategy (e.g. Capon et al., 1990; Manu, 1992), marketing (e.g. Hurley & Hult, 1998; Rothenberg, 2008) and economics (e.g. Geroski et al., 1993; Gunday et al., 2011).

In modern marketplaces, rapidly changing technologies and harsh global competition quickly erode the value of companies' existing product and service offerings. Innovation provides a way to potentially overcome this challenge and create competitive advantage and improved firm performance (e.g. Manu, 1992; Cooper & Kleinschmidt, 2000; Hitt et al., 2001; Calantone et al., 2002). More specifically, innovation has been linked with e.g. an increase in sales (e.g. Klomp & Leeuwen, 2001) market share and return on investments (e.g. Manu, 1992; Pelham, 1997) as well as organizational learning and the speed and quality of operations (e.g. Calantone et al., 2002; Thomke & von Hippel, 2002).

The potential benefits of investing in new product and service development do not of course come without a price. Lawless and Anderson (1996), for instance state that there is an initial penalty inherent in the adoption of new technologies for innovations, meaning that investments and internal resource usage may cause losses in the short term rather than profits. Indeed, a substantial time period may pass before the positive performance effects of innovations can be observed (Damanpour & Evan, 1984).

Altogether, however, the bulk of conducted research seems to agree that innovation and therein new product performance is strongly linked to firm performance. Thus it is proposed that CE impacts on NPP translate into positive FP. No formal hypothesis is made for testing this stance, but rather the strong link serves as rationale for the identical hypotheses regarding CE's effects on NPP and FP, and is also visually incorporated into the conceptual framework of the study.

2.2.2 CE's impact on new product and firm performance

Benefits and opportunities

The majority of scholars and practitioners base their rationale behind customer empowerment and co-creation activities on a highly economic logic (Bendapudi, 2003): Customers are by no means invited to partake in new product development out of courtesy, but because of the recognized benefits that can be gained through this collaboration. These benefits can be categorized into efficiency and effectiveness increases, both of which can be utilized as significant sources of competitive advantage (e.g. Prahalad & Ramaswamy 2000; Hull, 2004; Payne et al., 2008). Efficiency benefits are essentially about lowering operational costs and speeding up the whole process of product development, while effectiveness in this context signifies the end-product's improved novelty and fit with customer needs.

Efficiency gains can be classified into three distinct benefits: reduced costs, faster time to market and reduced risk of product failure. The first represents the traditional justification of co-creation activities, where labor is freed up by substituting employee work with customer input (e.g. Fitzsimmons, 1985). Ideally, customer input can be utilized with practically no cost in tasks that would traditionally require significant monetary allocations, such as idea generation, screening, product design and problem solving. However, not only are costs reduced, speed to market can also be improved (Fang, 2008; Sawhney et al., 2005) since in the virtual environment, where modern co-creation takes place, customer interactions often happen in real-time and simultaneously, unlike in survey-type traditional market research techniques. As the traditionally slow process of validating customer preferences is sped up, so is the transforming of these preferences into an end-product. Finally, after being developed in shorter time and with less expense than with traditional methods, the end-product is also often more likely to succeed commercially (e.g. Ogawa & Piller, 2006). As customers are actively ensuring that their needs are met throughout the co-creation process, the costly mistake of developing a product with no market is far less likely.

Effectiveness gains result from customer empowerment being an effective approach to meet the needs of the customer. Firstly co-created products have been shown to possess high expected benefits and novelty, and thus commercial attractiveness (e.g. Franke et al., 2006; Magnusson et al., 2003). For instance Urban and von Hippel (1988) describe a case where a concept for an industrial software solution developed through empowered customers reached much higher sales figures than conventionally developed concepts. In addition, an improved preference fit has the potential to elicit future purchase intentions as well as willingness to pay premium prices and engage in positive word of mouth (Hoyer et al., 2010; Franke et al., 2009). Thirdly it has been recognized that involvement in

co-creation activities makes a customer more aware of the challenges and constraints of the innovation process, resulting in preference changes and a higher appreciation of the final product or service (e.g. Joshi and Sharma 2004).

Risks and challenges

Regardless of its high potential, customer empowerment does contain a number of challenges due to the practical changes on product and service innovation strategy and processes. On a broad level, these changes can be categorized under diminished control, management complexities and customer-bound innovation.

When NPD trajectories and ideas that would otherwise be kept secret are revealed to customers, fairly high levels of transparency and *control-loss* can be required on the firm's part (e.g. Prahalad & Ramaswamy 2004). Secrecy concerns may arise especially in the product launch stage, where unwanted publicity can be highly damaging. Another issue related to diminished control is that of complicated intellectual property rights, as illustrated by Hoyer et al., (2010, pp. 289): "Although some consumers might gladly hand over the fruits of their skills and labor -- others might expect to retain full ownership over intellectual property". Perceptions of unfairness and even legal entanglements may ensue if companies are not clear and consistent with their policies. Finally, a common risk of diminished control is that a company may inadvertently lose sensitive product know-how to customers (e.g. Enkel et al., 2005)

In addition to decreasing control, the empowerment of consumers increases the *complexity of managing* the new product development process as well as the company at large. Empowered consumers may seem like a free resource, but in actuality contain coordination and management, as well as other types of nonmonetary costs (Bendapudi & Leone, 2003; Blazevic & Lievens, 2008). For instance, resources must be allocated to planning and implementing flexible communications strategies, as typical personnel management is not likely to apply, since consumers are outside the direct control of firms (Halbesleben & Buckley 2004). With in-house knowledge and toolkits, some empowered customers may even become formidable sources of competition (e.g. Cook 2008, Piller et al., 2011), further complicating the management of the relationship. And finally, in some cases soliciting vast amounts of customers for input may unwittingly provide the company with more information than it can economically process (e.g. Edmunds & Morris 2000).

Thirdly and finally, customer empowerment introduces risks related to NPD *being bound to customers*. In Enkel et al.'s (2005) study these risks are identified as: dependence on customers' personal characteristics, limitation to non-radical innovation and serving only a niche market.

Customers may only be willing to be involved in the company's innovation activities because they expect a personal reward (e.g. von Hippel, 1986) or demand exclusive rights to the end result. This may be acceptable in B2B contexts where the involved customer is an important profit bringer, however preventing to sell the product to other uninvolved customers cancels out most scaling possibilities. In addition, as Enkel et al., (2005, pp. 207) put it, "[a] group of doubting Thomas's will never come up with a radical innovation, while a group of visionaries may overlook important details in the innovation process". Also important to acknowledge is that the involved customers, representing a small group of the entire customer potential, may be the only ones interested in the co-created product. Lastly, the empowered customers may act under "functional fixedness" (von Hippel, 1986; Leonard, 2002) i.e. they only consider how to improve the product in ways which are familiar rather than radically new ways. The result of this may be a limitation to only incremental innovation.

POTENTIAL IMPACTS OF CE ON PERFORMANCE	
BENEFITS	**CHALLENGES**
Efficiency + Reduced costs as result of substituting employee labor with customer input + Reduced risk of product failure through ensured fit with customer preferences + Faster time to market **Effectiveness** + High expected benefits, novelty and commercial attractiveness + Increased potential of positive word-of-mouth and repurchases + Willingness to pay premium prices + Appreciation of the NPD process, resulting in increased appreciation of the end product	**Diminished control** - Secrecy concerns as a result of transparency requirements - Sharing of intellectual property rights may result in legal complications - Loss of know-how through disloyal customers **Complex management** - Nonmonetary costs e.g. time and effort used for coordination and management - Flexible management and communications strategies required - High possibility of information overload **Customer-bound innovation** - Dependence on customers' views, demands or personality - Serving a niche market only - Limitation to incremental innovation

Table 1 Potential CE impacts on Firm Performance and New Product Performance - benefits and challenges

All the reviewed benefits and challenges associated with a customer empowerment orientation have been compiled into table 1. Balancing these perspectives, this thesis posits that on average the former will outweigh the latter, and accordingly proposes the two main hypotheses as:

H1: Customer empowerment has a positive impact on new product performance

H2: Customer empowerment has a positive impact on firm performance

2.2.3 Contextual considerations

The next aspect to consider regarding CE impacts are the various contexts affecting the relationship and its individual components. As Hoyer et al., (2010) describe in their suggestions for further research: "it is important to identify markets and situations where co-creation is likely to be a profitable strategy" (pp. 292). However, as can be determined by the quote, the extant literature on the matter has only begun to be conducted, and therefore analysis and hypothesis development is far from straightforward. In this chapter, a look is taken first at potential moderating contexts of CE, namely a business-to-business (B2B) vs. business-to-consumer (B2C) focus, a service vs. product focus, as well as turbulent vs. stable markets. The literature on the effects of these contexts will shortly be reviewed, followed by a closer look at their relationship with innovation in general and potential moderating effects on customer empowerment. Lastly the considerations will be reflected on the previously identified benefits and challenges of customer empowerment. After hypotheses regarding these potential moderators have been outlined, other predictors of performance – namely firm size and market position – will shortly be reviewed, concluding the chapter.

Business-to-business (B2B) vs. business-to-consumer (B2C) focus

Both consumers and organizations have a set of needs and decision-making processes that ultimately lead to the purchasing of products. However, there are vast differences regarding what these needs and decision-making processes actually are and how they are formed. A B2C market is often characterized by considerable distances between a company and its customers, the prevalence of strong intermediaries, vast numbers of potential customers, swiftly changing preferences and low levels of loyalty. (Spann et al., 2009). In contrast, B2B markets are traditionally characterized by objective, non-impulsive and multi-layered buying behavior, long purchasing cycles, customer loyalty and partnerships (e.g. Lilien, 1987).

As noted earlier in this thesis, most of the extant research on co-creation and customer empowerment has been conducted in the context of business-to-business markets (e.g. Hoyer et al., 2010, pp. 284). Indeed, in the B2B context the potential economic and innovation benefits of customer empowerment are even intuitively quite understandable, and affirmed by numerous studies (e.g. Campbell &

Cooper, 1999; Brochoff, 2003; Prandelli et al., 2008). In a B2B context, engaging in close customer interaction during R&D often results in reduced uncertainty and time, increased effectiveness and shared financial risk (Campbell & Cooper1999 pp. 508). A B2B context has, however, also its own challenges, namely the large investments required to constantly keep the customer in the NPD-loop, as well as the possible unusability of co-created products for further sales efforts due to exclusivity demands (e.g. Greer & Lei, 2012).

For B2C-focused companies the potential benefits are largely the same as for B2B-focused firms but some additional challenges are inherent. Firstly, the sheer amount and complexity of management involved in CE usually requires more resources in a consumer context, where there may be thousands of co-creators involved (e.g. Hoyer et. al 2010). Secondly, customer heterogeneity is on a different level altogether, and thus risk of new product failure is much higher (e.g. Stevens & Burley 2003; Adams-Bigelow 2004). However, it could be argued that for this reason customer empowerment could actually be a valuable source of competitive advantage in reducing the traditionally high failure rate (e.g. Hoyer et al., 2010).

Looking at the compiled list of CE challenges and benefits, both B2B and B2C favoring perspectives receive support. On the one hand, consumers can provide unique benefits in terms of co-creation. For instance, word-of-mouth is likely to be more potent and beneficial in the B2C context, and in general the leveraging of a true "crowd" can enable more radical innovation than empowering only one large customer. Additionally, consumer products may be easier to co-develop than B2B products that are often systems or bundles of multiple individual products and services (e.g. Magnusson, 2003)

On the other hand, in the B2B context, efficiency and effectiveness gains are clear and immediate – ensured customer need fit is likely to result in a significant customer satisfaction and revenue gains (e.g. Schweitzer et al., 2011). Further, for B2B companies, customer bound innovation may not be as much of a problem as for B2C companies who need to apply the co-created products/services to a wider audience. Similarly, secrecy concerns may not be as large as in the B2C context, where a multitude of empowered customers have to be managed and supervised (Enkel et al., 2005). Ultimately, taking all the arguments into account, a stance favoring the benefits of a business-to-business context is taken, and thus the next hypotheses are formulated as:

> ***H 1.1 & H 2.1: The impact of CE on new product and firm performance is higher for business-to-business centered companies than B2B centered companies***

Service vs. Product focus

In this thesis, new product development (NPD) has been defined broadly as the creating and launching of new products and services. However, as Nijssen et al., (2006, pp. 242) put it, "there has been a lively debate in the literature about the specific characteristics of services and products" with one side arguing that the concepts developed in a product context can easily be applied to a service context, and the other stressing the unique characteristics of services (e.g. Zeithaml et al., 1985; Lovelock & Gummesson, 2004; Vargo & Lusch, 2004). However, some differences are apparent regardless of one's broader scientific stance: Services are intangible, co-produced with customers, simultaneous, heterogeneous, and perishable (Fitzsimmons & Fitzsimmons, 2000) and in service innovation "it is not the service itself that is produced but the pre-requisites for the service" (Edvardsson & Olsson, 1996, pp. 1476). In essence, it has been found that service innovation is more about creating new procedures and concepts than new technology (Preissl, 2000).

Regarding the differing impact of a service- vs. product-focus in customer empowerment, research is scarce (Alam, 2006) but from this extant literature some tentative claims can be made. For instance, on a general level customer interaction has been shown to have a positive effect on new service performance (e.g. de Brentani & Cooper, 1992; Edgett, 1994; de Brentani, 1995). Further, it has been suggested that customer interaction is more important in service innovation than in product innovation because of the inseparability of customer participation in service production and consumption (Sundbo, 1997; Alam & Perry, 2002). Some caveats in service innovation have to be acknowledged as well. For instance Magnusson's (2003) experiment resulted in service innovation ideas of users being more creative than those of R&D professionals, but less utilizable. Also, some useful innovation strategies for a manufacturing business – such as managerial control – have been shown to be counter-productive for service businesses (Damanpour, 1991).

Adding to these insights with the already identified challenges and benefits of CE, a number of additional suggestions can be made. Firstly, positive word-of-mouth, inherent in successful CE, is often paramount in services, since they are not as measurable or transparent as tangible products (e.g. Wangenheim & Bayón, 2004). Secondly it may be suggested that as customers are an integral part of service production, they can clearly see the end-result of their empowerment and thus be more appreciative (and willing to pay a premium) of the end result. And finally, recurring customer relationships, a key benefit of well-executed customer empowerment, are often critical for service-focused companies. Taking all this into account, the following hypotheses are put forth:

> ***H 1.2 & H 2.2: The impact of CE on new product and firm performance is higher for service-centered companies than service-centered companies***

Turbulent vs. stable markets

Market turbulence (MT) has been described in many ways by numerous authors, which can be combined to encompass rapid changes in customers and their preferences, constant entry and exit of buyers and sellers from the market and the prolific introduction of new products (e.g. Kohli & Jaworski 1990; Slater & Narver, 1994). Prior research regarding MT's effects on customer empowerment and innovation in general offers mixed findings. Overall, it seems that the relationship between market turbulence and innovation is positive (e.g. Han et al. 1998; Calantone et al., 2002) and it has been suggested that innovation is in fact the most effective way to handle a turbulent environment (e.g. Gupta et al., 1986). However, under high market turbulence consumers may have difficulty articulating what they need or want (e.g. Droge et al., 2008) suggesting that in such a context their inclusion into product development may not be entirely unproblematic.

On the other hand, it has been shown that under high market turbulence, keeping track of changing customer needs is difficult and companies that succeed in it have more time to adapt and ultimately create better products (e.g. Slater and Narver, 1994). As a logical flip-side, in stable markets the analysis of customer needs is relatively easy, companies share more or less the same level of information of these customers, and more intense interaction will not necessarily lead in any increased firm or product performance.

Schweitzer et al. (2011) offer support for this line of reasoning with their empirical study on open innovation effectiveness under different levels of environmental turbulence. In essence, the authors find the relationship between customer integration and innovation success to be positively moderated by market turbulence, and conclude that "companies in turbulent markets are especially recommended to open up their innovation process" (pp. 1202). These arguments and findings gain further support from a look back at the earlier reviewed pros and cons of customer empowerment adoption. Inherent in market turbulence is an abundance of latent and changing needs – in such an environment it is plausible that competitive advantage may be gained from minimizing risk of product failure through customer empowerment. Taking all of the above into account, it is suggested that:

> ***H 1.3 & H 2.3: The impact of CE on new product and firm performance is higher during high market turbulence***

Turbulent vs. stable technology

Technological turbulence (TT) refers to the rate of technological advances within an industry – when technology is undergoing rapid change, breakthrough innovations have room to grow, lifecycles of existing products are shortened, the competitive advantage of established firms is eroded and new firms and products move forward fast (Zhou et al., 2005, pp. 47). In contrast, an industry with low technological turbulence is characterized by slower innovation cycles and more difficulty for emerging products and companies to break through the offerings of existing players.

Researchers are not unified in their findings about the effect of TT on customer interaction in innovation activities (e.g. Li and Calantone, 1998). On the one hand, e.g. Jaworski and Kohli (1993) suggest that under rapid technological change, customer information generation is less important due to customers' lack of knowledge regarding the nascent technology. In essence, when technological innovation is fast, consumers often do not know what they want or need. In this line it has been suggested that during such times customers are not necessarily of much help in innovation (e.g. Song et al., 2005) and thus one could hypothesize that also empowerment activities may not provide desired performance benefits.

However e.g. Day and Wensley (1988) and Narver and Slater (1990) argue that, when technological change is rapid, firms must strive to interact with customers because their needs and preferences can provide valuable insight into the changing product landscape. In this line Carbonell et al., (2009) hypothesize that customer involvement can help reduce the uncertainty created by technological changes and thus positively moderate customer involvement's effect of innovation performance. Empirical evidence was found in their study to support the hypothesis, and the authors add that the found effect even exists independently of the stage of the development process.

When considering these views in light of the listed pros and cons of CE, further arguments can be found. Much like with MT, it can be suggested that during high TT efficiency and effectiveness gains – namely the potential to reduce time to market, risk of product failure and overall R&D costs, as well as the high expected novelty and commercial attractiveness of the end product/service – are especially valuable. However, limitation to incremental innovation may be prominent during high TT due to customers not keeping up with technological change. All in all, it is suggested that while the issue is ambiguous, the arguments in favor of TT's positive moderation of CE appear to outweigh those not in favor of it, and therefore the last hypotheses are posited as:

> ***H 1.4 & H 2.4: The impact of CE on new product and firm performance is higher during high technological turbulence***

Controlling for other performance influences: Company size and market position

As the last issue of hypothesis development, it is necessary to address and identify other possible determinants of new product and firm performance besides customer empowerment, in order for the affects to be properly analyzed. From academic literature on strategic orientations' impact on performance (e.g. Narver & Slater 1990; Huhtala et al., 2014), two controls are identified and chosen: company size and market position.

A *company's size*, in relation to its competitors, is traditionally believed to have a positive relation with both NPP and FP due to a number of advantages that large firms have over small firms. Besides the obvious benefits related to economies of scale, large companies can often reach consumers more quickly than small firms due to more comprehensive access to distribution channels (Mitchell, 1989). In addition, large firms usually possess a reputation edge over small firms, causing consumers to perceive the purchase from a large firm less risky (Chandy & Tellis 2000).

Often closely connected to the size of a company is its *market position*. The advantages related to a dominant market position on performance are similar to those of company size, and quite self-explanatory. Having a strong hold over competitors creates switching costs for customers (e.g. Lieberman & Montgomery, 1988) and grants a company power in terms of scale. Also similar reputational and distribution superiority advantages as with overall size are often closely related to a dominant market position.

It is important to acknowledge that different studies inside the firm and new product performance literature are filled with many other potential control variables that could be applicable for this study. For FP, additional potential controls would include e.g. buyer power, supplier power, seller concentration, ease of market entry, rate of market growth and relative operating costs (Narver & Slater 1990). For NPP e.g. innovation range, competitive intensity and customer turbulence have been used as controls (Joshi & Sharma, 2004). Due to being limited to the dataset at hand, and to keep the model more manageable, none of these additional variables are included in the analyses of this study.

3 HYPOTHESES & THEORETICAL FRAMEWORK

Based on the previously outlined benefits, opportunities, risks and challenges of customer empowerment on both new product and firm performance, as well as their contextual considerations, the following research hypotheses are suggested:

H 1 CE has a positive impact on new product performance

H 1.1 The impact of CE on new product performance is higher in business-to-business focused companies than business-to-consumer focused companies

H 1.2 The impact of CE on new product performance is higher in product-focused companies than service-focused companies

H 1.3 The impact of CE on new product performance is higher during high market turbulence

H 1.4 The impact of CE on new product performance is higher during high technological turbulence

H 2 CE has a positive impact on firm performance

H 2.1 The impact of CE on new firm performance is higher in B2B-focused companies than B2C-focused companies

H 2.2 The impact of CE on firm performance is higher in service-focused companies than product-focused companies

H 2.3 The impact of CE on firm performance is higher during high market turbulence

H 2.4 The impact of CE on firm performance is higher during high technological turbulence

The hypotheses are conceptualized below into a theoretical framework, which serves as the basis for the empirical analyses conducted in the upcoming chapters.

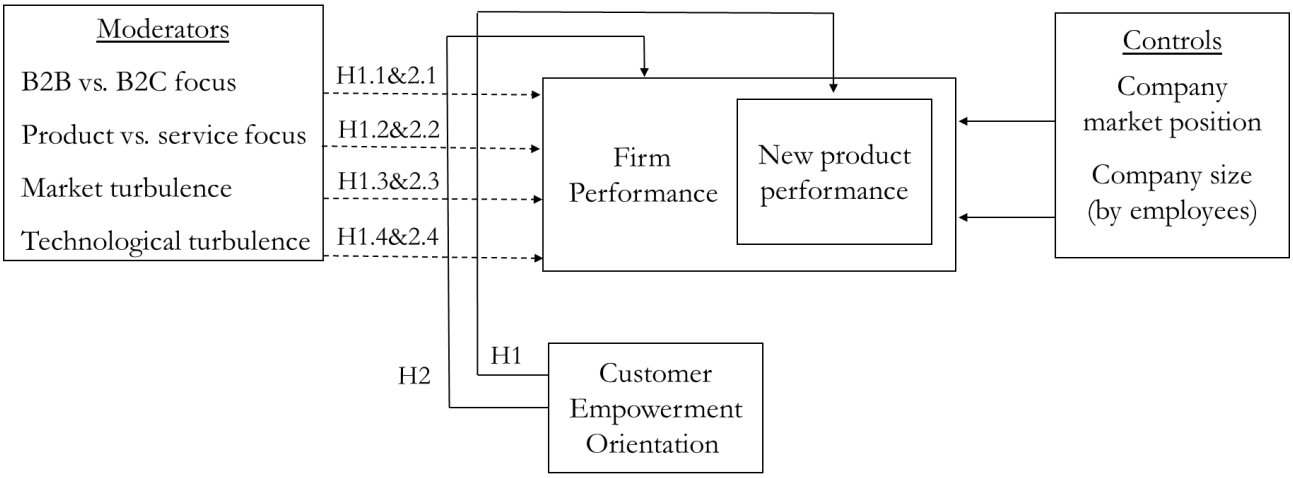

Figure 2 Theoretical and conceptual framework of the study

4 METHODOLOGY

4.1 Overall Research Process

The empirical part of this thesis is divided into 5 stages: 1) Data collection and preparation 2) Operationalization of variables 3) Exploratory and confirmatory factor analysis and 4) Regression analysis 5) validity and reliability testing. As the work is based on the StratMark 2014 Study and its questionnaire data, data collection was not needed. Rather, the work begins with preparing the large data-set for analysis by choosing, naming and coding variables from the original data, and eliminating missing data with a multiple imputation procedure. Dependent, independent, control and moderating variables are then operationalized through their separate scales and items. Next, factor analyses – both exploratory and confirmatory - are conducted to validate the used constructs as well as to increase parsimony. These phases are followed by an OLS hierarchical regression analysis designed to answer the research questions and various hypotheses of the thesis. Separate regression models are constructed for new product performance and firm performance, both containing seven sub-models with variables incrementally increasing. Finally, results are tested for validity and reliability. In this chapter the rationale, theory and practical procedure of each of these five research stages is described. The actual procedures and their implications are discussed in chapter 5 and 6 at length.

4.2 Data Collection and preparation

4.2.1 Data collection

The data used in the empirical part of this thesis is taken from the answers of the StratMark 2014 questionnaire, which is a bi-annual, national-level marketing and strategy study. The questionnaire of 2014 largely followed the structure of the 2012 study and so pre-testing was in this way not needed. The total pool of companies and their managers was acquired from the database of MicroMedia Oy. The questionnaire was sent electronically to this initial pool, of which 965 respondents completed the entire questionnaire, equivalent to the fairly high response rate of 11%. It should be noted that I was not personally involved in drafting or sending out the questionnaire, but rather was given the respondent data in its raw form to further develop and analyze.

4.2.2 Data preparation

Choosing, naming, coding variables from the original data set

Taking out the first five introductory questions, the complete StratMark questionnaire contains a total of 26 thematic question groups, each containing 3-15 questions regarding various elements of marketing strategy and performance. From this complete dataset, only certain were relevant for this

thesis: Q5, Q6, Q8, Q9, Q22, Q26, Q28 and Q29 (see appendix for the original questionnaire). The questionnaire questions are translated into English for this thesis to the best of the author's abilities and, when possible, using the English language of the original scales. Item names are taken from the journal articles that they originally appeared in, whenever possible. Items that needed to, are recoded for reverse values.

Missing Data – analysis and imputation

One of the first steps that has to be made when starting to work with a dataset is to see how much there is missing data (e.g. Perez et al., 2002). As is to be expected from such a large dataset as used in this thesis, missing data is present and choices have to be made in how to handle it. At its simplest, data imputation can be defined as "the practice of 'filling in' missing data with plausible values" (Schafer, 1999, pp. 3). However, as Schafer elaborates, "a naive or unprincipled imputation method may create more problems than it solves, distorting estimates, standard errors and hypothesis tests". Therefore it is important to choose the right method, which can depend largely on the research and sample context. The different key techniques of dealing with missing data are: 1) case deletion 2) single imputation and 3) multiple imputation. The chosen technique always depends on the so called missing data mechanism, categorized as missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR) (e.g. Little & Rubin, 2014). The most common way of testing these mechanisms is Little's multivariate test for MCAR (e.g. Arminger et al., 1995).

Case-deletion, as the name suggest, is about simply deleting cases whenever they contain missing data, either listwise or pairwise. Case deletion may be an acceptable approach when the sample is large, the amount of deletion needed is small, and data is missing at random (e.g. Hair et al. 2010) However, in most cases the better option is to impute the missing values with calculated estimates of what they were likely to be. *Single imputation* (SI) is appropriate when the amount of missing data is not large and a simply implementable imputed dataset is desired (e.g. Perez et al., 2002). The most common SI-techniques are mean imputation and expectation maximization (EM), of which the latter often provides the more reliable results, better also than e.g. listwise or pairwise case deletion (e.g. Allison, 2001; Musil et al., 2002). Mathematically, EM uses expectation (E-step) and maximization (M-step) algorithms iteratively until changes in expected values from iteration to iteration become negligible (see e.g. Hedderley & Wakeling, 1995).

A more comprehensive method still is *multiple imputation*, where several imputed datasets are created, in which different imputations are based on a random draw from different estimated underlying distributions (Donders et al., 2006). Multiple imputation is often recommended when

missing data is not random, and it poses a considerable problem to the analysis of the dataset. However, it also has drawbacks in usage (e.g. Perez et al., 2002) concerning e.g. the limited analysis possibilities of pooled imputed datasets. For instance, AMOS – the statistical tool used for conducting the confirmatory factor analyses of this study – is incapable of analyzing multiple-imputed pooled datasets, as are a number of other statistical programs.

4.3 Variable operationalization and scale reliability

After the data is sufficiently prepared, operationalization of variables can begin. In this chapter the chosen variables, items therein and the justification of the created scales is explained. Scale reliability analysis is also briefly introduced.

4.3.1 Dependent variables: New Product and Firm Performance

In the literature review it was asserted that there are well-grounded results implying that customer empowerment can have positive product and firm level performance impacts (e.g. Gruner & Homburg, 2000; Ramani & Kumar, 2008). However, quantitatively estimating and therein developing measures for these effects has been scarce, and is by no means an easy task. As Hoyer et al., (2010, pp. 292) state, most current co-creation evaluation metrics "fail to capture the multi-faceted nature of the consumer-firm relationship and its complex outcomes".

In studies on the consequences of firm-level strategic orientations, the results are often evaluated in terms of aggregate business-level performance measures (Ramani & Kumar, 2008), such as profits, sales and market shares (Voss & Voss, 2000) as well as return on sales and return on assets (Noble et al., 2002). Additionally, in survey-data driven strategic orientation research, even single items have been used to denote performance measures (e.g. Narver et al., 2004). This thesis will take a similar aggregate business performance approach for both new product and firm performance which, while acknowledged as non-exhaustive, can be deemed appropriate in comparison to prior strategic orientation research.

Firm performance

Firm performance measurement is as varied as the fields in which it is studied including marketing operations, strategy, human resources, organizational behavior, and accounting (e.g. Eccles, 1991; Neely, 2002; Franco-Santos & Bourne, 2005). For this thesis, relevant benchmarks are naturally from thematically and methodologically close studies, namely research on FP impacts of strategic orientations. One of the most comprehensive measurement constructs from this setting is offered by Ramani & Kumar (2008), who look at firm performance impacts of interaction orientation (containing

customer empowerment) through identification, acquisition and retention of profitable customers, conversion of unprofitable customers into profitable ones, improved customer satisfaction, increased customer ownership and, positive word of mouth.

For this study an alternative is taken that is perhaps less extensive than that of Ramani and Kumar (2008) but still broad, incorporating a total of nine firm performance items into the FP construct: Revenues (FP1) Revenue growth (FP2), Relative business profit (FP3) 3) ROI (FP4) 4) ROA (FP5) Market Share (FP6) Market Share growth (FP7) Volatility (FP8) and Achieving financial goals (FP9). These items are included in a host of relevant works on firm performance (e.g. Voss & Voss, 2000; Noble et al., 2002; Gunday et al., 2011) and give us insight from numerous important perspectives. Scale reliability and factor analyses determine which of these initial items remain in the final model.

New product performance

Much like firm performance, new product performance measurement has remained elusive in research (Huang et al., 2004) and measures vary widely. Griffin & Page's (1993) review of NPD success/failure measures finds 46 different S/F measures, dividable into five categories: firm benefit-, program-, product-, financial performance- and customer acceptance level measures. Another, more recent categorization is provided by Huang et al. (2004) who divide the most commonly used measurement parameters under four classes: financial performance, objective market acceptance, subjective market acceptance and product-level measures.

For this thesis an approach is taken that incorporates the first, third and fourth types of measures described in Huang et al.'s (2004) categorization. In practice the scale items are taken directly from Murray et al.'s (2011) product performance construct, the initial items of which are: New products' share of revenues (NPP1), New products' profitability (NPP2), Product/service innovations (NPP3), Speed of getting new products to the market (NPP4) and Number of successful new products/services (NPP5). Items 3-5 are taken directly from Murray et al., (2011) and the first two are complementary items added by the researchers behind the StratMark study, providing added insight into the profitability and amount of new products.

4.3.2 The focal independent variable: Customer Empowerment

The items for customer empowerment are based on Ramani & Kumar's study (2008), in which they construct a concept they call interaction orientation (INTOR), suggested as an advantageous strategic orientation focused on facilitating and utilizing customer interactions. INTOR is built from four components: 1) customer concept 2) interaction response 3) customer value management and 4) customer empowerment. As the authors describe, the CE items describe the "extent to which a firm

facilitates its customers to share feedback on its products and services with the firm and with other customers, and to participate actively in designing products and services." (pp. 32).

The actual scale items for customer empowerment, taken from the sub-construct of the above described INTOR model, are: "This firm encourages customers to share opinions of its products or services with the firm" (CE1) "This firm encourages customers to share opinions of its products or services with other customers" (CE2) and "This firm encourages customers to participate interactively in designing products and services" (CE3) (Ramani & Kumar, 2008, pp. 42).

If we consider customer empowerment as a synonym with co-creation (which this thesis does), the abovementioned scale items do not completely capture the nature and activities of interest. Interesting would be for instance to delve deeper into true integration of customers in NPD, instead of staying on the level of encouragement. However, as the focus here is on the strategic level, the chosen scale fits for the answering of the research question well.

4.3.3 Moderators

Categorical variables: B2B vs. B2C and Service vs. Product focus

The first hypothesized moderators have to do with the chosen focus of a company, specifically regarding a products vs. services and a B2B vs. B2C focus. In the survey, respondents are asked to evaluate the percentage of revenues accumulated from a) B2B products b) B2B products c) B2C services d) B2B services from 0% to 100%. From this data, two groups are created: B2B companies (Over 50% of revenues derived from B2B products and services) and B2C companies (Over 50% of revenues derived from B2C products and services). These groups are combined into one categorical variable measuring *B2B vs. B2C focus* (1=B2B, 2=B2C).

From the same question item as above, two groups are similarly derived to indicate the *product vs. service focus* of a given company: Product based companies (over 50% of revenues derived from B2B and B2C products) and services based companies (over 50% of revenues derived from B2B and B2C services). As with the previous variable, these two groups are combined into a single variable measuring product vs. service focus (1=product, 2=service).

Market and technological turbulence

The last two hypothesized moderators of the effects of customer empowerment are two types of externalities surrounding a company's activities, namely market turbulence (MT) and technological turbulence (TT). The scales are taken directly from Jaworski & Kohli's (1993) landmark work on market orientation. In the original study, these turbulence constructs were supplemented by a third

measure, competitive intensity, to fully capture the environmental consequence of market orientation. Here competitive intensity is left out, in order to keep further analyses more manageable.

The initial scale items for *Market Turbulence (MT*) are: "In our kind of business, customers' product preferences change quite a bit over time" (MT1), "Our customers tend to look for new products all the time" (MT2), "We are witnessing demand for our products and services from customers who never bought them before" (MT3), "New customers tend to have product related needs that are different from those of our existing customers" (MT4) and "We cater to many of the same customers that we used to in the past" (MT5) (Jaworski & Kohli, 1993, pp. 68).

The initial scale items for *Technological Turbulence (TT)* are: **"**The technology in our industry is changing rapidly" (TT1), "Technological changes provide big opportunities in our industry" (TT2), "Many new product ideas have been made possible through technological breakthroughs in our industry" (TT3) and "Technological developments in our industry are rather minor" (TT4). It should be noted that the final construct items are determined after scale reliability and factor analyses. (Jaworski & Kohli, 1993, pp. 68-69).

4.3.4 Controls

In the proposed model, other potential predictors of new product and firm performances must also be taken into account as control variables. Commonly in strategic orientation and performance literature these include firm size and firm market position (e.g. Narver & Slater 1990; Jansen et al., 2006); Huhtala et al., 2014). Firm size is commonly measured by either number of employees or amount of revenues while market position can be measured numerically (e.g. percentage of market share) or descriptively (e.g. "market leader"). The control variables in the proposed model of this thesis are *firm size* by number of employees and descriptive *market position* (a. "Only Company" b. "Market Leader" c. "Challenger" d. "Follower").

4.3.5 Scale reliability

Regardless of all of the aforementioned constructs and their scales being grounded in proven prior studies, they may still turn out to have insufficient measuring power for one reason or another. Because of this, one of the first necessary steps in the analysis stage is to evaluate the reliability of used scales. This is done most commonly by establishing the Cronbach's Alpha for the created constructs (e.g. Field, 2009).

Cronbach's Alpha can be calculated with the formula: $$\alpha = \frac{N^2\overline{\mathrm{Cov}}}{\sum s^2_{\mathrm{item}} + \sum \mathrm{Cov}_{\mathrm{item}}}$$

in which Cov = covariance and s^2 = variance. A commonly used threshold value is Nunnally's (1978) recommendation to strive for a Cronbach's Alpha of .70. George and Mallery (2003) provide additional rules of thumb for possible results: " > .9 – Excellent, > .8 – Good, > .7 – Acceptable, > .6 – Questionable, > .5 – Poor, and < .5 – Unacceptable" (p. 231). Hair et al. (2010, pp. 118) further point out that lower Cronbach's Alpha levels may be expected and acceptable in exploratory research. In chapter 5, Cronbach's Alpha will be the first analysis conducted to ensure scale reliability and consequently basis for further analyses.

4.4 Factor Analysis

4.4.1 General description and rationale

Factor analysis is a technique for identifying groups or clusters of variables and can thus be used for trying to understand the structure of a latent variable (Field, 2009). By doing this, factor analysis helps in evaluating construct validity (Nunnally, 1978). When some variables correlate highly with each other, this suggests that they may be measuring characteristics of the same underlying dimension, also referred to as a factor. When a data set is reduced from a number of related variables to a decreased amount of factors, statistical parsimony - the minimum possible number of explanatory variables – is achieved (Field, 2009). The general linear factor model can be presented as:

$$Y_i = \beta_1 X_{1i} + b_2 X_{2i} + \cdots + \beta_n X_{ni} + \varepsilon_i, \text{ where}$$

Y_i is the i:th factor
β_1 to β_n are the factor loadings from 1 to n
X_{1i} *to* X_{ni} are the values of the variable X for the i:th observation
ε_i is the residual, i.e. the difference between the predicted and observed value of Y

There are two main types of factor analysis: explorative (EFA) and confirmatory (CFA). EFA does not require prior knowledge or determinations about how indicators are related to underlying factors, nor does a number of factors need to be set (Kline 2005, pp. 71). Based on the given data, factors are formed through a maximization of variance explained (Suhr, 2006). CFA on the other hand, requires both the number of factors and their relationships to the independent predictor items to be hypothesized a-priori (Kline 2005, p.71) – the focus is thus not to discover associations between all variables and factors, but rather to verify a measure of a construct that already has theoretical basis.

For this thesis, both EFA and CFA are conducted in order to determine construct validity and obtain maximum parsimony. First exploratory factor analysis is conducted to build on scale reliability and uncover potentially unhypothesized relationships between the various variables and build upon initial

scale reliability tests. Potentially guided by the EFA results (Gorsuch, 1997), confirmatory factor analysis in then conducted to form the final constructs used in the regression analysis.

4.4.2 Exploratory factor analysis (EFA) – method and requirements

For data to be suitable for EFA, the sample size should be above 200 (Gorsuch, 1990) and pass the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test for sphericity. KMO and Bartlett's test deduce the appropriateness of a correlation matrix for factor analysis. In KMO, if the result is close to zero, this indicates diffusion in the pattern of correlations rendering factor analysis inappropriate (Field, 1999, pp. 647). Values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good and values between 0.8 and 0.9 are excellent (Huchenson & Sofroniou, 1999). Bartlett's test examines whether a correlation matrix resembles an identity matrix – if the results of the test are significant, the correlations between variables are overall different from zero (Field 2009, pp. 648), and therefore clusters can reliably be identified.

The resulting factor loadings of the EFA will give initial insight into how well the theorized scales succeed in measuring their respective constructs, and which items inside the scales may be the most problematic. Once factors have been extracted, a technique called factor rotation can be used to rotate factor axes in a way that variables are loaded maximally to only one factor. This makes the interpretation of results easier, as opposed to the spread out results provided by unrotated factor loadings. There are multiple techniques for executing factor rotation, of which varimax is one of the most widely used (Field 2009, pp. 644). It attempts to maximize the dispersion of loadings within factors, resulting in a smaller amount of variables loaded highly into factors.

4.4.3 Confirmatory factor analysis (CFA) – method and requirements

As stated, CFA is conducted to verify the theoretical basis from which a construct has been made in a more robust way than EFA (e.g. Kline, 2005; Schreiber et al., 2006). For this thesis, a fairly high level of confidence regarding the constructs can be assumed since they are based on scales from prior research and have been used in the earlier studies using StratMark study data. However, often measures can be improved from their initial state for a number of reasons, and to see the ways in which this improvement can be done a confirmatory factor analysis is a highly applicable method.

Unlike EFA, in CFA, the number and form of factors is set by the researcher based on theory. Similarly to EFA, indicators of successfully constructed scales are high factor loadings and low inter-factor correlations (Kline 2005, pp. 73). For the improvement of the constructs and entire model, items with low loadings may be removed, given that the nature and character of the original variables

is maintained after item reduction (Raubenheimer, 2004; Hair et al. 2010). This logic of item reduction can be continued only until a certain point – according to Bollen (1989) a standard CFA model that consists of two or more factors should have a minimum of two indicators per factor.

Overall, what needs to be inspected in CFA is not only the level of loadings and correlations but various measures related to reliability, validity and overall model fit. There are many measures for model fit, some of the most common being the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) (e.g. Kline, 2005). Suggested acceptable model fit thresholds for them are >.096 (Hooper et al., 2008) and <0.06 (Hu & Bentler, 1999) respectively. As for reliability and validity, the most widely used measures are average variance extracted (AVE), composite reliability (CR) and discriminant validity (e.g. Hair et al., 2010). The suggested thresholds are above 0.5 for AVE and above 0.7 for CR. Discriminant validity can be calculated through MSV (Maximum Shared Variance) and ASV (Average Shared Squared Variance) as well as by square rooted AVE levels. MSV and ASV should be above AVE levels and square rooted AVE levels should be higher than any inter-construct correlation.

4.5 Multiple Regression analysis

4.5.1 General description and rationale

Multiple regression analysis investigates relationships between a dependent variable and a number of independent variables with the intent of determining one or multiple of the following: a) whether a relationship between the variables exists b) the strength of the relationship c) the structure of the relationship and d) predicted values of the dependent variable (Malhotra & Birks, 2006). This study is interested in the first three of the aforementioned, i.e. the existence, strength and structure of the relationship between CE, performance and four identified potential moderators.

In practice, the regression analysis of this thesis is conducted using an ordinary least squares (OLS) procedure, mathematically, represented by the following general expression:

$$Y = \beta_0 + \beta_{1i} X_{1i} + \beta_{2i} X_{2i} + \ldots + \beta_n X_{ni} + \varepsilon_i,$$ where

Y is the value of the outcome variable
β_0 is a constant presenting the point where the regression line intercepts the Y axis
β_1 to β_n are the regression coefficients for the predictors from 1 to n
X_{i1} to X_n are the values of the independent variable X for the i:th observation, and
ε is the residual

Mathematically, the equation seeks to find the linear combination of predictors that correlate maximally with the outcome variable (Field, 2010). In practice, the key interest is in the overall predictive capacity of the model (coefficient of determination, R^2) as well as the significance and strength of the standardized regression coefficients (betas) depicting the explanatory power of individual independent variables.

The rationale for using multiple regression for this study lies in its proven usefulness for measuring strategic orientations' impacts (e.g. Covin et al., 2006, Morgan et al., 2009, Murray et al., 2011) as well as two characteristics of the current study: a large sample size (Hair et al. (2010) recommend a 15:1 observations to variables ratio) and survey data combined with a specific interest towards interaction effects (Homburg et al., 2012).

4.5.2 Hierarchical OLS regression with interaction effects

In practice, the chosen specific method is not only OLS but a hierarchical regression analysis, in which variables are entered cumulatively to the model (into so called blocks) based on a specified hierarchy according to the purpose and logic of the research (e.g. Cohen et al. 2003). The hierarchical approach makes it easier to assess the real influence of each added variable by observing changes in predictive power and betas from block to block. In addition to hierarchical variable addition, the regression analysis of this study incorporates interaction effects. A commonly used name for this type of analysis is moderated multiple regression (MMR). For the regression equation, an interaction effect means that the effect of X on Y depends on a moderating variable Z (e.g. Field, 2010). Therefore the model is adjusted to include an interaction term X*Z, changing the basic equation to:

$$\boldsymbol{Y = \beta_0 + \beta_{1i}X_{1i} + \beta_{2i}Z + \beta_{3i}X{*}Z + \varepsilon_i}$$

The focus is on analyzing significant interaction terms (X*Z) and their beta coefficients to determine the existence, strength and direction of moderations. After this, the results are further visualized with a simple slopes technique (e.g. Preacher et al., 2006; Aiken & West, 1991) for which conditional values of the moderator must be chosen. For continuous moderators, such as the ones in this thesis, the specific choices for said moderator may be any value of scientific interest (Preacher et al., 2006) and when there is a lack of theoretically meaningful values Cohen et al. (2003) recommend choosing values at the mean of z and at 1 standard deviation above and below the mean of Z.

Overall, in this thesis a similar logic to that of e.g. Covin et al., (2006) and Morgan et al., (2009) is used. Control variables are entered into the first block of the hierarchical regression, followed by the focal independent variable CE. The four potential moderating variables – Technological & Market

Turbulence, B2B vs. B2C focus and service vs. product focus – are then incorporated into a single block, followed lastly by their separate interaction terms. Ideally, predictors should be entered into a hierarchical regression in order of expected importance (Field, 2009, pp. 212), however no difference between the moderators' respective impact is hypothesized in this study, and therefore the order of variables entered is not based on any such prioritization.

4.5.3 Validity and reliability requirements

Lastly, it is important to acknowledge the assumptions and requirements that need to be met for the results of the regression analysis to be reliable and valid. The first requirement concerns the sample size: 50 observations is considered a minimum, 100 observations is recommended, and the preferred ratio of observations to variables is 15:1 or 20:1 (Hair et al., 2010).

The other requirements stem from the assumptions of an (OLS) regression analysis, which as outlined by e.g. Ketokivi (2009) are that the error term exhibits: a) an expected value of zero b) a normal distribution and independence from other error terms c) a constant variance (homoscedasticity) and d) no correlation with the independent variables. If any of these assumptions are violated, then the insights of the regression analysis may be inefficient, biased and misleading. In practice, these assumptions are tested through various regression diagnostics, namely tests for multicollinearity, heteroscedasticity and error term normality.

Multicollinearity occurs when two or more predictor variables are very closely linearly related (Field, 2009, pp. 790), and when high it can cause serious bias for interpretations. Essentially, high multicollinearity can cause untrustworthy regression coefficients, limit the size of R in a model, and make the importance of predictors difficult to evaluate (Field, 2009, pp. 224). The level of multicollinearity is often detected with variance inflation factors (VIF), for which a common rule of thumb is that a VIF of 10 or more is a sign of serious multicollinearity (Cohen et al., 2003, pp. 423). However, the chosen method of analysis, MMR, inherently introduces multicollinearity since by their very nature interaction terms are the product of two predictive variables multiplied together.

Multicollinearity in MMR has been studied at length (e.g. Aguinis, 1995; Cronbach, 1987; Dunlap & Kemery, 1987; Ganzach, 1998, Shieh, 2010) and although it has been suggested that it can result in diminished coefficient stability and predictor reliability (e.g. Dunland & Kemery, 1987), multiple studies show that it is not necessarily problematic (e.g. Cronbach, 1987; Aguinis, 1995; Shieh, 2010) and that therefore higher VIF levels of interaction terms are not to be taken as detrimental for the power of MMR. It has however been noted that computational problems may arise from multicollinearity (e.g. Cronbach, 1987), for which a suggested remedy has traditionally been variable

mean-centering (e.g. Aiken & West, 1991; Moorman & Slotegraaf, 1999; Morgan et al., 2009). It has been recently shown that although this technique has also been used widely to improve VIF and tolerance levels, it does not in fact remove multicollinearity (e.g. Echambadi, 2006). However, mean-centering does still reduce computational problems and improve the interpretability of results (Dalal & Zickar, 2012), and therefore remains a valid, if optional, technique to use in MMR.

For ordinary independent variables, variance inflation factors and tolerance levels are a valid way of measuring multicollinearity, but for the interaction terms in MMR (with centered variables) they do not apply, and so additional parameters must be considered. The classic symptom of multicollinearity is a high R-squared score with few significant predictors (Gujarati & Porter, 2009, pp. 337). Another sign are high standard errors (SEs) of parameter estimates, which have a tendency to inflate when multicollinearity is present (e.g. Deephouse, 1999, pp. 159). A more sophisticated method for deducing multicollinearity than the previous two is through analysis of condition indices (CI) and variance decomposition values (e.g. Hair et al. 2010 pp. 220-21). According this this technique, multicollinearity is estimated to be problematic for variables that reach CI levels of above 30 and have variance proportions above 90 percent with two or more coefficients (pp. 220).

The next important test is for the existence of *heteroscedasticity*, i.e. whether the residuals at each level of the predictor variable(s) have unequal variances, violating the homoscedasticity assumption (Field, 2009, pp. 220). Mild heteroscedasticity does not usually produce profound problems, but when on a high level, it can affect the validity or power of statistical tests when using OLS regression (Hayes & Cai, 2007, pp. 710) and therefore should always be investigated. It can be detected by plotting residuals against predicted values, and observing the resulting scatter plot (see e.g. Deephouse, 1999) – if the dispersion of residuals appears to be the same across all dependent variable values, the homoscedasticity assumption is estimated to hold. It should be acknowledged that this is the simplest form of testing for heteroscedasticity, but when obtaining clear results, it is deemed sufficient (e.g. Osborne & Waters, 2002).

Lastly, the assumption of e*rror term normality* – i.e. that the residuals are random, normally distributed variables with a mean of 0 (Field, 2009, pp. 221) – must be tested. Its detection, much like that of heteroscedasticity, can be visually perceived from the dispersion of residuals. Specifically, residual histograms and normal probability (P-P) plots can be computed to detect whether the residuals follow normal distribution (e.g. Osborne & Waters, 2002; Öztuna et al. 2006). As with the previous method, it is noted that residual histograms and P-P plots are simple techniques only capable of deducing clear violations of error term normality. When results are not clearly interpretable, various more robust statistical tests can be conducted for further analysis (e.g. Razali & Wah, 2011).

5 ANALYSIS AND RESULTS

5.1 Preliminary analyses

5.1.1 Missing data analysis and imputation

As a starting point for the empirical part of this thesis, the existence of missing data was taken under consideration. First, the amount and patterns of the missing data was analyzed to see how large of a problem it presented. The total percentage of missing values compared to the whole data set was very small (0,47%) but out of all cases and variables 32% and 56% (respectively) contained at least one missing value. Because of this, case deletion could have resulted in losing almost a third of the whole data. While the total sample size would still have stayed at a high enough level for the desired analyses, such a considerable case deletion was not considered optimal, as it would affect degrees of freedom, statistical power and standard errors negatively (e.g. Cohen et. al, 2003).

The next step was to discern the pattern of the missing data, and for this Little's MCAR test was conducted. The results were significant (0,000), which indicated that there are indeed patterns to the missing data. Often this implies that deletion (listwise or other) of cases with missing values or single imputation methods may introduce bias, and that multiple imputation would be the most appropriate method for replacing the missing data.

However, multiple imputation, as mentioned previously, has drawbacks (e.g. Perez et al., 2002), namely concerning the limited analysis possibilities of pooled imputed datasets. For instance, AMOS – the statistical tool used for conducted the confirmatory factor analyses of this study – is incapable of analyzing pooled datasets. Therefore expectation maximization (EM) imputation was chosen as the method to be used, due to it providing more reliable results than case deletion or mean imputation (e.g. Allison, 2001; Musil et al., 2002) while still maintaining a flexibly analyzable dataset. As a result the sample size stayed at 965 and missing values were replaced with values computed by the conducted EM imputation.

5.1.2 Descriptive statistics

With missing values imputed, a first look was taken at the dataset. As such a large set of companies from many industries and sizes is represented, interesting initial information can be gained regarding the distribution of certain basic-level company characteristics in the sample. The distributions of industry, firm size, market position and specialization (B2B vs. B2c; manufacturing vs. service business) can be observed in table 3, while industry and firm size have additionally been contrasted with their respective levels in Finland overall (Tilastokeskus, 2012) in table 2.

Half of the sample's companies have less than 50 employees, however companies with 250-500 and above companies are also represented well (17%). Industry division is very diverse with the most prominent ones being Industry (22.6%), IT (16.6%) and unspecified service industries (15.9%). The sample companies are split 45-55 between manufacturing- and service-based operations, while business-to-business is the predominant focus at almost 72%. In terms of market position, the sample is divided quite equally between market leaders, challengers and followers, with a handful of companies claiming to be the only ones in their current market.

The sample's main differences to overall Finnish statistics are the amount of large corporations (vs. 94.3% of Finnish companies having under 10 employees) and the over-representation of the top three industries stated earlier. All in all, however the study sample can be considered quite balanced and representative – a substantial amount of companies of most sizes and specializations is can be observed. The stated differences from Finland at large must of course be taken into consideration when making generalizations

	Finland		**Final sample**	
Industry branch	**nr.**	**%**	**nr.**	**%**
Farming, Forestry & Fishing	55274	17	6	0.6
Information and Communications	9065	2.8	160	16.6
Finance and Insurance	4713	1.4	49	5.1
Real Estate	15641	4.9	32	3.3
Vocational, Scientific and Technical activity	33714	10.5	15	1.6
Administrative and support services	13435	4	9	0.9
Public administration and national defence	27	-	1	0.1
Education	3131	1	3	0.3
Health and Social services	18622	5.8	9	0.9
Arts, Entertainment and Recreation	6198	1.9	16	1.7
Other Service activities	18800	5.8	153	15.9
Mining	859	0.3	2	0.2
International organisations and institutions		0	3	0.3
Industry	21308	6.7	218	22.6
Electricity, gas, heating and cooling	745	0.2	12	1.2
Water maintenance and other environmental	1307	0.4	6	0.6
Construction	41465	12.9	53	5.5
Wholesale and Retail	44616	13.9	80	8.3
Transportation and warehousing	22101	6.9	26	2.7
Accommodation and Dining	11232	3.5	30	3.1
Other	-		82	8.5
Total	322253		965	

Table 2 Industry distribution: study sample vs. Finland overall

Statistics in Finland			Study Sample		
Employees	Companies	%	Employees	Companies	%
0–9	303931	94.3	1-10	195	20.2
10–49	15083	4.7	11-50	360	37.3
50–249	2548	0.8	51-250	249	25.8
250–499	347	0.1	251-500	62	6.4
500–	275	0.1	>500	99	10.3
Total	322184		Total	965	

Study Sample	Nr.	%
Only company	23	2.4
Market Leader	263	27.3
Challenger: second largest	355	36.8
Smaller market share	324	33.6
Manufacturing focus	439	45.5
Service focus	526	54.5
B2B focus	692	71.7
B2C focus	273	28.3

Table 3 Firm sizes and company characteristics (national-level numbers from Tilastokeskus, 2012)

5.1.3 Initial scale reliability - Cronbach's Alphas

Next, the first step towards deducing the reliability of constructs in the study's model is taken, by calculating the Cronbach's Alphas (CA) of said constructs (e.g. Field 2009). Statistical tools such as SPSS also calculate the effects on CA should any given individual item be removed. Regarding the proposed constructs of this thesis, it was discovered that all scales were above the proposed threshold of .70 (Nunnally, 1978) except for market turbulence with an Alpha of .578.

	Initial	After item deleted
CE	0.766	0.766
MT	0.568	0.658
TT	0.872	0.872
NPP	0.884	0.884
FP	0.840	0.865

Table 4 Cronbach's Alphas

After appropriate item deletion (MT5) this improved to .658, which while still below the commonly used threshold, can be considered usable (e.g. George & Mallery 2003). This is especially true when many other analyses of scale reliability are still to be conducted, as is here. The firm performance construct was also modified by removing FP8, resulting in a final CA of .865. It is argued that the MT and FP constructs retain their original nature even in their trimmed form (as recommended by e.g. Raubenheimer (2004)), since they still contain a broad set of items.

5.1.4 Exploratory factor analysis

To compound on the initial scale reliability levels indicated by Cronbach's Alphas, an exploratory factor analysis was conducted separately on the performance constructs (EFA 1) and independent variables (EFA 2). The specific method used was the principal component analysis with varimax rotation as it is one of the most widely used (e.g. Field 2009, pp. 644).

For EFA 1, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .841 and a Bartlett sphericity coefficient of 8825.62 at .000 significance level were obtained. For EFA 2 the corresponding outputs were 0.80; 3771.77 and .000. Therefore both correlation matrices can be

generally deemed acceptable, with commonly used thresholds (e.g. Malhotra & Birks, 2006). The resulting principal components in the models explained 74,4% and 58,7% (respectively) of the total variance of variables.

While at acceptable levels, the loadings of items lead to certain conclusions that the Cronbach's Alphas had already hinted at. Namely, that the Market Turbulence (MT) construct is perhaps still not on an ideal reliability level (two items with below .70 loadings). Firm Performance (FP) item factor loadings were distributed across multiple components, which was not surprising as they are designed to be measuring growth, profitability and overall performance – quite different measures of performance in and of themselves. The above .30 dual loadings of FP2 and FP7 are also less than ideal.

EFA 1: Independent variables

	Component		
	1	2	3
TT4	,841		
TT3	,838		
TT1	,826		
TT2	,811		
CE1		,862	
CE2		,816	
CE3		,784	
MT2			,749
MT1			,721
MT4			,687
MT3			,568

Rotation: 4 iterations
KMO: 0.840
Bartlett's test: .000

EFA 2: Dependent variables

	Component			
	1	2	3	4
NPP 3	,850			
NPP 1	,836			
NPP 5	,835			
NPP 4	,782			
NPP 2	,763			
FP 4		,943		
FP 5		,937		
FP 3		,901		
FP 9		,756		
FP 1			,900	
FP6			,895	
FP 7	,330			,709
FP 2		,356		,666
FP 8				,636

Rotation: 5 iterations
KMO: 0.803
Bartlett's test: .000

Table 5 EFA results – factor loadings, KMO & Bartlett's test

All in all, the results suggest that further division of the Firm Performance construct into growth and profitability-based separate constructs, and/or trimming the construct to a more unified form, might be appropriate. However, very strong conclusions could not yet be made regarding the variables' and constructs' applicability in the final regression model, and so more investigation was conducted in the form of a confirmatory factor analysis.

5.2 Confirmatory Factor analysis

To further investigate the quality of the suggested constructs and the whole model, a total of three confirmatory factor analyses (CFA) were conducted. In Model 1 all constructs with their original scale items are included, in Model 2 the MT and FP constructs are adjusted, and in Model 3 the entire MT construct is removed. All the results of CFA Models 1-3 regarding loadings, reliability and validity can be seen on the next page in tables 6 and 7.

After analyzing ***Model 1*** in terms of loadings, overall model fit, validity and reliability, certain improvement necessities were clearly perceivable. In terms of model fit, the comparative fit index

(CFI) was 0.833 and root-mean square error of approximation (RMSEA) was 0.091 – neither reaching their desired threshold levels (>0.96; <0.06 respectively (Hu & Bentler, 1999)). In addition, the composite reliability (CR) and convergent validity (AVE) levels are also below cutoff points in the FP and MT constructs. The most obvious cause of model problems is again in the market turbulence construct, in which two items have loadings below 0.5. Also, as expected and mirrored in the EFA results, the FP construct is in need of item trimming, due to the large number of initial items, the exact combination of which was not strictly based on theory.

Next, items with low (under 0.5) factor loadings were removed, resulting in ***Model 2***. Notably, item reduction was conducted in a way that the nature and character of the original variables were conserved (Raubenheimer, 2004; Hair et al. 2010). In practice, items MT3, MT4, FP1, FP2, FP6, FP7 and FP8 were removed. Although the large number of items removed from the firm performance construct may seem drastic, the remaining four items (ROI; ROA; relative profits; meeting financial goals) still measure firm performance in a broad manner. For the market turbulence construct, only two items is not ideal but still within the limits set for factors in CFA (e.g. Bollen 1989). After the stated item removal, the model passes all reliability and validity measurement tests.

Lastly, more for being able to contrast models than with an actual intent of choosing it, ***Model 3*** is constructed, in which the market turbulence factor has been completely removed. In terms of model fit the two last models are nearly identical, with reliability and validity measures slightly in favor of model 3. However, as all of its parameters are still at acceptable levels, and as it is very much in the interest of the study to keep market turbulence in further analyses, model 2 is chosen as the final model. Correlation between MT and TT is evident, but not on a level that would render their inclusion in the same model impossible.

	CFA1						**CFA2**						**CFA3**			
	CE	**MT**	**TT**	**FP**	**NPP**		**CE**	**MT**	**TT**	**FP**	**NPP**		**CE**	**NPP**	**FP**	**TT**
CE	0.741					CE	**0.741**					CE	**0.741**			
MT	0.243	**0.597**				MT	0.218	**0.753**				NPP	0.279	**0.772**		
TT	0.251	0.540	**0.797**			TT	0.251	0.515	**0.797**			FPP	0.117	0.258	**0.886**	
FPP	0.125	-0.030	-0.028	**0.639**		FPP	0.118	-0.046	-0.031	**0.885**		TT	0.262	0.160	-0.032	**0.784**
NPP	0.273	0.128	0.140	0.274	**0.782**	NPP	0.273	0.090	0.140	0.260	**0.782**					
MSV	0.075	0.292	0.292	0.075	0.075	MSV	0.075	0.265	0.265	0.068	0.075	MSV	0.075	0.075	0.068	0.064
ASV	0.053	0.092	0.094	0.023	0.046	ASV	0.050	0.081	0.087	0.021	0.042	ASV	0.051	0.054	0.027	0.028

Table 6 CFA results – Correlations and Discriminant validity

CFA MODEL 1					CFA MODEL 2					CFA MODEL 3				
	CR	AVE	Loading	Item		CR	AVE	Loading	Item		CR	AVE	Loading	Item
CE	0.784	0.549	0.824	CE1	CE	0.784	0.549	0.824	CE1	CE	0.784	0.549	0.823	CE1
			0.726	CE2				0.726	CE2				0.725	CE2
			0.665	CE3				0.665	CE3				0.667	CE3
MT	0.671	0.549	0.775	MT1	MT	0.723	0.568	0.820	MT1					
			0.711	MT2				0.683	MT2					
			0.312	MT3										
			0.449	MT4										
TT	0.874	0.635	0.842	TT1	TT	0.874	0.635	0.853	TT1	TT	0.886	0.611	0.744	TT1
			0.742	TT2				0.732	TT2				0.809	TT2
			0.840	TT3				0.833	TT3				0.853	TT3
			0.746	TT4				0.754	TT4				0.722	TT4
NPP	0.886	0.408	0.778	NPP1	NPP	0.887	0.611	0.800	NPP1	NPP	0.874	0.635	0.777	NPP1
			0.679	NPP2				0.713	NPP2				0.678	NPP2
			0.858	NPP3				0.841	NPP3				0.859	NPP3
			0.696	NPP4				0.708	NPP4				0.696	NPP4
			0.833	NPP5				0.835	NPP5				0.832	NPP5
FP	0.825	0.611	0.330	FP1	FP	0.934	0.783	0.853	FP3	FP	0.934	0.783	0.856	FP3
			0.417	FP2				0.977	FP4				0.98	FP4
			0.856	FP3				0.960	FP5				0.957	FP5
			0.973	FP4				0.727	FP9				0.73	FP9
			0.963	FP5										
			0.323	FP6										
			0.316	FP7										
			0.042	FP8										
			0.729	FP9										
	Chi-square		2390,37			Chi-square		471,399			Chi-square		396,901	
	Df.		265			Df.		152			Df.		98	
	Probab.		,000			Probab.		,000			Probab.		,000	
	CFI		0.833			CFI		0.966			CFI		0.969	
	RMSEA		0.091			RMSEA		0.054			RMSEA		0.056	

Table 7 CFA results – loadings, composite reliability, convergent validity and model fit

5.3 Regression analysis: hypothesis testing

Regression analyses 1 and 2 (see tables 8 and 9) test the effects of customer empowerment on new product performance and firm performance respectively, and share the same hierarchical logic of adding variables to models 1 thru 7. Model 1 contains only the control variables, while Model 2 incorporates the CE construct and thus serves as the baseline model. In model 3 all of the hypothesized moderator variables' main effects are included, and in Models 4-7 the interaction terms of these moderators are added one by one to see their impact on the model with each step. The interaction effects are added so that the previous terms always remain in the model, and in this way model 7 is the full model including all latent variables and interaction terms. Starting from a block with only control variables follows the procedure of e.g. Covin et al. (2006), while incrementally adding the interaction effects is closer to the models of e.g. Delmas et al. (2007) and Lavie et al. (2007).

5.3.5 H1 & H2: CE has a positive impact on new product and firm performance

In regression analysis 1, both market position and firm size appear to be significant control variables, the former clearly positive and the latter slightly negative. In model 2 it can be seen that the standardized regression coefficient (beta) of CE is positive (0.191) and highly significant (p >.000). CE continues to have a significant and positive beta throughout all seven models. According to the adjusted R^2 change from Model 1 to Model 2, adding customer empowerment significantly increases the predictive capacity of the model by 3.5%.

Also in regression analysis 2, market position and firm size turn out to be significant control variables, but contrastingly both with positive beta weights. In model 2, the beta of CE in the model is highly significant (p >.000) and positive (.092) if not as strongly as in the NPP regression. Again, CE continues to have a significant and positive beta throughout all seven models. According to the adjusted R^2 change from Model 1 to Model 2, adding customer empowerment significantly increases the predictive capacity of the model by 0.7%.

Taking all this into account, it can be stated that customer empowerment does indeed seem to have a positive impact on both new product performance and overall firm performance. Therefore *both hypotheses 1 and hypothesis 2 are supported*.

DV: New product performance	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Market position	0.172***	0.159***	0.157***	0.158***	0.158***	0.156***	0.157***
Firm size (Employees)	-0.067**	-0.050†	-0.054†	-0.0512†	-0.0512†	-0.051†	-0.051†
Customer Empowerment		0.191***	0.175***	0.179***	0.179***	0.180***	0.180***
Technological Turbulence			0.085**	0.085**	0.085**	0.085**	0.085**
Market Turbulence			.037	.037	.036	.037	.036
B2B vs. B2C			-.033	-.035	-.035	-.036	-.037
Product vs. Service			-0.078**	-0.078**	-0.079**	-0.080**	-0.081**
Customer Empowerment x Technological Turbulence				0.067**	0.067**	0.065**	0.069**
Customer empowerment x Market Turbulence					.001	.003	.003
Customer empowerment x B2B vs. B2C						-.011	-.016
Customer Empowerment x Product vs. Service							-.020
R^2	.027	.063	.076	.081	.081	.081	.081
Adj. R^2	.025	.060	.069	.073	.072	.071	.070
F-value change	13.32***	37.05***	3.37**	4.65 †	.001	.126	.384

Table 8 Results of hierarchical regression analysis 1 – Impact of CE on NPP ***a) b) c)***

DV: Firm performance	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Market position	0.181***	0.175***	0.176***	0.177***	0.177***	0.179***	0.179***
Firm size (Employees)	0.109***	0.117***	0.119***	0.121***	0.122***	0.121***	0.121***
Customer Empowerment		0.092**	0.103**	0.105**	0.109**	0.107**	0.107**
Technological Turbulence			-.048	-.048	-.048	-.048	-.048
Market Turbulence			-.019	-.019	-.023	-.023	-.023
B2B vs. B2C			-.009	-.011	-.011	-.010	-.010
Product vs. Service			.020	.020	.021	.023	.023
Customer Empowerment x Technological Turbulence				0.049†	.027	.030	.030
Customer empowerment x Market Turbulence					0.060†	0.054†	0.054†
Customer empowerment x B2B vs. B2C						.027	.027
Customer Empowerment x Product vs. Service							.000
R^2	.057	.065	.069	.071	.074	.075	.075
Adj. R^2	.055	.062	.062	.063	.065	.065	.064
F-value change	29.02 ***	8.69 **	0.86	2.53	3.14 †	0.70	0.00

Table 9 Results of hierarchical regression analysis 2 – Impact of CE on FP ***a) b) c)***

a) Standardized regression coefficients are shown. † $p < 0.10$; ∗ $p < 0.05$; ∗∗ $p < 0.01$.∗∗∗ $p < 0.001$
b) N = 965 in all models
c) ANOVA test results concerning R^2 were significant at .000 level on all models

5.3.6 H1.1-4 & H2.1-4: Interaction effects

The hypothesized interaction effects are tested in models 4-7: Model 4 for technological turbulence, Model 5 for market turbulence, Model 6 for B2B vs. B2C focus and Model 7 for Manufacturing vs. Service focus, which is also the full model including all latent variables and interaction terms. The predictive power of the full models in the NPP and FP regressions is .070 and .064 respectively.

In the NPP regression analysis a small yet significant and positive moderation between technological turbulence and new product performance as well as a positive and significant technological turbulence main effect is found. Both the TT main effect and the interaction term stay significant throughout models 4-7. ANOVA test results for R^2 were significant at .000 level on all models, but according to F-value change tests only R^2 changes to Models 1 thru 4 were significant. Additionally a negative moderating effect was found for market turbulence, but with a non-significant partial F-test, meaning the moderation does not improve the model's predictive power.

In the FP regression analysis a marginally significant and positive moderation between MT and FP, which persists throughout models 5-7, is found. ANOVA test results for R^2 were significant at .000 level on all models, but according to F-value change tests only R^2 changes of models 1, 2 and 5 were significant. Additionally, a similar positive moderation effect was found for TT as in the NPP regression analysis, however the corresponding partial F-test was not significant.

In essence, out of the total eight hypothesized moderations two significant moderations were found: 1) technological turbulence's positive moderation of CE's impact on new product performance and 2) market turbulence's positive moderation of CE's impact on firm performance. It should also be noted that the power of these moderations is very slight. Nonetheless they were found to persist in all models where interaction effects were included, and so to exist when controlling for market position and firm size and including all the other potential moderators in the analysis. Therefore: *hypotheses 1.4 and hypothesis 2.3 are supported*

When significant interactions are found, it is often recommended to further decompose them for a clearer picture of the structure of their relations (e.g., Aiken & West, 1991). As mentioned in chapter 5, one of the traditional approaches for doing this is called the simple slopes technique (e.g. Preacher et al., 2006; Aiken & West, 1991). Therefore simple slopes were conducted, the visualized results of which can be seen in figure 3. To create the simple slopes the mean of the moderator and one standard deviation above and below the mean of the moderator were used according to what Rogosa (1980)

refers to as the "pick-a-point" approach. This is recommended when there is an absence of theoretically meaningful values to insert (e.g. Preacher et al., 2006; Cohen et al., 2003).

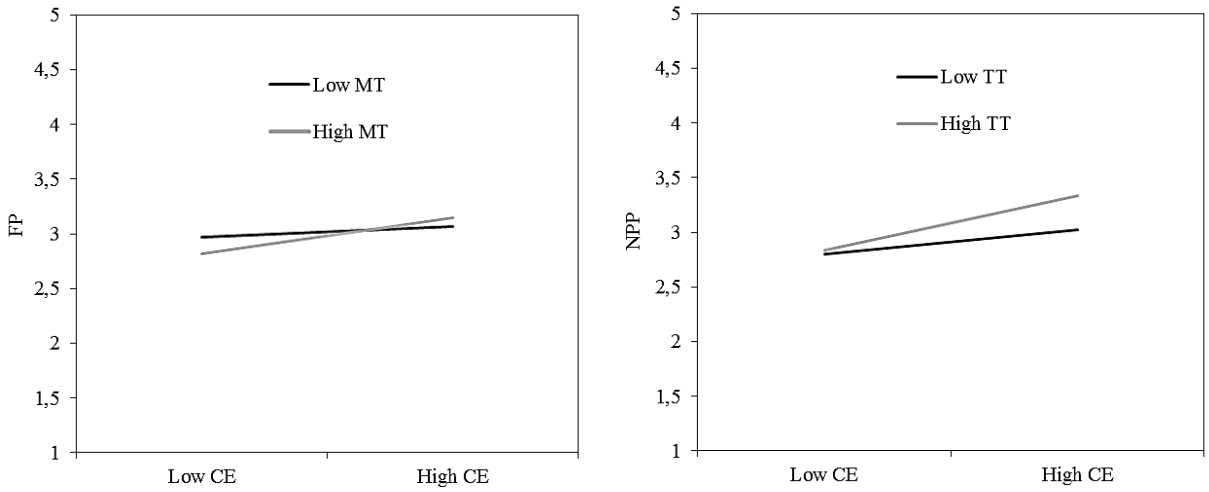

Figure 3 Visualization of found interaction effects – simple slopes

5.3.7 Validity and reliability

As the final step of the regression analysis, necessary diagnostics were conducted to look into potential problems with multicollinearity, heteroscedasticity and error term normality – the theory of which is explained in detail in the methodology chapter. As a concluding note, the overall predictive power of the model, and its relevance for the study is briefly elaborated. All tables and graphs related to regression diagnostics can be found in the appendix section 8.2.2.

As stated in chapter 4, *Multicollinearity* is always inherent in the nature of moderated multiple regression analyses (e.g. Aguinis, 1995, Dalal & Zickar, 2012; Goldhof et al., 2013) and therefore higher VIF levels are not to be taken as detrimental for the power of MMR. Centered variables were created as an alternative to uncentered variables, not as a remedy to multicollinearity since it has been shown to be inefficient in this (e.g. Echambadi, 2006) but to lessen computational problems and improve the interpretability of results (e.g. Dalal & Zickar, 2012). The multicollinearity of all variables besides the interaction terms can be judged by the VIF level of the uncentered variables in model/block 3 (see appendix 8.2.2). They all pass the acceptable threshold, as no variable has a VIF of over 2 (e.g. Cohen et al., 2003, pp. 423).

As the VIF and tolerance levels are not a valid measure of multicollinearity for the interaction terms, other parameters were observed. Firstly, the classic symptom of multicollinearity – high R-squared with few significant predictors – (Gujarati & Porter, 2009, pp. 337) was clearly not the case in the

analysis. Secondly, inflated standard errors (SEs) of parameter estimates were taken under consideration (e.g. Deephouse, 1999) by computing the SEs of both uncentered and centered parameter estimates. Neither set contained considerably high levels. Thirdly, condition indices and coefficient variance proportions were observed, as suggested by e.g. Hair et al. (2010, pp. 220). Although high CI levels were present, no variables exhibited above 90 percent variance proportions for two or more coefficients. Therefore the inherent multicollinearity of the interaction terms is estimated to not be problematic. To conclude, overall no evidence was found of multicollinearity affecting the model or analysis negatively.

For testing *heteroscedasticity*, residuals were plotted against predicted values (as in e.g. Deephouse, 1999) for both regression models. As the dispersion of the residuals appears to be the same across all dependent variable values – verified by a clearly flat horizontal fit line – the error variance was deduced as constant, and thus problems regarding heteroscedasticity could be dismissed. It is acknowledged that the plotting technique is a simple form of testing for heteroscedasticity, but when obtaining clear results, it can deemed reliable (e.g. Osborne & Water, 2002).

Lastly, *error term normality* was tested by computing residual histograms and normal probability (P-P) plots (e.g. Osborne & Waters, 2002; Öztuna et al. 2006). In the P-P plot, the observed values conform to the expected values, resulting in the observations closely "hugging" the 45-degree predicted linear line for both NPP and FP models (see appendix 8.2.2). Accordingly, in the residual histogram a clear normal distribution is graphically represented for both NPP and FP models. Therefore no further tests were deemed necessary to conclude that the error terms are indeed normally distributed in the models.

As a last note, the relatively low total predictive power (R^2) of the regressions requires a short elaboration. On the one hand, R-squared depicts the goodness of model fit, and therefore a low R-squared of the model means that there is high variability affecting the precision of predictions (e.g. Hair et al. 2010). However, as the focus of this thesis is to *uncover whether relationships exist* rather than accurately predict total effects, a low R^2 is not considered a problem (e.g. Achen, 1982; Gujarati & Porter, 2001). This is also exemplified by a number of other studies on strategic orientations' impacts on performance, in which relatively low model R-squared levels are obtained (e.g. Narver et al., 2004; Covin et al., 2006). Potential predictors of firm and new product performance often include organizational, environmental, and individual factors from the structural and systemic to the sociological and technological to the personal (Hansen & Wernerfelt, 1989). Therefore a highly predictive model would have to incorporate a very broad set of parameters, something which was not possible or even aimed for in this thesis.

6 CONCLUSIONS AND DISCUSSION

6.1 Research Summary and key findings

The theoretical part of the study strived to map out a comprehensive understanding of the customer empowerment (CE) and co-creation literature in the context of new product development (NPD). Through this literature both pros and cons of adopting CE-practices were identified, further deepened by contextual considerations. Very little prior literature exists on the measurable performance impacts of CE (e.g. Alam, 2002; Hoyer et. al 2010), and most of the ones that do, leave much room for debate (see e.g. e.g. Gruner & Homburg, 2000; Ramani & Kumar 2008; Fuchs & Schreier 2011). A case was nonetheless made that CE may as a whole be a practice that improves both the firm level and product level performance of a company. A conceptual framework was constructed to illustrate this hypothesis and its sub-hypotheses regarding the different recognized contextual perspectives.

With the help of a fairly large dataset covering a wide range of Finnish companies, these hypotheses and the conceptual model were quantitatively tested. The proposed constructs were first polished through scale reliability analysis and both explorative and confirmatory factor analyses. This resulted in the final models used to conduct 7-stage hierarchical regression analyses for both firm and new product performance. Looking back at the research questions posed in the beginning of this thesis, the following conclusions are drawn from the study and its analyses:

1. *How does a customer empowerment orientation impact the new product and firm-level performance of a company?*

According to the conducted analyses, customer empowerment does indeed seem to have a significant positive impact on both new product performance and firm performance. Based on the used model, CE explains 3.5%. of changes in NPP and 0.7% of changes in FP – a level reasonably similar to that of a number other strategic orientations' effects on performance in prior studies (e.g. Narver et al., 2004; Covin et al., 2006; Morgan et al., 2009).

2. *Can certain contexts be found to moderate the aforementioned impact? Namely:*
    a. *business-to-business vs. business-to-consumer focus*
    b. *product vs. service-based focus*
    c. *market turbulence*
    d. *technological turbulence*

According to the conducted analyses, company focus (a & b) regarding a B2B, B2C, service or product focus does not seem to moderate the effects of customer empowerment on new product performance or firm performance. However, the surrounding changes in a company's environment

were found to moderate both NPP and FP – technological turbulence for the former and market turbulence for the latter. These found moderations were small yet consistent throughout all the tested steps inside the hierarchical regression analyses.

6.2 Discussion

As hypothesized, the impact of CE on both NPP and FP was positive and significant in each model. The regression coefficients of the CE main effect (.191 and .092 respectively) and the adjusted R-squared changes after including CE into the models (.035and .007) are all indications of this. As with the low R-squared scores of the entire model, the same arguments apply for explaining those associated with CE. Namely, that customer empowerment is only one out of a vast number of potential new product and firm performance determinants, and therefore 3.5% and 7% predictive powers are entirely plausible (e.g. Narver et al., 2004; Covin et al., 2006; Morgan et al., 2009).

All in all it would then seem that a customer empowerment orientation is a strategy highly worth considering for companies. Regarding which kinds of companies in particular, this study could not find a clear answer, as results for the relevance of company focus for CE (B2B vs. B2C and manufacturing vs. service-based activities) were inconclusive. No positive or negative moderations were found, which although not hypothesized, is not entirely surprising since prior studies shedding light on the matter provide mixed insights (e.g. Campbell & Cooper, 1999; Gruner & Homburg, 2000; Magnusson, 2003; Carbonell et al., 2009).

It could be that the various pros and cons related to a chosen company focus balance each other out in terms of their combined effect on performance. B2B-CE may often be more natural than B2C-CE (e.g. Hoyer 2010) but does not for instance have the same mass-scaling potential and can be costly (Campbell & Cooper, 1999). Furthermore, it may that in a B2B context close customer interaction is actually more of a necessity for not falling behind competitors than a source of competitive edge. Therefore while CE may be perhaps more clearly implementable in the B2B context, it may not translate to superior performance compared to competitors any more than in a B2C context.

Similarly, the integrality of customer interaction in services has led some researchers to suggest that CE is more important in this setting than with tangible products (e.g. Sundbo, 1997; Alam & Perry, 2002) but ultimately a number of aspects may balance the table. Customers' service ideas may for instance be hard to convert into reality (Magnusson, 2003) and ultimately in services, as stated by Edvardsson & Olsson, (1996, pp. 1476) "it is usually not the service itself that is co-produced but the pre-requisites for the service". Therefore, co-created services may require more steps than tangible products before they can truly be implemented and improved performance reaped.

In contrast to the company focus factors, environmental turbulence seems to be a relevant positive moderator of customer empowerment's effect on performance – technological turbulence in the case of new product performance and market turbulence in the case of firm performance. It should, however, be acknowledged that the regression weights for the uncovered moderation effects were quite small (.054 for MT and .069 for TT) and therefore the strengthening effect of turbulence on performance is not a very powerful one. Regardless of this, the interpretation is that the more turbulent the market and technological surroundings are, the more companies should consider reaching out to their customers in the development of new products and services.

The findings bring support to prior research positing that the innovation process should be opened up to customers in highly turbulent markets (e.g. Schweitzer et al., 2011). Indeed, as also found by e.g. Han et al. (1998) and Hurley & Hult (1998), it may be the case that firms interacting more closely with their customers can better track the rapid evolution of their needs, and ultimately create superior products. This finding and its line of reasoning goes counter to a number of other studies, where consumers were found to have difficulty articulating what they need or want during high market turbulence (e.g. Droge et al., 2008), making the utilizing of their input cumbersome.

Similarly, the relationship between customer empowerment and technological turbulence has also been a matter of debate in prior research. A number of studies argue that customers cannot help in innovation during rapid technology change due to not being able to imagine the newly enabled product and service possibilities (e.g. Jaworski and Kohli, 1993; Song et al., 2005). However, the findings of this study support the opposite viewpoint shared by e.g. Day and Wensley, (1988), Narver and Slater (1990) and Carbonell et al. (2009) positing that when technological turbulence is high, customer interaction can provide valuable insight into the changing product and service landscape.

6.3 Managerial implications

For managers, the results of the study suggest that empowering customers in developing new products and services may be a profitable strategy both in terms of product and firm performance. Therefore companies should consider, as formulated in the questionnaire items, encouraging customers to "1) share opinions of their products or services with the firm 2) share opinions of their products or services with other customers and 3) participate interactively in designing products and services" (Ramani & Kumar, 2008, pp. 42).

CE's uncovered positive relationship with performance is, however, not to be taken as direct and quickly realizable, but rather only as a starting point – the nature of strategic orientations is that they

require proper activities for value to the firm to be captured (e.g. Ketchen, 2007; Morgan et. al., 2009; Murray et al., 2011). In other words, a CE orientation may enable the *potential* of capturing added value on the product and firm level, but only if this potential leads to the right practical implementation. This study does not delve deeply into the question of what operational steps this implementation might contain. However, from observing the combined list of potential effects of CE identified from prior studies (see table 1) some aspects to pursue and avoid can be found. Additionally, e.g. Piller et al.'s (2011) and Hoyer et al.'s (2010) frameworks offer practical tools to assess various kinds of empowerment activities and their appropriateness for a given business.

The results tentatively suggest that CE is an especially appropriate strategic orientation for a company during highly turbulent market and technology change conditions. This would imply that companies operating in industries with high market and technological disruption can involve customers in their product and service development to better keep up with the rapid changes and remain innovative, as suggested by e.g. Han et al. (1998); Hurley and Hult, (1998) and Carbonell et al., 2009. Managers would, however do well to tread carefully regarding this suggestion, since some studies have found customers to be unable to help in innovation when they do not understand the changing technological landscape themselves (e.g. Jaworski and Kohli, 1993; Song et al., 2005).

Neither positive nor negative moderation for CE was found regarding a company's focus on services vs. products or business-to-business vs. business-to-consumer customers. Therefore, a company's offering focus does not seem to play a role in whether or not it should adopt a CE orientation. However, it should be acknowledged that the study's modeling of company focus was very broad, and that an in-depth look into customer empowerment in a specific industry could give results clearly supporting/discouraging CE in this context. As e.g. Fuchs & Schreier (2010, pp. 29), state regarding car engines: "customers may believe that [they] do not stand a chance of competing with corporate R&D professionals when it comes to (co)creating new products --". Then again, in e.g. telecommunications services, customers have been found to come up with more creative innovations than product development professionals (Magnusson, 2003). More empirical studies are needed to uncover industries and company characteristics, for which a CE orientation is especially fitting.

6.4 Theoretical contribution

This thesis contributes to the academic literature in three ways. Firstly, the performance impacts of a customer empowerment orientation are overall under-researched, as CE has for the most part been studied on a case and conceptual level (e.g. Magnusson, 2003; Etgar, 2008; Buur & Matthews, 2008, Piller et. al., 2011) leaving much room for further quantitative studies on the theme. The need for this

type of research is echoed by numerous researchers calling for more empirical studies measuring the effects of CE (e.g. Campbell & Cooper, 1999; Alam, 2002; Hoyer et. al 2010; Fuchs & Schreier, 2011). The results of the study offer support for customer empowerment as a valid strategic orientation and new product development approach, suggesting that its benefits outweigh its challenges. More empirical research is needed to uncover the relative importance of these various pros and cons, as the analysis of this study was not concerned with operational level CE activities.

Secondly, this thesis analyzed whether company focus, market turbulence or technological turbulence boosts or dampens the effects of customer empowerment. No prior research with the specific goal of estimating these contextual factors' relevance for CE was found, and therefore this study helps pave the way for future work in this line of research. Hypothesis development had to be conducted by combining scattered research, the findings of which were not directly relatable and often mixed (e.g. Campbell & Cooper, 1999; Magnusson, 2003; Carbonell et al., 2009). Therefore both the conducted literature review and subsequent empirical analysis provide needed clarification for the role of contextual factors affecting CE. As for the results themselves, support was found for prior research advocating customer interaction in NPD during high environmental turbulence (e.g. Han et al., 1998; Hurley and Hult, 1998; Narver & Slater, 1990) but the role of a company's focus remains unanswered. Future research is needed to both deepen knowledge regarding the found CE-Turbulence relationship and verify whether a company's offering truly does not play a role for CE applicability.

The third and last theoretical contribution of the study concerns the new perspective it provides for the strategic orientation (SO) literature, since customer empowerment has not previously formally been conceptualized as an SO. The approach of considering the CE element of Ramani & Kumar's (2008) interaction orientation construct as an orientation of its own, allows for a more strategic look at empowerment than portrayed in most prior research. The study does not specifically contrast CE with other more widely acknowledged strategic orientations such as market-, customer-, competitor-, innovation-, entrepreneurial-, or technological orientation (e.g. Kohli & Jaworski 1990; Noble et al., 2002, Siguaw et al., 2006; Calantone et al., 2002), but rather sets it as one of many strategic directions a company may choose. It is acknowledged that as a strategic orientation, complementary organizational capabilities are required for the value of CE be fully realized (e.g. Ketchen, 2007; Morgan et. al., 2009; Murray et al., 2011) and the studying of these capabilities would be a natural next step in future research of CE performance impacts.

6.5 Limitations and suggestions for further research

While contributing to both the theory and practice around customer empowerment in new product development, certain limitations of the study are identified. Firstly, by considering CE from the perspective of a strategic orientation, interpretations remain on a broad and somewhat unspecific level. Claims are not made regarding processes and activities around CE, but rather of the general orientation supporting it. Therefore a closer look into the practical activities needed to capitalize on the potential of CE, could yield results more easily translatable to managerial guidelines and best practices than what this study offers. For instance, Piller et al.'s (2011) and Hoyer et al.'s (2010) work offers a good starting point for which practical practices to take under analysis.

Secondly, the nature of the found performance boost of CE also remains on a general level. If the firm performance and new product performance constructs are broken down into their individual items we can say that CE seems to have a positive relationship with the profitability, revenues and meeting of financial goals of a company, as well as the amount and profitability of new products and services it launches. However, these are still the subjective estimates of the respondents and therefore it would be interesting to contrast them with objective, quantifiable performance data. In addition, as stated earlier, as a strategic orientation CE requires complementary organizational capabilities for value to the firm to be fully realized (e.g. Ketchen, 2007; Morgan et. al., 2009; Murray et al., 2011) and therefore no direct link between CE and performance can yet be suggested.

In the same vein, no consideration is given to which stage(s) of new product development are actually affected by incorporating a CE orientation. Therefore further digging into a more operational level of customer empowerment activities taking into account which NPD-stage they happened in, could give valuable insight into the impact of companies going further than merely *facilitating* empowerment and co-creation but actually enforcing it, the stages that it happens in, and the measurable effects this has on performance.

Fourthly, while the study takes a look at the relevance of industry distribution for CE, in terms of company focus, results were inconclusive. In addition to the results themselves, the setup of the study's model was also very broad as it did not consider industries specifically, but rather on a general B2B/B2C/product/service level. Therefore examining and cross-comparing CE activities in different industry contexts more closely would be needed to get a clearer understanding of the relevance of industry for CE-appropriateness. An in-depth analysis of two very different types of industries, for instance, could give interesting insights into how customers can be empowered successfully or unsuccessfully in these contexts, and whether significant differences are apparent between the two.

Lastly, more specifically and methodologically speaking, some recommendations for future research would include a) a structural equation modeling approach to shed further light on the complex linkages between customer empowerment, various contextual variables and different types of performance indicators b) an inclusion of more quantifiable and objective data in terms of both CE (e.g. number of NPD-projects where customers were involved) and performance (e.g. actual new product sales revenue numbers, and c) a qualitative in-depth look into a given industry with a focus on performance impacts resulting from CE activities in certain new product development stages.

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8 APPENDIX

8.1 Survey questionnaire – Stratmark 2014

Below are the questions used in this study as they were presented to respondents (in the original Finnish language, from the original questionnaire). Questions not used in the analyses of this thesis are not shown, except for the the first five introductory and industry questions.

[]K3. Muu johtaja, tarkenna: *

Vastaa tähän vain jos seuraavat ehdot täyttyvät:
Vastaus oli 'Muu johtaja' kysymyksessä '3 [K3]' (K3. Asema organisaatiossa (tehtävänimike))

Vastauksesi:

[]K4. Edustamasi liiketoimintayksikkö *

Kirjoita vastauksesi tähän:

Nimi

Ellei erikseen mainittu, vastaa kaikkiin tämän kyselyn kohtiin liiketoimintayksikkösi ja valitsemasi päätoimialan näkökulmasta. Mikäli yrityksestäsi ei voida erottaa selkeästi toiminnaltaan tai markkinoiltaan poikkeavia yksiköitä, vastaa koko yrityksen näkökulmasta. Pienten yritysten kohdalla liiketoimintayksikkö ja yritys tarkoittavat yleensä samaa.

[]K5. Mikä on liiketoimintayksikkösi pääasiallinen toimiala? *

Valitse **vain yksi** seuraavista:

- ○ Maatalous, metsätalous ja kalatalous
- ○ Kaivostoiminta ja louhinta
- ○ Teollisuus
- ○ Sähkö-, kaasu- ja lämpöhuolto, jäähdytysliiketoiminta
- ○ Vesihuolto, viemäri- ja jätevesihuolto, jätehuolto ja muu ympäristön puhtaanapito
- ○ Rakentaminen
- ○ Tukku- ja vähittäiskauppa; moottoriajoneuvojen ja moottoripyörien korjaus
- ○ Kuljetus ja varastointi
- ○ Majoitus- ja ravitsemistoiminta
- ○ Informaatio ja viestintä
- ○ Rahoitus- ja vakuutustoiminta
- ○ Kiinteistöalan toiminta
- ○ Ammatillinen, tieteellinen ja tekninen toiminta
- ○ Hallinto- ja tukipalvelutoiminta
- ○ Julkinen hallinto ja maanpuolustus; pakollinen sosiaalivakuutus
- ○ Koulutus
- ○ Terveys- ja sosiaalipalvelut
- ○ Taiteet, viihde ja virkistys

Yrityksen liiketoimintaympäristö ja asema päämarkkinoilla

Ensimmäisessä osiossa käsitellään edustamasi liiketoimintayksikön toimintaympäristöä ja asemaa päämarkkinoilla.

[]K1. Yhteystiedot *

Kirjoita vastauksesi tähän:

Vastaajan nimi: _____

Sähköpostiosoite: _____

[]K2. Yhteydenotto *

Valitse **vain yksi** seuraavista:

- ◯ Haluan, että minuun otetaan yhteyttä sähköpostitse koskien Markkinoinnin tila -kyselyn tuloksia.
- ◯ En halua, että minuun otetaan yhteyttä sähköpostitse koskien Markkinoinnin tila -kyselyn tuloksia.

Sähköpostitietoja ei luovuteta muille osapuolille. Tutkimustiedot raportoidaan ainoastaan kokonaisuuksina, joista yksittäisiä vastaajia ei voida tunnistaa.

[]K3. Asema organisaatiossa (tehtävänimike) *

Valitse **vain yksi** seuraavista:

- ◯ Pääjohtaja/konsernin johtaja
- ◯ Toimitusjohtaja
- ◯ Hallituksen puheenjohtaja
- ◯ Varatoimitusjohtaja
- ◯ Partneri
- ◯ Markkinointijohtaja
- ◯ Myyntijohtaja
- ◯ Aluejohtaja
- ◯ Yleisjohtaja
- ◯ Kehitysjohtaja
- ◯ Toimialajohtaja
- ◯ Muu johtaja

- ◯ Muu palvelutoiminta
- ◯ Kotitalouksien toiminta työnantajina; kotitalouksien eriyttämätön toiminta tavaroiden ja palvelujen tuottamiseksi omaan käyttöön
- ◯ Kansainvälisten organisaatioiden ja toimielinten toiminta
- ◯ Muu _____

[]K6. Mikä on edustamasi liiketoimintayksikön tuottamien hyödykkeiden ja palveluiden osuus sen liikevaihdosta? Vastaa siten, että eri vaihtoehtojen yhteenlasketuksi arvoksi tulee 100 %.

Kirjoita vastauksesi tähän:

Kulutushyödykkeet (b2c) _____

Tuotantohyödykkeet (b2b) _____

Kulutuspalvelut (b2c) _____

Yrityspalvelut (b2b) _____

[]K8. Mikä seuraavista parhaiten kuvaa liiketoimintayksikkösi asemaa päämarkkinoilla? *

Valitse vain yksi seuraavista:

- ○ Ainoa yritys markkinoilla
- ○ Markkinajohtaja: suurin markkinaosuus
- ○ Haastaja: toiseksi tai kolmanneksi suurin markkinaosuus
- ○ Seuraaja: pienempi markkinaosuus

[]K9. Missä määrin seuraavat väittämät kuvaavat liiketoimintayksikkösi markkinoita ja toimialaa? *

Valitse sopivin vaihtoehto:

	Täysin eri mieltä	Eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Samaa mieltä	Täysin samaa mieltä	En osaa sanoa
Liiketoiminnassamme asiakkaiden tuotemieltymykset muuttuvat huomattavasti ajan myötä.	○	○	○	○	○	○	○	○
Asiakkaillamme on tapana etsiä jatkuvasti uusia tuotteita.	○	○	○	○	○	○	○	○
Tuotteillemme (ja palveluillemme) on kysyntää sellaisten asiakkaiden keskuudessa, jotka eivät koskaan aikaisemmin ostaneet niitä.	○	○	○	○	○	○	○	○
Uusilla asiakkailla on tuotteeseen liittyviä tarpeita, jotka ovat erilaisia kuin nykyisillä asiakkaillamme.	○	○	○	○	○	○	○	○
Palvelemme useita samoja asiakkaita kuin aikaisemminkin.	○	○	○	○	○	○	○	○
Toimialallamme teknologinen muutos on nopeaa.	○	○	○	○	○	○	○	○
Teknologiset muutokset tarjoavat toimialallemme suuria mahdollisuuksia.	○	○	○	○	○	○	○	○
Toimialamme teknologiset läpimurrot ovat mahdollistaneet suuren määrän uusia tuoteideoita.	○	○	○	○	○	○	○	○
Teknologiset kehitysaskeleet ovat toimialallamme melko pieniä.	○	○	○	○	○	○	○	○

[]K22. Kuinka hyvin seuraavat väittämät kuvaavat tilannetta liiketoimintayksikössäsi? *

Valitse sopivin vaihtoehto:

	Täysin eri mieltä	Eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Samaa mieltä	Täysin samaa mieltä	En osaa sanoa / ei relevanttia meille
Tämä yritys kannustaa asiakkaita jakamaan mielipiteitään yrityksen tuotteista ja palveluista kanssaan.	○	○	○	○	○	○	○	○
Tämä yritys kannustaa asiakkaita jakamaan mielipiteitään yrityksen tuotteista ja palveluista muiden asiakkaiden kanssa.	○	○	○	○	○	○	○	○
Tämä yritys kannustaa asiakkaita osallistumaan vuorovaikutteisesti tuotteiden ja palveluiden suunnitteluun.	○	○	○	○	○	○	○	○

[]K26. Työntekijöiden lukumäärä liiketoimintayksikössäsi *

Valitse vain yksi seuraavista:

- ○ 1-5
- ○ 6-10
- ○ 11-20
- ○ 21-50
- ○ 51-100
- ○ 101-250
- ○ 251-500
- ○ > 500
- ○ En osaa sanoa

[]K28. Liiketoimintayksikkösi liikevaihto (EUR) viimeisimmän julkistetun tiedon mukaan *

Valitse vain yksi seuraavista:

- ○ Alle 350 000
- ○ 350 000 - 2 milj.
- ○ 2 milj. - 10 milj.
- ○ 10 milj. - 50 milj.
- ○ 50 milj. - 100 milj.
- ○ 100 milj. - 250 milj.
- ○ 250 milj. - 500 milj.
- ○ 500 milj. - 1000 milj.
- ○ Yli 1000 milj.
- ○ En osaa sanoa

[]K29a. Taloudelliset indikaattorit *

Valitse sopivin vaihtoehto:

	Huomattavasti pienempi / heikompi kuin kilpailijoilla	Pienempi / heikompi kuin kilpailijoilla	Jonkin verran pienempi / heikompi kuin kilpailijoilla	Ei eroa kilpailijoihin nähden	Jonkin verran suurempi / parempi kuin kilpailijoilla	Suurempi / parempi kuin kilpailijoilla	Huomattavasti suurempi / parempi kuin kilpailijoilla
Liikevaihto	○	○	○	○	○	○	○
Liikevaihdon kasvu	○	○	○	○	○	○	○
Suhteellinen liikevoitto edelliseltä tilikaudelta	○	○	○	○	○	○	○
Sijoitetun pääoman tuottoprosentti (ROI)	○	○	○	○	○	○	○
Kokonaispääoman tuottoprosentti (ROA)	○	○	○	○	○	○	○
Markkinaosuus	○	○	○	○	○	○	○
Markkinaosuuden kasvu	○	○	○	○	○	○	○
Kassavirran heilahtelu (volatiliteetti)	○	○	○	○	○	○	○
Taloudellisten tavoitteiden saavuttaminen	○	○	○	○	○	○	○

[]K29c. Innovaatioindikaattorit *

Valitse sopivin vaihtoehto:

	Huomattavasti matalampi kuin kilpailijoilla	Matalampi kuin kilpailijoilla	Jonkin verran matalampi kuin kilpailijoilla	Ei eroa kilpailijoihin nähden	Jonkin verran korkeampi kuin kilpailijoilla	Korkeampi kuin kilpailijoilla	Huomattavasti korkeampi kuin kilpailijoilla
Uusien tuotteiden osuus liikevaihdosta	○	○	○	○	○	○	○
Uusien tuotteiden kannattavuus	○	○	○	○	○	○	○
Tuote-/palveluinnovaatiot	○	○	○	○	○	○	○
Nopeus, jolla uudet tuotteet/palvelut saadaan markkinoille	○	○	○	○	○	○	○
Uusien menestyneiden tuotteiden/palveluiden lukumäärä	○	○	○	○	○	○	○

8.2 In-depth analyses, graphs and tables

8.2.1 Scale reliability – Initial and modified cronbrach's alphas

Latent Variable	CA if item deleted	CA initial	CA final*
CE		**0,766**	**0,766**
This firm encourages customers to share opinions of its products or services with the firm	,634		
This firm encourages customers to share opinions of its products or services with other customers	,703		
This firm encourages customers to participate interactively in designing products and services	,744		
MT		**0,568**	**0,658**
In our kind of business, customers' product preferences change quite a bit over time	,406		
Our customers tend to look for new products all the time	,413		
We are witnessing demand for our products and services from customers who never bought them before	,522		
New customers tend to have product related needs that are different from those of our existing customers	,463		
We cater to many of the same customers that we used to in the past (R)	,658		
TT		**0,872**	**0,872**
The technology in our industry is changing rapidly	,831		
Technological changes provide big opportunities in our industry	,845		
Many new product ideas have been made possible through technological breakthroughs in our industry	,829		
Technological developments in our industry are rather minor (R)	,839		
NPP		**0,884**	**0,884**
New products' share of revenues	,852		
Profitability of new products	,872		
Product/Service innovations	,846		
Speed at which new products/services launched into market	,875		
Number of new successful products/services	,846		
FP		0,840	**0,865**
Revenues	,835		
Revenue growth	,824		
Relative profits compared to previous fiscal year	,803		
Return on investiment (ROI)	,804		
Return on assets (ROA)	,803		
Market share	,830		
Market share growth	,829		
Cashflow volatility	,865		
Meeting financial goals	,808		

* items that lessened Cronbach's Alpha were removed (marked in grey)
* (R) = reverse-coded

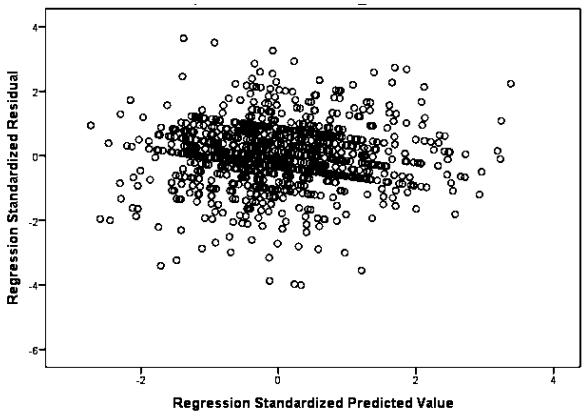
8.2.2 Reliability and validity of regression analyses

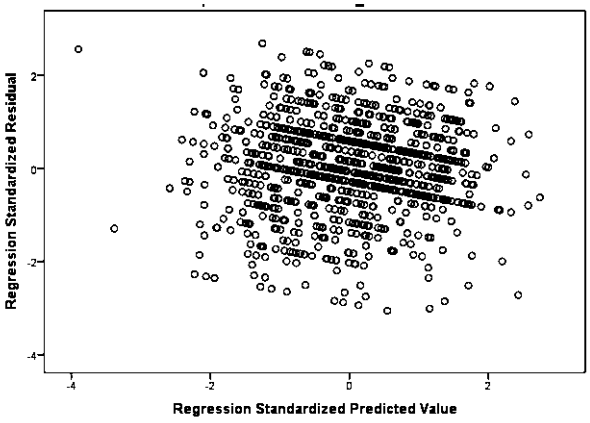
Analyses for heteroscedasticity, error term normality & multicollinearity

New product performance

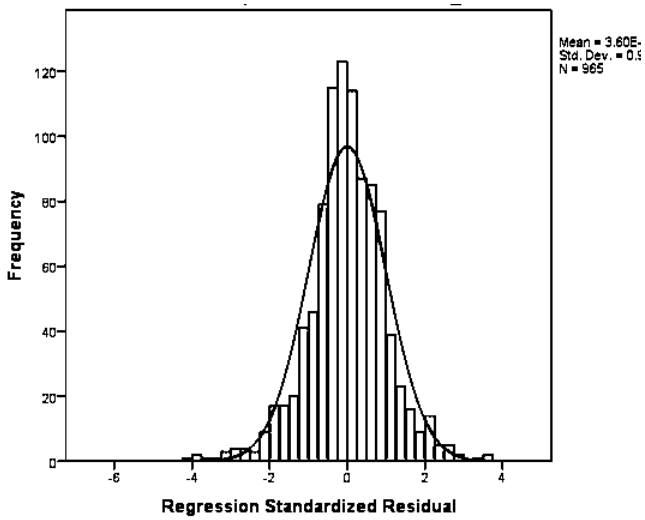
Firm performance

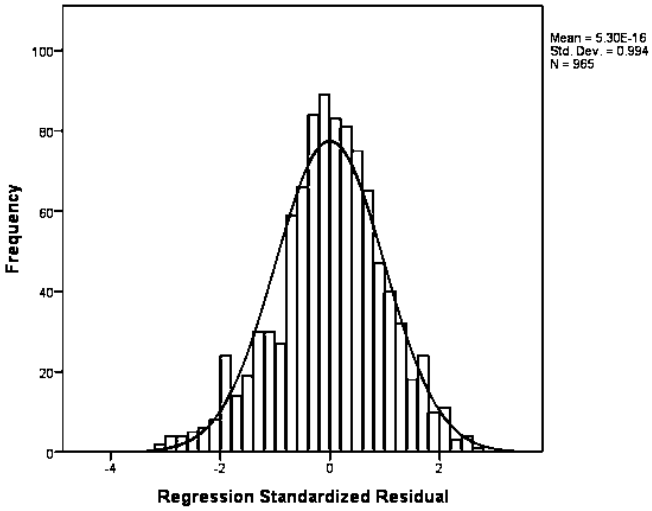
Heteroscedasticity

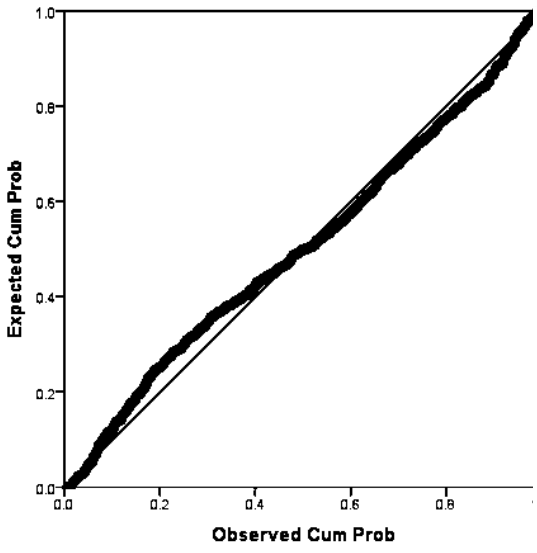


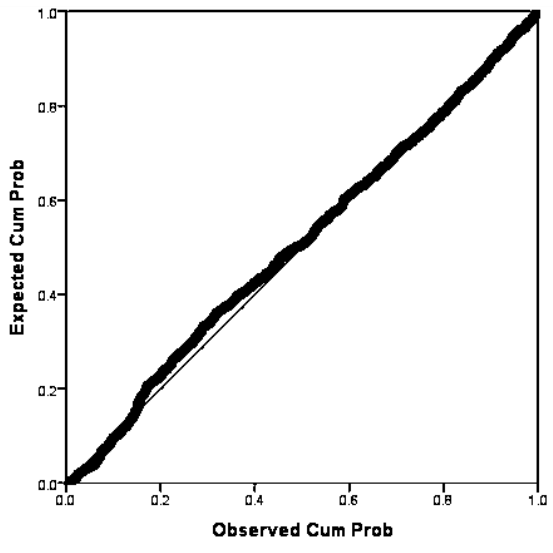


Error term normality









Multicollinearity 1: variance inflations, tolerances & standard errors

Model		New product performance						Firm performance					
		Uncentered			Centered			Uncentered			Centered		
	Variables	**Tol.**	**VIF**	**SE**	**Tol.**	**VIF**	**SE**	**Tol.**	**VIF**	**SE**	**Tol.**	**VIF**	**SE**
1	Market position	.903	1.107	.035	.903	1.107	.047	.903	1.107	.047	.903	1.107	.035
	Firm size (Employees)	.903	1.107	.014	.903	1.107	.019	.903	1.107	.019	.903	1.107	.014
2	Market position	.900	1.111	.034	.900	1.111	.046	.900	1.111	.046	.900	1.111	.034
	Firm size (Employees)	.897	1.115	.014	.897	1.115	.019	.897	1.115	.019	.897	1.115	.014
	Customer Empowerment	.992	1.009	.024	.992	1.009	.033	.992	1.009	.033	.992	1.009	.024
3	Market position	.893	1.120	.034	.893	1.120	.047	.893	1.120	.047	.893	1.120	.034
	Firm size (Employees)	.886	1.128	.014	.886	1.128	.019	.886	1.128	.019	.886	1.128	.014
	Customer Empowerment	.950	1.053	.025	.950	1.053	.034	.950	1.053	.034	.950	1.053	.025
	Technological Turbulence	.755	1.324	.022	.755	1.324	.031	.755	1.324	.031	.755	1.324	.022
	Market Turbulence	.795	1.258	.063	.795	1.258	.029	.795	1.258	.086	.795	1.258	.021
	B2B vs. B2C	.899	1.112	.058	.899	1.112	.086	.899	1.112	.079	.899	1.112	.063
	Manufacturing vs. Service	.873	1.146	.021	.873	1.146	.079	.873	1.146	.029	.873	1.146	.058
4	Market position	.893	1.120	.034	.893	1.120	.047	.893	1.120	.047	.893	1.120	.034
	Firm size (Employees)	.884	1.131	.014	.884	1.131	.019	.884	1.131	.019	.884	1.131	.014
	Customer Empowerment	.092	10.876	.079	.946	1.057	.034	.092	10.876	.108	.946	1.057	.025
	Technological Turbulence	.049	20.548	.088	.755	1.324	.031	.049	20.548	.121	.755	1.324	.022
	Market Turbulence	.795	1.258	.063	.795	1.258	.029	.795	1.258	.086	.795	1.258	.021
	B2B vs. B2C	.898	1.113	.058	.898	1.113	.086	.898	1.113	.079	.898	1.113	.063
	Manufacturing vs. Service	.873	1.146	.021	.873	1.146	.079	.873	1.146	.029	.873	1.146	.058
	CE*TT	.028	35.555	.016	.993	1.007	.022	.028	35.555	.022	.993	1.007	.016
5	Market position	.891	1.122	.034	.893	1.120	.047	.891	1.122	.047	.893	1.120	.034
	Firm size (Employees)	.882	1.134	.014	.884	1.131	.019	.882	1.134	.019	.884	1.131	.014
	Customer Empowerment	.083	12.002	.090	.942	1.061	.034	.083	12.002	.123	.942	1.061	.025
	Technological Turbulence	.048	20.957	.095	.755	1.324	.031	.048	20.957	.130	.755	1.324	.022
	Market Turbulence	.286	3.502	.063	.792	1.263	.029	.286	3.502	.086	.792	1.263	.021
	B2B vs. B2C	.893	1.120	.058	.898	1.113	.086	.893	1.120	.079	.898	1.113	.063
	Manufacturing vs. Service	.872	1.147	.094	.872	1.146	.079	.872	1.147	.129	.872	1.146	.058
	CE*TT	.027	36.618	.018	.846	1.181	.024	.027	36.618	.024	.846	1.181	.018
	CE*MT	.149	6.720	.017	.842	1.188	.023	.149	6.720	.023	.842	1.188	.017
6	Market position	.883	1.132	.034	.884	1.131	.047	.883	1.132	.047	.884	1.131	.034
	Firm size (Employees)	.881	1.135	.014	.883	1.133	.019	.881	1.135	.019	.883	1.133	.014
	Customer Empowerment	.047	21.184	.111	.940	1.064	.034	.047	21.184	.152	.940	1.064	.025
	Technological Turbulence	.048	21.039	.096	.755	1.325	.031	.048	21.039	.131	.755	1.325	.022
	Market Turbulence	.286	3.502	.287	.792	1.263	.029	.286	3.502	.393	.792	1.263	.021
	B2B vs. B2C	.045	22.161	.058	.897	1.115	.086	.045	22.161	.079	.897	1.115	.063
	Manufacturing vs. Service	.868	1.151	.096	.869	1.150	.079	.868	1.151	.131	.869	1.150	.058
	CE*TT	.027	36.745	.018	.832	1.202	.024	.027	36.745	.024	.832	1.202	.018
	CE*MT	.149	6.721	.018	.808	1.237	.024	.149	6.721	.024	.808	1.237	.018
	CE*B2Bvs.B2C	.034	29.648	.054	.942	1.062	.073	.034	29.648	.073	.942	1.062	.054
7	Market position	.882	1.134	.034	.883	1.132	.047	.882	1.134	.047	.883	1.132	.034
	Firm size (Employees)	.881	1.135	.014	.883	1.133	.019	.881	1.135	.019	.883	1.133	.014
	Customer Empowerment	.032	31.634	.135	.939	1.065	.034	.032	31.634	.185	.939	1.065	.025
	Technological Turbulence	.046	21.931	.098	.755	1.325	.031	.046	21.931	.133	.755	1.325	.022
	Market Turbulence	.285	3.503	.293	.792	1.263	.029	.285	3.503	.401	.792	1.263	.021
	B2B vs. B2C	.043	23.082	.272	.893	1.119	.087	.043	23.082	.371	.893	1.119	.063
	Manufacturing vs. Service	.040	25.093	.096	.868	1.152	.080	.040	25.093	.131	.868	1.152	.058
	CE*TT	.026	38.447	.018	.800	1.250	.025	.026	38.447	.025	.800	1.250	.018
	CE*MT	.149	40.639	.018	.808	1.237	.024	.149	40.639	.024	.808	1.237	.018
	CE*B2Bvs.B2C	.032	31.108	.055	.899	1.112	.075	.032	31.108	.075	.899	1.112	.055
	CE*ManufVsService	.026	38.826	.051	.901	1.110	.069	.026	38.826	.069	.901	1.110	.051

* VIF = variance inflation factor, SE = standard errror, Tol. = Tolerance

Multicollinearity: condition indices & variance proportions (NPP regression)

Model			Variance Proportions										
		Condition Index	Market Position	Empl.	CE	TT	MT	B2B vs. B2B	Service vs. Manuf	CE * TT	CE * MT	CE * B2C vs. B2B	CE * Service vs. Manuf
1	1	4.902	.41	.86									
	2	6.104	.57	.12									
2	1	5.202	.00	.75	.08								
	2	5.951	.97	.17	.04								
	3	13.748	.02	.07	.88								
3	1	6.030	.13	.39	.01	.02	.01	.00	.06				
	2	7.663	.07	.04	.00	.01	.00	.57	.11				
	3	8.141	.75	.51	.00	.00	.00	.00	.01				
	4	10.371	.00	.00	.00	.26	.11	.11	.56				
	5	12.469	.02	.00	.56	.27	.00	.12	.08				
	6	14.074	.01	.00	.10	.44	.79	.03	.01				
	7	23.523	.02	.06	.34	.00	.09	.16	.17				
4	1	5.892	.10	.28	.00	.00	.00	.02	.02	.00			
	2	7.955	.08	.12	.00	.00	.01	.52	.01	.00			
	3	8.624	.76	.52	.00	.00	.00	.00	.00	.00			
	4	9.112	.00	.01	.00	.00	.00	.01	.54	.01			
	5	12.954	.01	.00	.03	.01	.41	.01	.01	.00			
	6	13.383	.01	.00	.02	.01	.31	.28	.15	.00			
	7	20.911	.04	.06	.00	.04	.27	.15	.26	.02			
	8	89.805	.00	.00	.95	.93	.00	.01	.00	.96			
5	1	5.934	.10	.25	.00	.00	.00	.02	.01	.00	.00		
	2	8.379	.08	.10	.00	.00	.00	.51	.03	.00	.00		
	3	9.089	.68	.57	.00	.00	.00	.00	.01	.00	.00		
	4	9.231	.08	.00	.00	.00	.00	.00	.52	.00	.00		
	5	11.264	.00	.00	.00	.01	.01	.14	.01	.01	.01		
	6	13.669	.01	.00	.02	.01	.02	.00	.01	.00	.00		
	7	18.739	.05	.07	.01	.01	.00	.31	.43	.01	.01		
	8	88.993	.00	.00	.12	.96	.21	.00	.00	.97	.21		
	9	113.084	.00	.00	.85	.01	.77	.00	.00	.01	.77		
6	1	6.202	.08	.22	.00	.00	.00	.00	.01	.00	.00	.00	
	2	6.836	.05	.08	.00	.00	.00	.01	.04	.00	.00	.01	
	3	9.518	.60	.60	.00	.00	.00	.00	.02	.00	.00	.00	
	4	9.580	.19	.00	.00	.00	.00	.00	.37	.00	.00	.00	
	5	11.630	.00	.00	.00	.01	.01	.00	.01	.01	.01	.00	
	6	13.102	.00	.02	.01	.01	.01	.01	.12	.00	.00	.01	
	7	18.289	.07	.07	.01	.00	.00	.00	.43	.00	.00	.01	
	8	64.193	.01	.00	.00	.23	.02	.60	.00	.24	.02	.60	
	9	102.062	.01	.00	.02	.63	.63	.19	.00	.64	.63	.18	
	10	125.366	.00	.00	.96	.11	.34	.20	.00	.11	.34	.19	
7	1	6.013	.05	.13	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	7.021	.08	.16	.00	.00	.00	.00	.00	.00	.00	.01	.00
	3	9.089	.01	.02	.00	.00	.00	.00	.01	.00	.00	.00	.00
	4	9.938	.75	.52	.00	.00	.00	.00	.00	.00	.00	.00	.00
	5	11.509	.02	.11	.00	.00	.01	.00	.00	.00	.00	.01	.01
	6	12.166	.00	.00	.00	.01	.01	.00	.00	.01	.01	.00	.00
	7	18.227	.07	.06	.01	.00	.00	.00	.00	.00	.00	.00	.00
	8	**61.216**	.01	.00	.00	.05	.00	.48	.19	.05	.00	.48	.18
	9	**80.980**	.00	.00	.00	.33	.11	.07	.46	.33	.11	.07	.46
	10	**106.517**	.01	.00	.01	.58	.65	.18	.00	.58	.65	.17	.00
	11	**151.813**	.00	.00	**.97**	.02	.22	.25	.34	.02	.22	.26	.34

Multicollinearity 3: condition indices & variance proportions (FP regression)

Model			Variance Proportions										
		CI	Market Position	Empl.	CE	TT	MT	B2B vs. B2B	Service vs. Manuf	CE * TT	CE * MT	CE * B2C vs. B2B	CE * Service vs. Manuf
1	1	4.902	.41	.86									
	2	6.104	.57	.12									
2	1	5.202	.00	.75	.08								
	2	5.951	.97	.17	.04								
	3	13.748	.02	.07	.88								
3	1	5.984	.13	.38	.01	.02	.03	.00	.05				
	2	7.567	.09	.01	.00	.01	.02	.48	.15				
	3	8.099	.66	.55	.00	.00	.01	.02	.01				
	4	9.598	.04	.00	.01	.10	.36	.16	.30				
	5	12.057	.05	.00	.46	.04	.21	.05	.31				
	6	12.945	.00	.00	.13	.81	.35	.11	.00				
	7	22.926	.02	.06	.40	.01	.02	.18	.18				
4	1	5.863	.10	.28	.00	.00	.01	.01	.02	.00			
	2	7.839	.10	.07	.00	.00	.04	.46	.03	.00			
	3	8.574	.66	.58	.00	.00	.01	.01	.00	.00			
	4	9.064	.03	.00	.00	.00	.01	.00	.55	.01			
	5	11.029	.05	.00	.01	.00	.73	.12	.00	.00			
	6	13.457	.01	.00	.04	.02	.10	.21	.07	.00			
	7	19.736	.04	.06	.00	.03	.10	.18	.34	.02			
	8	89.645	.00	.00	.95	.94	.00	.01	.00	.96			
5	1	5.905	.10	.25	.00	.00	.00	.02	.00	.00	.01		
	2	8.250	.09	.05	.00	.00	.01	.44	.05	.00	.00		
	3	9.017	.44	.61	.00	.00	.01	.02	.06	.00	.00		
	4	9.190	.26	.01	.00	.00	.00	.00	.43	.00	.01		
	5	11.164	.03	.00	.00	.01	.13	.18	.03	.01	.03		
	6	12.192	.03	.01	.02	.02	.09	.00	.00	.00	.03		
	7	18.845	.04	.07	.01	.01	.01	.33	.41	.01	.05		
	8	36.501	.01	.00	.08	.06	.74	.00	.02	.06	.86		
	9	94.646	.00	.00	.88	.90	.00	.01	.00	.92	.00		
6	1	6.176	.09	.22	.00	.00	.00	.00	.01	.00	.01	.00	
	2	6.831	.05	.07	.00	.00	.00	.01	.04	.00	.00	.01	
	3	9.438	.53	.58	.00	.00	.01	.00	.04	.00	.00	.00	
	4	9.574	.21	.00	.00	.00	.00	.00	.38	.00	.01	.00	
	5	11.009	.03	.03	.00	.00	.18	.00	.01	.01	.01	.00	
	6	12.374	.00	.02	.01	.02	.01	.01	.04	.00	.05	.00	
	7	18.119	.07	.07	.01	.00	.00	.00	.48	.00	.01	.01	
	8	35.194	.01	.00	.02	.02	.76	.06	.01	.01	.87	.04	
	9	65.917	.00	.00	.01	.40	.03	.51	.00	.40	.03	.52	
	10	117.848	.00	.00	.95	.56	.00	.42	.00	.57	.00	.41	
7	1	6.008	.05	.13	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	6.977	.08	.15	.00	.00	.00	.00	.00	.00	.00	.01	.00
	3	8.918	.00	.03	.00	.00	.02	.00	.01	.00	.01	.00	.00
	4	9.879	.74	.44	.00	.00	.01	.00	.00	.00	.00	.00	.00
	5	10.934	.00	.16	.00	.00	.10	.00	.00	.01	.00	.00	.00
	6	12.168	.01	.02	.00	.02	.03	.00	.00	.01	.06	.00	.00
	7	17.469	.09	.06	.01	.00	.03	.00	.00	.00	.00	.00	.01
	8	**35.391**	.00	.00	.01	.01	.78	.03	.01	.01	.90	.02	.01
	9	**61.234**	.01	.00	.00	.05	.00	.50	.19	.06	.00	.50	.18
	10	**85.309**	.00	.00	.00	.76	.01	.01	.42	.76	.01	.01	.42
	11	**142.763**	.00	.00	**.97**	.16	.01	.45	.37	.16	.01	.45	.37