



**Customer Integration in Innovation Development:
Illuminating Different Design Aspects**

Anna-Lena Hanker

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Justus-Liebig-University Giessen

Department of Business Administration and Economics

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Supervisors:

Prof. Dr. Monika C. Schuhmacher

Chair of the Department of Business Administration with the focus on Technology, Innovation, and Start-up
Management (BWL X)

Prof. Dr. Alexander Haas

Chair of the Department of Marketing and Sales Management (BWL I)

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List of Abbreviations

AVE	Average Variance Extracted
B2B	Business-to-Business
B2C	Business-to-Consumer
CI	Customer Integration
C.I.	Confidence Interval
CITC	Corrected Item-Total-Correlation
NPD	New Product Development
PO	Psychological Ownership
S.E.	Standard Error
SLR	Systematic Literature Review
VCC	Value Co-Creation

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1 General Introduction

1.1 Relevance and Outline of Customer Integration in Innovation Development

Scholars and managers alike agree on the importance of integrating external knowledge into innovation development processes to enhance innovation success (Schweitzer et al., 2020; Hamdi-Kidar et al., 2019). Due to the increased rate of technological development (Ibrahim and Obal, 2020), innovation cycles shorten and display new challenges for firms (Chesbrough, 2003; Foucart and Li, 2021). Firms need to respond quickly to current market developments and increased market complexity through learning about customer needs and desires in order to avoid high and costly failure rates of innovations (Füller, 2010; Hajli et al., 2020). Hence, external knowledge exploitation through open innovation processes is highly relevant for firms to react to rapidly changing markets and customer needs (Chang and Taylor, 2016; Chesbrough, 2003). For example, large multinational corporations like Dell, Starbucks, or Nivea have successfully followed and implemented open innovation approaches by integrating both internal and external stakeholders into their innovation development (Roberts et al., 2016).

The integration of customers is one central aspect of open innovation as customers are one important – if not the most important – stakeholder group that frequently contributes knowledge and value to innovation development (e.g., Cui and Wu, 2017; Enkel et al., 2005; Jespersen, 2011). In fact, the number of studies on customer integration (CI) in innovation development has increased steadily since the introduction of the open innovation paradigm by Henry Chesbrough (2003). Previous studies show that there is a high relevance of successfully integrating customers into innovation development as customers can report their needs and desires to firms to initiate and improve innovation development (e.g., Lau et al., 2010; Zhu et al., 2017). Empirical research as well as different success stories demonstrate an overall positive impact of CI in innovation development on firm performance (e.g., Cui and Wu, 2016; Li et al., 2020) and on new product success (Franke et al., 2006; Zhu et al., 2017). For example, well-

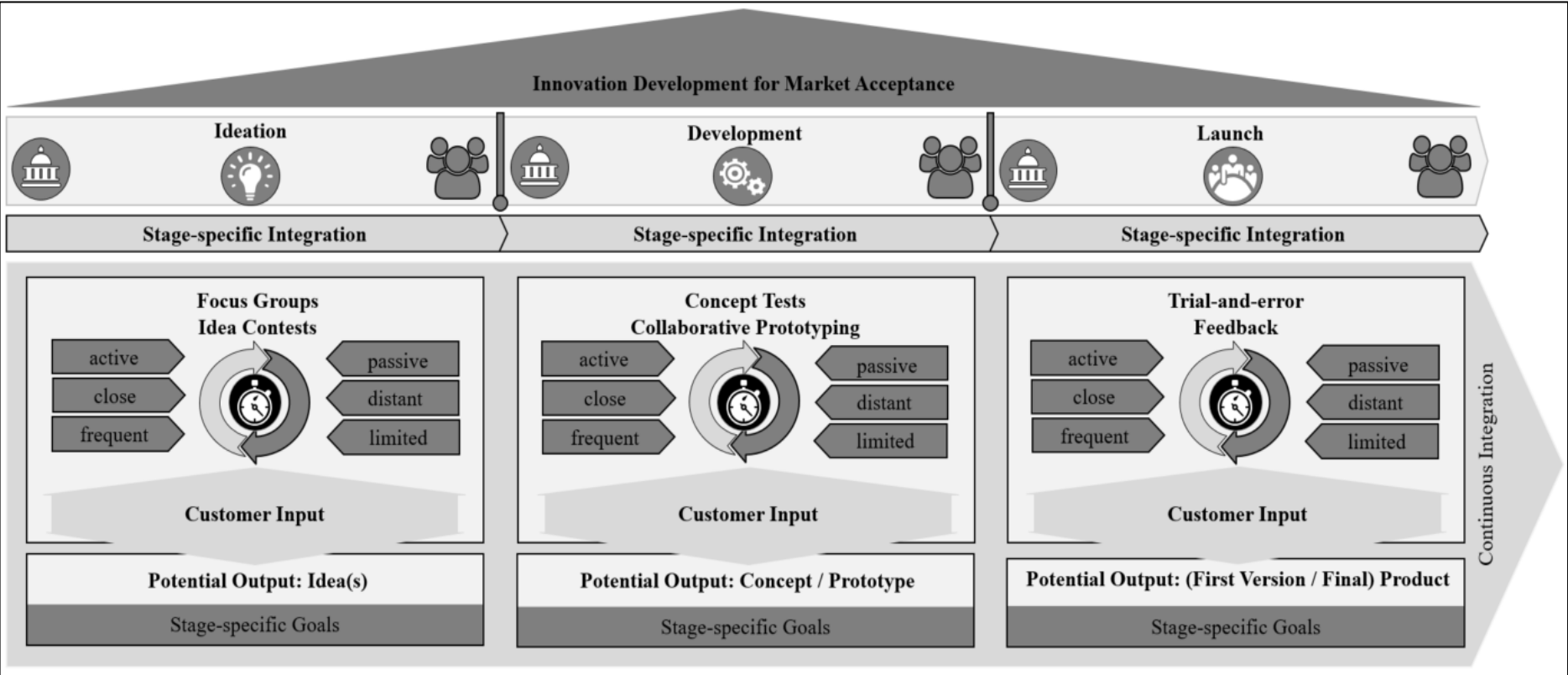
known firms like LEGO or IBM regularly integrate customers into their innovation development to enhance firm success (Bayus, 2013; Hiennerth et al., 2014). The success of these firms support research findings in reporting positive outcomes of CI in innovation development. Such positive outcomes include, but are not limited to, value creation (Poetz and Schreier, 2012), the increase of financial performance indicators (Chang and Taylor, 2016), an increased technical quality and speed to market (Carbonell et al., 2009), or the positive effect on customer satisfaction through an increased market fit between the developed innovation and the customer need (Chan et al., 2010; Sawhney et al., 2005).

In literature, a multitude of different terminologies for what this dissertation conceptualizes as CI exists, such as customer participation (Fang, 2008), co-creation (Gemser and Perks, 2015), user involvement (Magnusson, 2009), crowdsourcing (Poetz and Schreier, 2012), co-development (Stock et al., 2017), and many more. One central element all these terminologies share is the interaction of firms with customers to innovate (Bosch-Sijtsema and Bosch, 2015; Rohrbeck et al., 2010). Therefore, by using the term CI, the present dissertation generally refers to any possible participation form of actual and potential customers and/or users of a future innovation in the innovation development of a firm (Magnusson, 2009; von Hippel, 1986). In this sense, customers can actively engage in collaborative problem solving as partners, or participate more passively when the firm ‘only’ derives knowledge from customers for internal application in the innovation development process (Cui and Wu, 2016). Overall, customers can share knowledge, and feedback about their needs with existing solutions, engage in joint problem-solving with a firm, or initiate innovative problem solutions (Poetz and Schreier, 2012). On the one hand, this interaction can be close and frequent over an extended period of time (Knudsen, 2007). On the other hand, interactions can be discrete and limited in nature (Cui and Wu, 2017). In addition, firms can integrate customers throughout any stage of the innovation development process, such as opportunity identification, idea generation, concept

development, product development, testing, or launch of a new product (Gruner and Homburg, 2000). More recently, research follows a simplified three-stage model of the innovation development process in which firms can integrate customers, consisting of ideation, development, and launch (e.g., Chang and Taylor, 2016). Whereas some scholars and managers focus on CI in such specific stages, others stress the importance of integrating customers throughout the whole innovation development process (e.g., Chang, 2019). For example, Google has initiated various idea communities to gather and generate ideas for future application, while Local Motors engages customers throughout the whole process of co-creating new cars based on 3D printing. As such, the actual process of CI can involve different integration methods with regard to the respective integration stage. On the one hand, firms use information-gathering methods for CI, like focus groups (Leahy, 2013), idea contests (Schuhmacher and Kuester, 2012), or concept tests (Janssen and Dankbaar, 2008). On the other hand, firms can apply experimental methods like trial-and-error approaches through collaborative prototyping (Bogers and Horst, 2014). To some extent, these integration methods overlap. For example, Lego created the *Friends* line based on observations of customers' playing habits in focus groups and then applied trial-and-error-approaches with their customers over an extended period of time to refine and adapt the new product.

Considering all these different, yet interweaving, aspects of CI in the innovation development process, CI ultimately aims for a better understanding of customer needs, which strengthens a firm's competitive advantage in the respective market (e.g., Sawhney et al., 2005). Hence, the overarching aim of integrating customers into innovation development is to create innovations for improved market acceptance (e.g., Fang, 2008; Hoyer et al., 2010). In line with the aforementioned considerations, Figure 1.1 illustrates a (simplified) process of CI in innovation development that aims to provide the basic understanding of CI in innovation development for this dissertation project.

Figure 1.1: Overview of the Customer Integration Process in Innovation Development



1.2 Research Questions, Overall Approach, and Outline of the Dissertation

Referring to the academic and practical relevance of CI in innovation development outlined above, several scholars have addressed the topic over the last few years. Hence, this dissertation aims to provide an up-to-date overview of CI in innovation development (paper 1), to reveal existing research gaps (paper 1), and to address the most prominent research questions regarding different CI design aspects in innovation development (paper 2 and paper 3). Consequently, the overall aim of this dissertation project is to advance theory and practice on CI in innovation development as an important facet of external knowledge integration within the open innovation paradigm (Chesbrough, 2003). Hence, the dissertation seeks to deepen the knowledge on how to integrate customers effectively and efficiently in innovation development. In the following section, the research questions relevant for this dissertation will be derived, followed by an outline of the overall approach of the dissertation.

In sum, this dissertation comprises five chapters. **Chapter 1** consists of this introductory chapter, which emphasizes the relevance of CI in innovation development and outlines the overall approach of the given dissertation. The subsequent three chapters represent one paper each, which are submitted to or accepted in peer-reviewed academic journals. The final chapter 5 summarizes the overall findings of this dissertation, its theoretical contributions, managerial implications, and the overall strengths, limitations, and potential future research directions.

Due to the strong academic and practical interest in CI in innovation development outlined above (e.g., Chang and Taylor, 2016; Roberts et al., 2016), researchers have addressed a variety of research questions with different methodologies and perspectives, specifically with a focus on new product development (NPD). These different methodologies and perspectives have resulted in diverse and conflicting findings with respect to different contextual study factors, such as empirical setting or theoretical perspective. Hence, researchers are currently confronted with a highly fragmented research field addressing various aspects of CI and its design in NPD.

Moreover, most of these studies address singular aspects of CI in NPD, such as the timing of CI in NPD (e.g., Chang, 2019) or financial outcomes of CI in NPD (Hamdi-Kidar et al., 2019). Thus, interdependencies of different aspects of CI, its design in NPD, and respective antecedents, outcomes, moderators, and mediators remain unclear. To synthesize (contradictory) research findings and to outline open research questions, **chapter 2** offers a systematic literature review (SLR) of CI in NPD, which aims to address the first two research questions of this dissertation project:

Research Question 1): Which (design) aspects of customer integration in new product development have been addressed in existing research and what is the status quo of the main results?

Research Question 2): Which potential research gaps and questions emerge for future research?

With this SLR, the contribution to research and management on CI in NPD is twofold. First, the main results of extant studies on CI in NPD are systematically synthesized. As current research does not account for interdependencies of different CI design aspects, a holistic perspective on CI (design) in NPD extends existing studies on the topic. Second, from this SLR, current research gaps across these extant studies are revealed. In addition, theoretically derived future research directions and corresponding research questions are provided for future studies to enhance the understanding on the overall process of CI in NPD. Therefore, the first study sheds light on questions for future studies that will be valuable for scholars and practitioners alike when addressed accordingly.

The following two chapters intend to deepen the understanding of specific CI design aspects and respective antecedents and outcomes. In paper 2 outlined in **chapter 3**, the aim is to broaden the understanding of different levers of CI intensity in NPD by investigating its antecedents and performance implications. Specifically, business-to-consumer (B2C) firms are focal as B2C

firms vary in their ability to enforce CI in NPD. Previous research demonstrates that different strategic firm orientations play a decisive role in the design of CI, such as competitor orientation (e.g., Svendsen et al., 2011), entrepreneurial orientation (e.g., Sulhaini and Sulaimiah, 2017), or market orientation (e.g., Hurley and Hult, 1998). Specifically, prior studies indicate that market orientation affects firms' innovation activities (Hurley and Hult, 1998; Narver et al., 2004). Following Frambach et al. (2003), paper 2 frames market orientation as allocating given resources in response to the external environment and specifically, customers' wants and needs. This framework of market orientation is extended by considering retailers and customers as two separate stakeholder groups. Hence, retailer orientation serves as an additional facet of the market intelligence perspective (Coley et al., 2010). Based on previous studies, competitor orientation and interfunctional coordination are additionally included as market orientation facets (Kohli and Jaworski, 1990; Kohli et al., 1993; Narver and Slater, 1990). To validate the assumption on the determining role of these market orientation-related antecedents for CI intensity, the paper includes 19 interviews conducted with managers from B2C firms. These managers additionally explained what they suppose fosters CI intensity. As a result, paper 2 includes employees' incentive schemes as a fifth organizational antecedent determining CI intensity. Prior research examining firms' motivation mechanisms supports this notion (Jaworski and Kohli, 1993; Mihm, 2010; Song and Parry, 1993). In sum, paper 2 therefore investigates the role of five antecedents to CI intensity – customer orientation, retailer orientation, competitor orientation, interfunctional coordination, and incentive system – to address the third research question of this dissertation project:

Research Question 3): How can B2C firms enhance the successful integration of customers in new product development?

In addition, prior research reveals contradictory findings on when to integrate customers intensively for effective NPD. For example, Lynch et al. (2016) show that CI is most effective

in early stages only whereas Moon et al. (2018) attest a positive influence of CI in development and launch stages. Hence, current research findings on when to integrate customers intensively for new product success are inconclusive. For B2C firms, prior studies reveal conflicting findings on when CI intensity is most effective for enhanced new product success (e.g., Cui and Wu, 2017; Lynch et al., 2016). However, B2C managers need to understand the effect of CI intensity in different stages of the NPD process to best allocate resources. Thus, this dissertation addresses a fourth research question:

Research Question 4): When is customer integration intensity effective for new product success?

In sum, paper 2 outlined in chapter 3 addresses the role of different antecedents to CI intensity as one design aspect of CI and additionally examines the influence of CI intensity on new product success across different stages of the NPD process. Therefore, paper 2 extends existing research in four meaningful ways. First, paper 2 focuses on how and when to integrate customers in NPD. The question of ‘how’ addresses CI intensity in NPD and its antecedents (Study 1). The question of ‘when’ addresses the range of CI across NPD stages (Fang, 2008), i.e., the impact of CI intensity on new product success in different stages of the NPD process (Study 2). Second, the paper establishes general insights on CI intensity in a cross-sectional B2C setting and extends findings of existing studies focusing on business-to-business (B2B) settings (e.g., Gruner and Homburg, 2000; Urban and von Hippel, 1988), on specific industries (e.g., Lüthje et al., 2002; Thanasopon et al., 2018), or on specific CI tools (e.g., Lagrosen, 2005; Merlo et al., 2014). Third, the first study within the second paper identifies to what extent different key levers allow managers to influence the intensity of CI in NPD and extends prior research on CI design in B2C settings (e.g., Füller et al., 2007; Jeppesen, 2005). Finally, the paper extends the notion of market orientation by explicitly considering the orientation on retailers as an additional facet for fostering CI intensity.

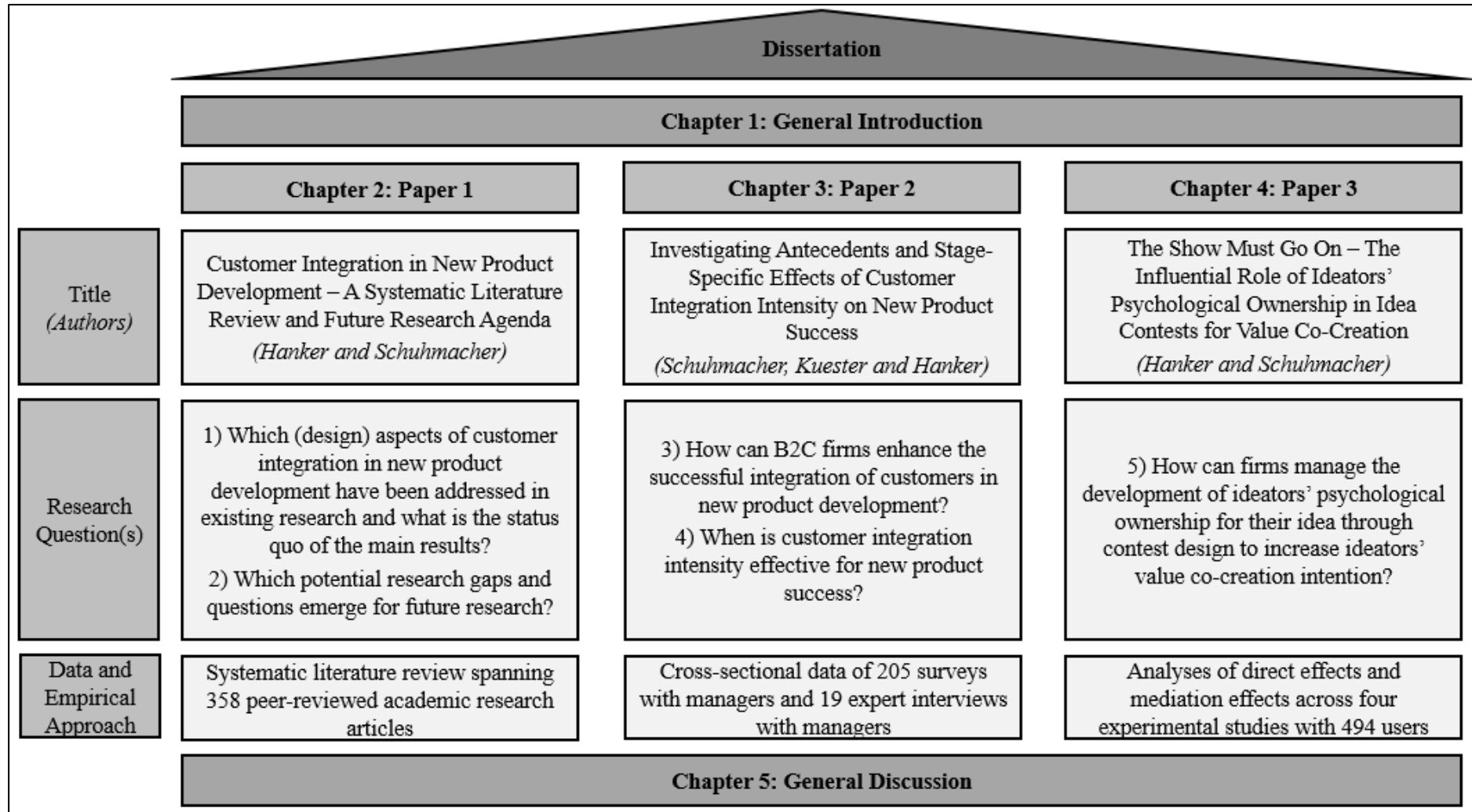
Furthermore, one central question is how to actually integrate customers into innovation development for effective long-term value co-creation (VCC). Consequently, several studies address tools and methods firms apply for leveraging external customer knowledge into firm-internal innovation development processes, such as focus groups (e.g., Leahy, 2013), user toolkits (Prügl and Schreier, 2006), or user communities on web platforms (e.g., Simula and Vuori, 2012). One prominent tool that has recently gained a high practical relevance is the usage of web platforms for initiating idea contests with users (e.g., Terwiesch and Xu, 2008). With idea contests, contest holders, i.e., firms, are able to ask interested participants to submit ideas on how to solve a specific problem or how to tackle a current challenge. Although research provides insights on what motivates so-called ideators to participate in idea contests by generating and submitting an idea (e.g., Connelly et al., 2014; Hofstetter et al., 2018), existing studies neglect that ideators emotionally bond to their idea. Hence, ideators potentially develop psychological ownership (PO) for their idea during contest participation, which likely affects their VCC intention. In sum, these considerations lead to the fifth and final research question tackled in this dissertation:

Research Question 5): How can firms manage the development of ideators' psychological ownership for their idea through contest design to increase ideators' value co-creation intention?

Drawing on insights from contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003), paper 3 outlined in **chapter 4** combines these two theoretical perspectives to propose that customers submitting ideas in innovation contests emotionally bond to their ideas, which ultimately increases their intention for VCC with the contest-initiating firm. In line with these theoretical viewpoints and previous insights demonstrating that different contest designs enable firms to shape contest outcomes (Lazear and Rosen, 1981; Terwiesch and Xu, 2008), the third paper additionally suggests that ideators' VCC intention is manageable by contest holders via

affecting ideators' levels of PO for their idea as an outcome of different contest designs. For example, extant studies show that contest holders can apply different contest designs to influence contest outcomes, such as idea quality (Piller and Walcher, 2006) or the number of submitted ideas (Bockstedt et al., 2016). Thus, the experimental settings applied for this paper center around different contest design elements to investigate how these contest designs impact ideators' developed PO for their submitted idea and in turn, ideators' VCC intention. Hence, four idea contests in the form of field experiments address the role and management of PO in idea contests for ideators' VCC intention. Hence, this paper contributes to research on and the management of idea contests in two major ways. First, all studies within the third paper show that ideators develop high levels of PO for their idea, which in turn affect their VCC intention for that idea beyond the actual idea contest. Second, the findings demonstrate that firms are able to manage the level of PO and ultimately, ideators' VCC intention via different contest designs. Specifically, a textual rather than a visual contest task, a broad compared to a focused task specificity, and contestant visibility instead of blind contests increase ideators' levels of PO and thus, their VCC intention.

Finally, **chapter 5** concludes this dissertation with a summary and discussion of the main findings to emphasize how the three separate academic papers outlined in this dissertation enhance the understanding of CI in innovation development. The final chapter additionally highlights the main theoretical contributions and managerial implications of this dissertation and delineates its main strengths and limitations, thereby outlining potential future research directions. In sum, Figure 1.2 illustrates the overall structure of this dissertation.

Figure 1.2: Overall Structure of the Dissertation

2 Paper 1: Customer Integration in New Product Development – A Systematic Literature Review and Future Research Agenda

Anna-Lena Hanker^a and Monika C. Schuhmacher^a

^aDepartment of Business Administration with the focus on Technology, Innovation, and Start-up Management, Justus-Liebig-University of Giessen, Licher Str. 62, 35394 Giessen, Germany

Status: Reject and Re-Submit in the Journal of the Academy of Marketing Science

Abstract

Researchers and managers alike have long realized the innovation potential of CI in NPD. Consequently, different research streams address different design aspects of CI or/and antecedents, outcomes, moderators or mediators of CI. With the focus of extant research on design aspects of CI, researchers investigate, for example, customer characteristics, the timing of CI, or tools for CI in NPD. This fragmented research field with different emphases calls for a SLR of the findings on the design of CI in NPD. Based on a systematically derived sample of 358 empirical articles covering 42 years, we provide an aggregate overview of the current status quo of the literature. We synthesize research findings into a holistic framework, from which we uncover research gaps, develop a future research agenda based on different theoretical and conceptual perspectives, and propose potential research questions.

Keywords: *Customer Integration, New Product Development, Systematic Review*

Triggered by the seminal work by Chesbrough (2003) on open innovation and by von Hippel (1986) on lead users, managers and researchers alike have realized the innovative potential of CI in NPD. Consequently, customers are not simply buyers and users of an innovation, but they actively shape a firm's NPD as feedback providers (e.g., Simula and Vuori, 2012), ideators (e.g., Schweitzer et al., 2014), and even co-developers (e.g., Stock et al., 2017). Researchers refer to CI in NPD also as user involvement (e.g., Jespersen, 2010), co-creation (e.g., Nambisan and Baron, 2009), co-development (e.g., Stock et al., 2017), or crowdsourcing (e.g., Zhu et al., 2017). Although there are conceptual differences across these terms, all of these concepts share the idea of interaction between customers and firms to innovate. With CI, we consequently refer to the interaction between customers and firms in NPD with the aim of innovating new products (e.g., Enkel et al., 2005).

Different research streams constitute the CI literature. One class of studies investigates CI in general and shows the overall positive impact of CI on firm performance (e.g., Cui and Wu, 2016; Rubera et al., 2016). A second class of studies, i.e., a highly fragmented research field, addresses a multitude of research questions and perspectives on the design of CI in NPD. Most of these studies address singular design aspects of CI in NPD, e.g., on customer characteristics (e.g., von Hippel, 1986), CI in specific stages (Chang, 2019) or across stages of the NPD (e.g., Gruner and Homburg, 2000), or specific tools used for CI (e.g., Fang, 2008). On the one hand, these studies reveal contradictory results as they differ in research focus or empirical setting. On the other hand, interdependencies of different CI facets remain unclear. In sum, increasing publication numbers demonstrate a growing interest in this topic. However, a highly fragmented research field addressing several interdependent research questions unravels.

In consequence to the bulk of research on CI in NPD, researchers have started to conduct reviews on this topic (see Table 2.1). However, these reviews either include CI in NPD only as a subtopic (e.g., Randhawa et al., 2016), or they focus on one specific CI facet (e.g., Goduscheit

and Jørgensen, 2013). Thus, the interrelations of various facets of CI and its different design aspects are unclear. For example, there are contradictory findings with regard to when customers should be integrated into NPD to maximize NPD success (e.g., Lynch et al., 2016; Rohrbeck et al., 2010) or whether co-creating products with lead users results in products of higher quality compared to collaborating with ordinary users (e.g., Ogawa and Pongtanaalert, 2013; Schweisfurth, 2017). Due to the focus of these studies, we lack a holistic understanding of interrelations of various facets of CI in NPD. In addition, extant reviews rarely include theoretically and/or conceptually derived research gaps and a corresponding agenda for future research. Thus, our goal is to provide a SLR summarizing the entire body of research on CI and its different design aspects in NPD. Specifically, we aim to provide an overview of research foci in the field among the last 42 years by systemizing the heterogeneous body of literature into a holistic framework. To promote future research directions, we uncover current research gaps and derive suggestions and potential research questions for future research based on different theoretical and conceptual perspectives.

Our contribution with this SLR is twofold. First, we systematically summarize and synthesize the main results of CI research. So far, interdependencies of different facets are not clear as most studies address only single aspects of CI. Hence, we take a holistic perspective and address interrelations of CI and its design aspects. Second, despite the vast amount of existing reviews on CI in NPD, we lack a discussion of research gaps and guidance for a future research agenda based on specific theoretical and conceptual perspectives. Based on our SLR, we reveal research gaps and develop theoretically and conceptually motivated avenues for future research. This way, our study helps strengthening the focus on questions that will add value to scholars and practitioners alike. Thus, we highlight research gaps and develop future research suggestions by outlining specific, theory-driven research questions.

Table 2.1: Overview of Reviews on Customer Integration-related Topics

Authors (Year)	Method	Number of Articles	Study Focus	Including Customer Integration	Holistic Framework	Future Research Directions
Lüthje and Herstatt (2004)	Literature Review	Not given	Lead User Method	No	No	Yes
Hauser et al. (2006)	Literature Review	Not given	Research Fields in Innovation	Partly	No	Yes
Greer and Lei (2012)	Literature Review	Not given	How Firms Engage in CI	Yes	Partly	Yes
Goduscheit and Jørgensen (2013)	SLR	61	User Toolkits	Users only	No	No
Randhawa et al. (2016)	Co-Citation Analysis	321	Open Innovation	Users only	No	Yes
Palacios et al. (2016)	Trends	43	Crowdsourcing & Organizational Forms	Crowdsourcing only	No	Yes
Gamble et al. (2016)	SLR	127	User-centric Innovation	Users only	No	No
Chang and Taylor (2016)	Meta-Analysis	35	Contingency Factors for CI Effectiveness	Yes	Yes	No
Alves et al. (2016)	Co-Citation Analysis	426	Value Co-creation in Management	Partly	No	No
Current Study	SLR	358	Holistic Framework of CI in NPD	Yes	Yes	Yes

2.1 Procedure

For our SLR, we followed the general systematic review process proposed by Palmatier et al. (2018) based on Littell et al. (2008). First, we formulated research questions: 1) Which (design) aspects of CI in NPD have been addressed in existing research and what is the status quo of the main results? 2) Which potential research gaps and questions emerge for future research? Second, we specified our setting of interest by defining CI, i.e., the interaction between customers and firms in NPD with the aim of innovating new products (e.g., Enkel et al., 2005; Fang, 2008), and by determining exclusion criteria (see Table 2.2). Additionally, we developed a protocol for a sound study design that is transparent and replicable (Littell et al., 2008; Palmatier et al., 2018). We used the procedure outlined in Figure 2.1 and created a template based on specific categories, such as journal, year of publication, and variables of investigation, to allow for the assessment of articles. Third, for sampling, we derived keywords by investigating all articles on CI published between 2011 and 2016 in four leading journals, which outline a focus on innovation according to their mission statements: *Journal of Product Innovation Management*, *International Journal of Innovation Management*, *Creativity and Innovation Management*, and *International Journal of Entrepreneurship and Innovation*. Based on the published articles on CI in this period, we identified 39 relevant keywords (see Appendix A1). Combining each keyword with the search term *new product development*, we searched the scholarly database EBSCO to find articles published in peer-reviewed journals. This scan resulted in a total sample of N=1,741 studies published until the end of 2019, when we stopped our searching procedure. Reviewing the titles of these articles, we excluded all duplicates (N=458), articles published in a foreign language (not English; N=20), and articles with no full text available (N=9), resulting in a preliminary sample of N=1,254 articles (see Figure 2.1). Fourth, we reviewed the abstracts of the remaining articles based on our exclusion criteria (see

Table 2.2) and consequently excluded N=751 articles, yielding a sample of N=503 articles. We uploaded these 503 articles in our template based on our study protocol.

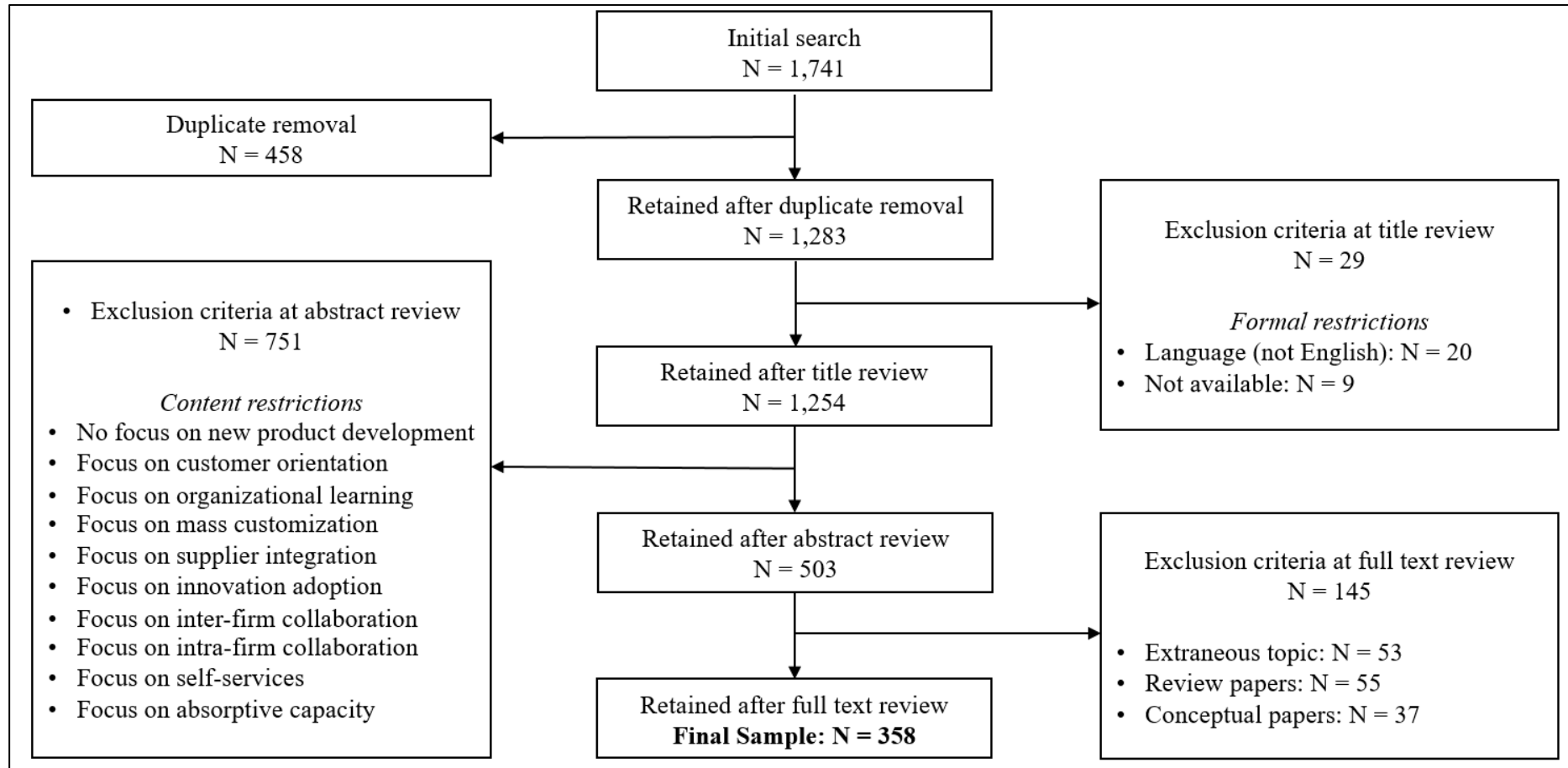
To review these articles systematically, we read the 503 articles' full texts. Based on this reading, we had to exclude further 145 articles due to extraneous topics (N=53), review papers (N=55), such as mere viewpoint papers, narrative literature reviews (e.g., Greer and Lei, 2012; Hauser et al., 2006; Lüthje and Herstatt, 2004), or SLRs that presented no new research insights (e.g., Gamble et al., 2016; Goduscheit and Jørgensen, 2013). Here, we also excluded a trend analysis (Palacios et al., 2016) and several co-citation analyses (e.g., Alves et al., 2016; Randhawa et al., 2016). Additionally, as we are interested in synthesizing research findings, we focused on empirical articles only and excluded all papers of conceptual nature (N=37). Thus, our final sample consists of 358 research articles. Fifth, for data analyses, we used the software MAXQDA for coding our sampled articles as the software allows for summarizing and assigning heterogeneous text material to headers for comparability. In addition, this procedure allows for quantifying the vast amount of research on CI. We structured our database by entering the first 10% of papers for which we created a system of categories and subcategories using codes. Here, we started with descriptive codes, such as year of publication. In addition, we coded setting backgrounds, such as industry or stage of CI, for which subcodes were the respective industries and stages. Further, we deductively derived categories for the variables empirically investigated based on the conceptual models outlined in the respective studies. For example, our analysis shows that researchers investigate different tools for CI, for which we then used subcodes like focus groups, communities, or toolkits. We deductively derived additional codes when we found new insights and established a hierarchical coding system by aggregating subcodes where applicable. Two researchers conducted this step independently. Then the researchers compared, discussed, and revised their codes and made adjustments where necessary. Next, both researchers independently coded the remaining articles. This analysis

resulted in an overall intercoder-reliability of 0.81. Based on this analysis step, we deductively derived our results, which we discussed and adjusted. In the following and final sixth step, we report our results and conclusions (Palmatier et al., 2018).

Table 2.2: Specification of Exclusion Criteria at Abstract Review and at Full Text Review for the Systematic Literature Review

Criterion	Specification	Example
<i>Extraneous topic: No focus on new product development</i>	Articles that do not examine CI in the NPD process. Such articles usually investigate strategic aspects, e.g., organizational learning or absorptive capacity, cost optimization, process innovations, business model innovations, or new service development.	Kahn (2001) investigates the effect of market orientation and interdepartmental integration on product development performance and thereby focuses on the result of internal integration mechanisms on the product performance, but not on the NPD itself.
<i>Extraneous topic: Not customer integration</i>	Articles that focus on internal or external knowledge integration via stakeholders other than customers or articles that do not specifically focus on CI, e.g., supplier integration, inter-firm, or intra-firm collaboration.	Schiele (2010) focuses on supplier integration as an open innovation approach to investigate how innovative firms organize purchasing functions for NPD.
<i>Extraneous topic: Focus on customer relations after new product development</i>	Articles that focus on customer orientation or customer relationship management in sales, e.g., customer preferences and behaviour in product purchasing, innovation adoption, product improvements, mass customization of final products, or product-based self-services.	Steiner and Hergenröther (2014) investigate modular product architectures for mass customization, but they focus on existing (sub-) product variants that can be selected for customizing products out of a high selection variety.
<i>Review papers</i>	Articles that purely narrate on existing studies to synthesize findings.	Sommer and Moskowitz (2016) summarize best practices and pitfalls on co-creation in virtual environments based on existing findings.
<i>Conceptual papers</i>	Articles that develop concepts or frameworks for future empirical investigation.	De Waal (2016) develops an extended conceptual framework for product-market innovation and proposes a models of distinct categories which is underlined by industry examples.

Figure 2.1: Methodology of Sample Selection and Exclusion Criteria

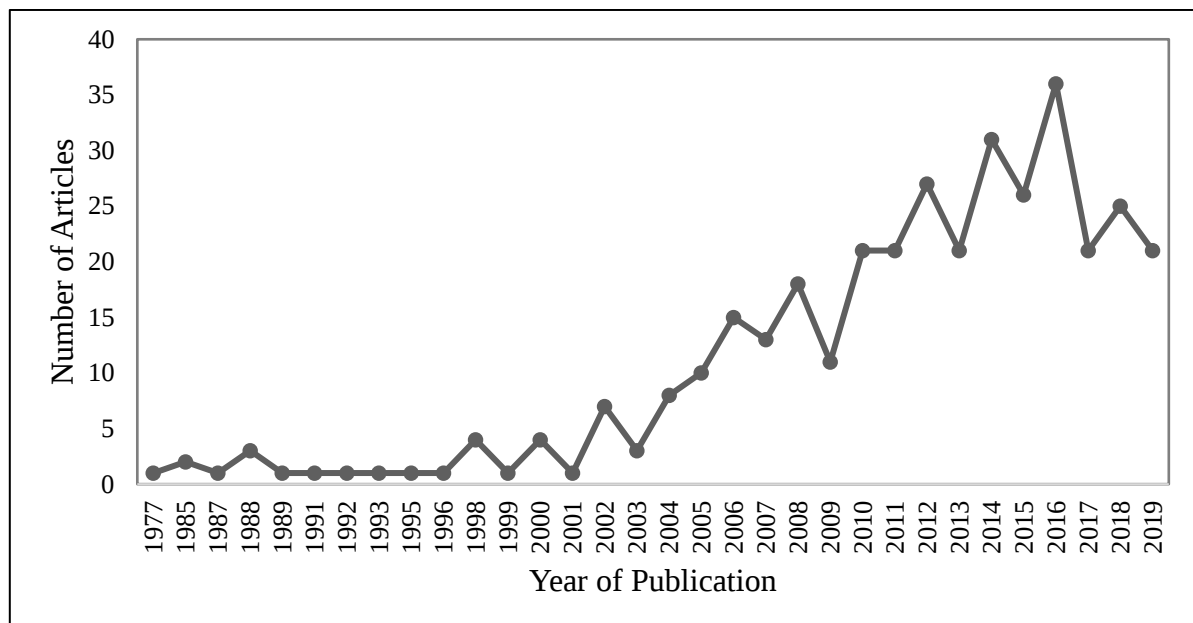


2.2 Results

2.2.1 Development of Research Area

Overall, the sampled articles on CI in NPD cover a 42-year time span from 1977-2019. After a period of more than 20 years with slowly rising interest in the topic, the number of articles on CI increased strongly in the beginning years of the 21st century (see Figure 2.2), especially after Chesbrough (2003) introduced the *Open Innovation* paradigm. As the peak of publications was reached in 2016 and publications dropped since then, the timing for a SLR is appropriate.

Figure 2.2: Publications on Customer Integration in New Product Development



Furthermore, with 116 journals, we find a variety of journals publishing articles with a focus on CI. These journals span research areas such as management, marketing, and engineering. Out of these 116 samples journals, 28 journals published three or more of our sampled articles (see Table 2.3). In addition, 22 journals published two articles each and 66 journals are included in our literature sample with one publication each.

Table 2.3: Journals and Number of Publications

Rank	Number of Publications	Journal
1	65	Journal of Product Innovation Management
2	19	International Journal of Innovation Management
3	12	Research Policy
	12	R&D Management
4	11	Industrial Marketing Management
5	10	International Journal of Product Development
6	9	Journal of Business & Industrial Marketing
	9	Journal of Marketing
7	8	Creativity & Innovation Management
	8	Management Science
8	7	Research Technology Management
	7	Journal of Business Research
	7	Technovation
	7	International Journal of Technology Management
9	6	Industrial Management & Data Systems
	6	Journal of Engineering & Technology Management
10	5	European Management Journal
	5	Journal of Marketing Research
11	4	Computers and Industrial Engineering
	4	International Journal of Innovation and Technology Management
	4	Journal of Engineering Design
	4	Journal of Intelligent Manufacturing
	4	Journal of Marketing Management
12	3	Decision Sciences
	3	Journal of Cleaner Production
	3	Journal of the Academy of Marketing Science
	3	Marketing Letters
	3	Technology Analysis & Strategic Management

2.2.2 Empirical Setting of Customer Integration (Design) in New Product Development

– Status Quo

Examining the empirical setting of the sampled articles, we refer to the study context, such as the sector and industry, and CI implementation, i.e., medium, tool, and stage (see Figure 2.3).

First, we find that only 68% of the articles specify the sector of investigation, i.e., whether they focus on the B2C and/or B2B market. Of those that indicate the general sector, 55% focus

on B2C, 36% on B2B, and 8% explicitly on both B2B and B2C. In addition, 1%, i.e., two articles, focus solely on the C2C sector.

Second, regarding specific industries, 58% of the sampled articles explicate a specific industry. The majority centers in technology and IT (e.g., Nambisan and Baron, 2009), followed by the food industry (e.g., Ku et al., 2016) and health industry (e.g., Schweitzer et al., 2015). Other industries frequently investigated for CI are the automotive industry (Rese et al., 2015) and household appliances (e.g., Verleye, 2015). 21% of the articles use cross-industrial designs (e.g., Homburg and Kuehnle, 2014). Finally, 21% of the articles do not specify the industry setting (e.g., Füller et al., 2012).

Third, the sampled articles differ in the way researchers implement CI. On the one hand, studies differ in the medium chosen for CI, i.e., analog or digital (e.g., Mallapragada et al., 2012). On the other hand, researchers apply different tools of CI, e.g., toolkits (e.g., Füller et al., 2011). As a result, researchers combine different mediums and tools for their empirical settings. For example, Füller et al. (2007) address innovation by online communities, thus implementing a digital medium and a community as the tool. In contrast, Kratzer and Lettl (2008) investigate school groups by using an analog medium and focus groups as the tool. Overall, frequently applied tools in research include innovation contests like idea contests (e.g., Schweitzer et al., 2012) or design competitions (e.g., Nishikawa et al., 2013), community platforms (e.g., Zhu et al., 2017), discussion forums (e.g., Nambisan and Baron, 2009), or social media comments (e.g., Roberts and Candi, 2014). With regard to the medium, most studies (61%) do not specify whether they use the chosen CI tool embedded in an analog or digital medium. Of the remaining studies that indicate the medium, most articles apply a digital medium (28%) (e.g., Faullant et al., 2016) and only few studies (8%) use an analog medium (e.g., Leahy, 2013). Finally, very few studies (3%) use both an analog and digital medium (e.g., Schweitzer et al., 2012).

Fourth, we find that articles differ in their focus on NPD stages. Overall, 48% of the articles do not specify which NPD stage they apply. Of the remaining articles, 8% simplify a focus on early stages. Similarly, 18% of studies span various stages (e.g., Zhu et al., 2017). Some studies zoom in on a specific NPD stage. With 15% of the articles (e.g., Schweitzer et al., 2014), the stage most frequently applied for studying CI is the ideation stage. Moreover, 5% of the articles focus on the development and/or design stages, 3% on the screening and concept testing stages, 2% on prototyping and validation stages, and 1% on the launch and commercialization stage.

2.2.3 Empirical Settings of Customer Integration (Design) in New Product Development – Future Research Directions

From our insights on the empirical settings of our sampled articles, we derive two main avenues for future research (see Table 2.4). First, even though research on CI in NPD started in the B2B context (e.g., Foxall et al., 1985), the focus has shifted to the B2C context in recent years (e.g., Schuhmacher et al., 2018). In fact, considering technological developments, we find a need for research to shift its attention back to the B2B sector, which is currently outdated. For example, avatar-based CI, e.g., in form of virtual prototyping, overcomes intangibility and enables firms to provide B2B customers with visual insights into complex product settings, such as mechanical engineering (e.g., Kohler et al., 2009). In addition, we know little about the usefulness of CI tools in general, but especially with regard to newly arising digital tools for the B2B setting. Consequently, research needs to adapt those tools in investigating CI to explain which B2B firms should use which (digital) CI tools for which purpose.

Second, not only for B2B, but also for B2C markets, digital technologies such as virtual reality (VR) or augmented reality (AR) are applied for CI. This way, firms can enable customers to interactively experience the product concept and adapt functionalities and designs instantaneously according to their needs (e.g., Flávian et al., 2019). Thus, CI research in the

B2C setting needs to use such digital tools based on VR/AR for CI to receive insights on their applicability. Respective studies should also assist researchers in understanding how to achieve specific NPD outcomes with such tools and specifically, which potentially new outcomes should be developed from and for such CI.

2.2.4 Antecedents of Customer Integration (Design) in New Product Development – Status Quo

As antecedents of CI (design) in NPD, researchers consider factors regarding the customer environment, i.e., customer motives and barriers, and the firm environment, i.e., firm characteristics, NPD process characteristics, and new product characteristics (see Figure 2.3).

2.2.4.1 Customer Environment

2.2.4.1.1 Customer Motives

In general, customer motives drive customers to participate in CI (e.g., Nambisan and Baron, 2009). Overall, following the self-determination theory (Ryan and Deci, 2000) and the seminal articles by Füller (2006; 2010), researchers investigate extrinsic motives, e.g., payment and career prospects, and intrinsic motives, e.g., fun and altruism.

In the context of extrinsic motives, an extensive amount of studies investigates how different rewarding structures influence customers' willingness to participate in CI. Rewards investigated are money (e.g., Füller, 2010), prizes (e.g., Blohm et al., 2011), reputation (e.g., Salgado and De Barnier, 2016), or social recognition (e.g., Ogawa and Pongtanalert, 2013). For example, Salgado and De Barnier (2016) find that monetary and reputational rewards motivate customers to participate in NPD contests. In contrast, other studies demonstrate that monetary rewards and reputation are less relevant to customers than, e.g., social recognition (e.g., Füller et al., 2010; Rohrbeck et al., 2010).

For intrinsic motives, Blohm et al. (2011) show that identifying with the firm and peers, altruism, skill development, intellectual stimulation, and fun motivate customers to participate in CI (see also, e.g., Nambisan and Baron, 2009). Additionally, customers perceive idea sharing, exchanging knowledge, a feeling of belonging, and the contact to peers as rewarding activities within CI (e.g., Füller et al., 2007). Another motive for CI is customers' dissatisfaction with existing product solutions (e.g., Füller, 2010; Raasch et al., 2008). Here, studies demonstrate that customers participate in CI to solve their individual problems and to fulfil their personal needs (Lüthje, 2004). In this sense, learning motivation and intrinsic interest in product improvement are drivers for customer participation in CI (e.g., Füller, 2010).

Finally, some studies do not focus on the willingness to participate but investigate how specific customer motives drive the output of CI. For example, Stock et al. (2015) demonstrate that intrinsic motives like fun and learning lead to a higher degree of newness of the innovation while extrinsic motives like reward expectations more strongly affect innovation feasibility. In contrast, Acar (2018) shows that monetary rewards increase neither the number nor the novelty of ideas generated by customers.

2.2.4.1.2 Customer Barriers

In contrast to motives, some studies investigate what hinders customers to participate in CI in NPD, i.e., customer barriers (e.g., Braun and Herstatt, 2008). For example, Kok et al. (2012) find perceived effort and lack of time as barriers to CI participation. In addition, researchers show that potential difficulties resulting from technological complexity, problematic interactions with firms, and a lack of feedback hinder customers to participate in CI (e.g., Braun and Herstatt, 2008). Finally, opaque mechanisms of CI and an uneasy use of CI platforms likely result in customer barriers to CI (e.g., Simula and Vuori, 2012).

2.2.4.2 Firm Environment

2.2.4.2.1 Firm Characteristics

Several studies zoom in on how firm characteristics lead firms to implement CI. On the one hand, studies investigate organizational settings as antecedents to CI. Specifically, researchers examine the role of organizational structure (e.g., Kim et al., 2008; Langerak and Hultink, 2008), organizational culture (e.g., Kim et al., 2008; Mahr and Lievens, 2012), or the degree of cross-functional integration or coordination for explaining whether firms make use of CI and how they design CI (e.g., Keszey and Biemans, 2016; Schuhmacher et al., 2018). Further, the strategic orientation of the firm (e.g., Kim et al., 2008), specifically competitor orientation (Svendsen et al., 2011), retailer and customer orientation (Schuhmacher et al., 2018), market orientation (Morgan et al., 2019), as well as learning and entrepreneurial orientation (Sulhaini and Sulaimiah, 2017) are influential for implementing CI. In addition, a positive firm reputation (e.g., Henard and Dacin, 2010), transformational rather than transactional leadership styles (e.g., Stock et al., 2017), and intimate partnerships (e.g., Athaide and Zhang, 2011; Ku et al., 2016) foster CI usage. Finally, managers indicate that an employee incentive system that depends on NPD leads to a more intense CI (Schuhmacher et al., 2018).

On the other hand, extant research investigates reasons that lead firms to question the benefits of CI for NPD and thus, hinder them to apply CI. Such firm barriers to CI include the fear of increasing complexity, a potential loss of control, and the fear of sharing sensitive information (e.g., Janssen and Dankbaar, 2008; Lynch and O'Toole, 2006). Further, some firms do not perceive a need for additional skills through integrating customers (e.g., Janssen and Dankbaar, 2008). In this sense, the fear of changing familiar processes (e.g., Lynch and O'Toole, 2006), a potential lack of customer expertise (e.g., Voss, 1985), and efficiency aspects such as time and costs (e.g., Rese et al., 2015) are reasons for firms to refrain from using CI in NPD.

2.2.4.2.2 New Product Development Process Characteristics

Another pool of firm-specific antecedents relates to NPD process characteristics. Here, several studies examine how the degree of formalization of the NPD process, i.e., flexibility or control (Smets et al., 2013), influences the usage of CI. Mainly, researchers find that a high degree of formalization drives the integration of customers in NPD (e.g., Lin and Germain, 2004; Liu and Fang, 2017).

2.2.4.2.3 New Product Characteristics

A few studies investigate which new product characteristics affect firms' perceived necessity of CI. The most frequently studied new product characteristic is the degree of innovativeness (e.g., Lau et al., 2010). O'Connor (1998), for example, shows that CI is harder to implement for radical than for incremental innovations because customers have difficulties in describing requirements towards a new product for which a market does not yet exist. In contrast, Kim et al. (2008) indicate that CI is needed for digital, network-based, and modular products with a high degree of innovativeness. In this line, Callahan and Lasry (2004) find that the relevance of CI for NPD increases with innovativeness up to a certain level and decreases for very radically new products.

Similarly, researchers find that the complexity of a new product also drives CI. While Raasch et al. (2008) show that CI declines with increasing technological complexity, other studies demonstrate that product complexity drives CI (e.g., Lin and Germain, 2004). In addition, Allen et al. (2018) show that firms use CI to a certain point for designing a technical new product while restraining from CI for products perceived as overly technical. The authors find reverse effects for product usability and reliability (Allen et al., 2018).

2.2.5 Antecedents of Customer Integration (Design) in New Product Development – Future Research Directions

We develop four areas for future research on antecedents of CI (design) (see Table 2.4). First, with regard to the customer environment, more research is needed to better understand which motives enable which performance outcomes. There is a limited amount of research on the direct effect of customer motives on NPD performance outcomes. However, firms are interested in which specific customer motives to spur for intended outcomes in general, but also along specific stages of the NPD process. Regarding customer barriers to CI, research predominantly focuses on (potential) customer barriers on a general level, such as a lack of time and effort (Kok et al., 2012), limitations in skills and resources (Etgar, 2008), or physical and mental effort (Xie et al., 2008). However, empirical research lacks a more context-related investigation of customer barriers, such as distrust in the firm (e.g., Kosonen et al., 2013) or data privacy (e.g., Rust et al., 2002). For such context-related barriers, we know little about when, why, and how they emerge.

Furthermore, many firms apply CI in terms of a contest, in which participating customers compete against each other. Surprisingly, the vast amount of studies on contests neglects to investigate customer motives and barriers to participating in such a contest. We propose that research needs to account for the specific situation of rivalry within contests, which can translate into either a customer barrier or a customer motive. Contest theory provides valuable insights on rivalry mechanisms resulting in the decision on whether to participate in a contest (Terwiesch and Xu, 2008). Specifically, contest theory reasons that the decision to participate in a contest and to tackle a given challenge depends on the probability to win an announced contest prize and on the expected return of the contest (Lazear and Rosen, 1981). Drawing on contest theory, future research should investigate the relevance of such rivalry mechanisms as motives or barriers to participate in CI. Once we have a better understanding of these rivalry

mechanisms, future research should address how firms can prevent or counteract such barriers to CI by creating specific rivalry and/or incentive systems.

Second and referring to firm characteristics, leadership styles currently become more transformational than transactional (Jia et al., 2018), leading to organizational structures being less mechanistic, but more emergent and organic (Cunha and Gomes, 2003), and firms advocating team structures rather than steep hierarchies (Young-Hyman, 2017). First studies establish that firms with transformational leadership styles foster the implementation of CI (e.g., Stock et al., 2017). However, extant research lacks insights on whether and how different leadership styles support CI in NPD and how different styles influence the design and execution of CI. In this regard, cognitive resource theory (Fiedler and Garcia, 1987) postulates that especially in demanding work environments, leaders exhibit different cognitive resources, which in turn affect organizational conduct. Indeed, developing new products is a challenging and demanding work environment. Thus, based on the cognitive resource theory, future research should develop an understanding how the application of leaders' cognitive resources in form of specific leadership styles determines the application and design of CI. Specific leadership styles that we propose to potentially impact CI designs and which we thus call research to investigate are, for example, authentic leadership (Gardner et al., 2011), charismatic leadership (Conger and Kanungo, 1998), or servant leadership (Van Dierendonck, 2011).

Third, in the last years practitioners apply and researchers call for the investigation of agile and flexible NPD processes (Lee and Xia, 2010). So far, most studies on CI design mainly follow a stage-specific NPD process logic where customers are integrated in a specific NPD stage. Turning towards the understanding of agile NPD processes, NPD becomes more fluid and less structured. According to practice theory (Feldman and Orlikowski, 2011), process and outcome become inseparable, potentially blurring the boundaries between previously specific stages, such as ideation, concept development, and prototyping. Thus, agile NPD processes

come along with complexity, potentially leading to difficulties implementing CI. This situation should lead to a change in CI usage and to different CI designs, e.g., new CI tools. So far, there is paucity in research on how CI has to change for these agile and flexible NPD processes. Hence, research needs to investigate which CI design best fits to agile NPD processes.

In turn, managing agile NPD processes and thus, more flexible CI also results in an increasing complexity for employees (e.g., Janssen and Dankbaar, 2008). Consequently, employees responsible for applying agile processes for NPD might resist to integrate customers in NPD overall, potentially leading to the emergence of firm-internal barriers to CI and specific CI designs. However, extant research does not explain how top management can foresee and reduce potential employee barriers to CI in agile NPD processes. The theory of force field analysis and planned change (Lewin, 1951) provides knowledge on how to enable organizational change into the desired direction and is applicable along organizational change processes. Considering the theory's essential message that the driving forces need to be stronger than the resisting forces for change to happen, research needs to advance our understanding on how to reduce firm-internal barriers to CI and its different design aspects. Based on the theory, studies should investigate how to strengthen driving forces, such as leadership coaching, conflict management, or training programs, into a firm's culture for a long-term willingness to changing processes like agile NPD.

Finally, with regard to NPD characteristics as antecedents, we call future research to dive deeper into the topic of innovativeness. The role of innovativeness for implementing CI is not yet clear as research reveals different findings (e.g., Kim et al., 2008; O'Connor, 1998). In fact, studies on innovativeness as antecedent for CI are outdated and one-sided. Today, we know that innovativeness is not a one-dimensional construct, but captures different facets (Rubera, 2015). Drawing on contingency theory (Burns and Stalker, 1961), we know that the choices we make must fit the situation faced. Thus, future research needs to differentiate not only the degree

of innovativeness, but also take into account the type of innovativeness of the intended new product. Whereas technological innovativeness refers to a new technology applied, design innovativeness implies something new in a product's external appearance (Rubera, 2015). Consequently, different CI designs should result depending on what kind of innovativeness the firm targets. Hence, future research needs to address how different types of innovativeness lead to different CI designs. In a similar vein, researchers can then reconsider the moderating role of innovativeness as its influence for the effectiveness of CI is not yet resolved (e.g., Langerak and Hultink, 2008). Thus, we call future studies to assess how different types of innovativeness may change the relation between CI and performance outcomes of CI in NPD.

2.2.6 Customer Integration Design Aspects in New Product Development – Status Quo

A lot of research on CI investigates CI design aspects, i.e., the actual process of integrating customers into NPD (e.g., Dahan and Hauser, 2002). Overall, we find that these studies address four CI design aspects in total (see Figure 2.3): (1) focus on customers, i.e., *whom* to integrate (e.g., von Hippel, 1986; Schreier et al., 2012); (2) focus on CI timing, i.e., *when* to integrate customers (e.g., Cui and Wu, 2016; Schuhmacher et al., 2018); (3) focus on CI intensity (e.g., Fang, 2008; Gruner and Homburg, 2000), i.e., *how much* to integrate customers; and (4) focus on CI tools, i.e., *how* to integrate customers (e.g., Rejeb et al., 2011; Tidd and Bodley, 2002).

2.2.6.1 Customer Characteristics

Based on the seminal article by von Hippel (1986), a considerable amount of research focuses on customers, and specifically on the role of lead users for NPD (e.g., Gruner and Homburg, 2000). Overall, the majority of studies demonstrates a positive effect of integrating lead users (e.g., Hamdi-Kidar et al., 2019; Schreier and Prügl, 2008). Consequently, several studies are devoted to the identification of lead users (e.g., Franke et al., 2006). Findings

indicate that virtual stock markets (Spann et al., 2009) or pyramiding (von Hippel et al., 2009) are useful indicators to identify lead users. Here, the willingness to collaborate, product knowledge, and brand alignment are crucial for lead user identification (e.g., Marchi et al., 2011). Recently, researchers challenge the common assumption that lead users rest outside the firm and thus, question the outside-focused search for lead users. For example, Schweisfurth (2017) shows that lead users can also be present inside the firm. However, even though internal lead users produce ideas of higher quality than ordinary employees and users, their ideas still show inferior quality compared to those of external lead users.

In contrast to the bulk of studies that attests a positive role of lead users for NPD, some studies show an insignificant effect of lead users with regard to knowledge generation in NPD, i.e., the collection and assessment of needs and preferences (e.g., Song et al., 2006). In addition, Mahr and Lievens (2012) show that lead users are less suited for design and usability improvement. In fact, recent studies hint towards a potential market failure of lead user integration as lead users primarily innovate for their own need and do not provide sufficient value to an optimal extent of new product diffusion (e.g., de Jong et al., 2015).

Based on the discussion of lead user effectiveness and on the characterization and identification of lead users, research attention shifted towards the broader question of which customer characteristics to focus on for successful CI (e.g., Marchi et al., 2011; Schemmann et al., 2016). Thus, research shifted the focus from lead users to beneficial customer characteristics of ordinary users for NPD (e.g., Schemmann et al., 2016). For example, Schreier and Prügl (2008) find customer expertise, use experience, locus of control, and consumer innovativeness to be such customer characteristics (see also, Prügl and Schreier, 2006). Further, research demonstrates the following characteristics to increase NPD outcomes: customer attributes and skills, such as creativity (e.g., Füller et al., 2010), openness and extraversion (e.g., Faullant et al., 2016; Füller et al., 2008), passion, trust, and brand identity (e.g., Füller et al., 2008; Marchi

et al., 2011), and customers' task expertise (e.g., Zhu et al., 2017). Overall, the more knowledgeable and experienced the integrated customers, the more feasible and beneficial are the resulting NPD ideas (e.g., Zhu et al., 2017). Here, a focal point of discussion is the effectiveness of customers for specific knowledge domains (e.g., Athaide et al., 2003; Eslami et al., 2018), i.e., industry-specific knowledge (e.g., Chou et al., 2015), product knowledge (e.g., Marchi et al., 2011), or technological knowledge (e.g., Athaide and Zhang, 2011).

2.2.6.2 Timing

Although several studies choose a specific NPD stage as empirical setting for investigating CI, few researchers empirically investigate when to integrate customers in NPD. Here, studies compare CI effectiveness across stages or focus on the effectiveness of a stage-comprising CI.

First, with regard to the focus on specific stages, extant studies substantiate that customers are an effective information source for specific NPD stages (e.g., Fang, 2008); predominantly, for ideation tasks in early stages (e.g., Schweitzer et al., 2012) or for product feedback in later stages (e.g., Kohler et al., 2009; Simula and Vuori, 2012). Few studies zoom in on the effectiveness of CI specifically in the middle stage of NPD, i.e., the product development. For example, Cui and Wu (2017) show that customers can be active co-developers in the middle stage (see also, Fang, 2008; Rese et al., 2015).

Second, several researchers compare the relevance of CI across different NPD stages. Most studies assess a higher CI effectiveness in early compared to late stages of NPD (e.g., Rohrbeck et al., 2010). Here, studies show that CI is most effective when only used in early stages (e.g., Lynch et al., 2016). However, Moon et al. (2018) also find CI to be effective in product development and implementation stages when firms aim for a high number of new products. Chang (2019) finds that CI across several NPD stages is less effective than CI in two NPD stages that yield synergies, such as ideation and development, or development and launch.

Finally, Chang and Taylor (2016) reveal that CI is most effective within early and late stages and less useful in middle stages of the NPD (see also, Gruner and Homburg, 2000).

Third, even though extant studies imply that CI is appropriate for NPD only in specific stages, many researchers promote an all-stage-comprising CI to be effective (e.g., Lynch and O'Toole, 2006). For example, Zimmerling et al. (2017) highlight a positive effect of CI across all NPD stages. Similarly, Eslami et al. (2018) show that CI is dynamic by nature and evolves and adapts along different stages, thus ensuring CI effectiveness for all stages of the NPD.

2.2.6.3 Intensity

While the timing perspective of CI solely addresses the when-question of integration, CI intensity refers to the questions how often to integrate customers and how long to integrate customers. Hence, CI intensity tackles CI frequency and duration, irrespective of the number of stages considered (e.g., Gruner and Homburg, 2000). In general, research identifies a higher frequency of interactions and a longer duration of CI to foster NPD outcomes (e.g., Gruner and Homburg, 2000; Lynch et al., 2016). Interestingly, Subramanyam et al. (2010) find that while customers prefer less intensive CI participation, internal developers aim for high CI intensity. In fact, Zimmerling et al. (2017) conclude that continuous and thus, intensive CI can serve as a risk management tool potentially reducing or even preventing NPD failure.

In contrast to the duration- and frequency-based understanding of CI intensity, some researchers refer to CI intensity as a question of activeness vs. passiveness, which then affects CI duration and frequency (e.g., Fang, 2008). Cui and Wu (2016) specify the passiveness of customers when integrated in NPD as solely disclosing information and the activeness as acting like real co-developers. Compared to passive behavior, more active interactions resemble a higher CI intensity, which in turn positively influences NPD effectiveness (see also, e.g., Bajaj

et al., 2004; Gruner and Homburg, 2000). Nevertheless, research results show that active CI is costly (e.g., Rohrbeck et al., 2010) and time-intensive (e.g., Rese et al., 2015).

2.2.6.4 Tools

Extant studies also turn to the CI design question of how to integrate customers, i.e., which tools firms should use for CI. Overall, the vast amount of research investigates one specific tool (e.g., Rejeb et al., 2011) and only few studies compare the usefulness of different tools (e.g., Tidd and Bodley, 2002). Here, researchers address both analog and digital tools.

Regarding analog tools, studies concentrate on focus groups for identifying customer needs (e.g., Leahy, 2013), cooperative workshops for acquiring and synthesizing new insights (e.g., Hoffmann, 2007), living labs for creating unexpected outcomes (e.g., Leminen and Westerlund, 2012), concept tests for visualization of product concepts to reduce NPD costs (e.g., Lees and Wright, 2004), or observation techniques for ergonomic testing (e.g., Kok et al., 2012).

Digital tools investigated are, for example, avatar-based innovation tools for stimulating creativity and enabling visualization and product testing in virtual worlds (e.g., Kohler et al., 2009), image boards for gathering customer feedback on new product designs (e.g., Murto et al., 2014), virtual product representations for co-designing with customers and eliciting feedback on functionality and design (e.g., Gyi et al., 2010), and user toolkits for identifying changing customer demands (Steiner et al., 2011) as well as for supporting market research (Prügl and Schreier, 2006). Another frequently examined tool is web platforms for sourcing ideas (e.g., Rohrbeck et al., 2010; Simula and Vuori, 2012). For example, Füller et al. (2007) investigate joint-development activities by online communities on web platforms (see also, Chou et al., 2015). Typically, such online communities consist of users collecting and discussing ideas, which research refers to as crowdsourcing (e.g., Bayus, 2013). Other studies on platform-based CI concentrate on social network sites (e.g., Roberts and Candi, 2014),

primarily for gathering information on customer needs and preferences. In addition, firms initiate contests for specific NPD-related tasks on web platforms and ask customers for solutions in exchange for a prize (Piller and Walcher, 2006).

Overall, most studies investigating CI tools agree that analog tools are effective in generating new and in-depth insights from rather few customers (e.g., Hoffmann, 2007; Lees and Wright, 2004). In contrast, digital tools are very efficient in terms of integrating a high number of customers who create a vast amount of input in a short period of time (e.g., Allen et al., 2018; Schemmann et al., 2016). Thus, firms searching for function-related or technological information should use web-based surveys (e.g., Olsen and Welo, 2011). For both analog and digital tools, CI in form of a peer network is beneficial as gaining feedback from other users and being attentive to their ideas enhances the probability of submitting ideas with a high potential for idea realization and commercialization (Hoornaert et al., 2017; Jensen et al., 2014).

2.2.6.5 Interplay of Customer Integration Design Aspects

While most researchers investigate isolated effects of single CI design aspects, few studies focus on the interplay of different CI design aspects, i.e., they question how CI design aspects interweave. The majority of these few studies investigate how two CI design aspects interweave. For example, Schuhmacher et al. (2018) investigate the interplay of CI intensity and CI timing, i.e., how the degree of CI intensity in different NPD stages affects specific NPD outcomes. In contrast, Füller et al. (2010) examine which personal characteristics are important for which NPD stage. Similarly, Jespersen (2010) demonstrates a differential impact of pioneering and requesting users for the ideation and commercialization stages.

2.2.7 Customer Integration Design in New Product Development – Future Research Directions

Considering our literature synthesis on specific CI design aspects, we reveal several research gaps and suggest four specific avenues for future research with several research questions each (see Table 2.4). First, firms increasingly turn to digital CI today, such as prototyping via VR (Dahan and Hauser, 2002). Although studies on such CI designs exist (e.g., Sawhney et al., 2005), research lacks insights on how VR/AR-enabled CI designs call for different types of customers who are willing to participate in and can contribute to CI based on digital technologies, e.g., customers with a high level of stereoscopic vision or play instinct. Furthermore, due to the increasing use of platforms and communities for CI (Schemmann et al., 2016), we see that some customers pay more attention to and build upon others' ideas. In fact, these customers turn out to deliver more useful ideas (e.g., Bayus, 2013). However, research so far provides no insights on what drives some customers to behave more attentively. At the same time, firms often combine different ideas of several customers to create an ideal solution (e.g., Zhu et al., 2017). Once research provides a better understanding on mechanisms turning customers into ideator entities, firms will save costs and effort. Thus, researchers should pay more attention on how to design effective customer teams. Here, researchers can draw on fundamental creativity research like the Whole Brain Model (Herrmann, 1996). This model proposes that teams which cover all four thinking styles, i.e., logical, organizational, empathetic, and creative, are more effective in creative activities. This way, researchers could turn to different thinking styles as customer characteristics and investigate how thinking styles and resulting team compositions can contribute to effective CI in NPD.

Second, extant studies on CI intensity predominantly define CI intensity as comprising CI frequency and CI duration. For example, Gruner and Homburg (2000) measure CI intensity with items referring to the duration and the frequency of joint work (see also, e.g., Lynch et al.,

2016; Schuhmacher et al., 2018). We question whether frequency, duration, or also activeness of CI really constitute CI intensity. For example, frequently responding to online surveys unlikely corresponds to high CI intensity in terms of customers' intensive interaction with the task, which should be determined through engagement, contribution, and commitment (e.g., Schleimer and Shulman, 2011). These considerations point to a lack in research with regard to a fine-grained understanding, and thus conceptualization and operationalization, of CI intensity. Therefore, research should spend effort on a scale development for CI intensity. Once such a scale is developed, researchers can focus on finding an optimal level of CI intensity to attain desired NPD outcomes.

Third, we need a better understanding regarding the effectiveness of different CI tools. For example, results indicate that firms use digital tools mainly for efficiency reasons (e.g., Schemmann et al., 2016). Consequently, firms use social media as an efficient form of CI (e.g., Mount and Martinez, 2014). However, we propose that the use of social network sites as a CI tool also has effectiveness implications. Social identity theory (Tajfel and Turner, 1979) postulates that individuals behave in accordance with their self-concept based on the respective social group. Furthermore, the theory explains that individuals classify their behavior by the selected group membership. Social media is such a place where individuals create, define, and locate their self-concept within an intergroup system. Hence, when firms call for customer input via social network sites, participants might provide information and knowledge to keep face rather than providing the most relevant information from a firm perspective. In fact, research shows that NPD outcomes, such as firm profitability or market growth, do not improve through the use of social media (Roberts and Candi, 2014). Hence, future research needs to assess risks and benefits of social media as a CI tool for specific NPD outcomes.

In contrast to social media sites, other CI tools, do not threaten the self-concept of individuals. For example, when participating on platforms such as Innocentive, usually only

initiating firms but not participants are able to see contributions. Similarly, for being a member of a community, one can choose a pseudonym and thus, the NPD input can be anonymous. Therefore, future research should better understand social dynamics taking place with different CI tools. Based on such social dynamics, research needs to investigate which tools are effective for specific NPD outcomes. However, research lacks a comparison of the effectiveness of different CI tools for different NPD outcomes. Similarly, with regard to the medium used, researchers seem to choose digital and analog settings for investigating CI in NPD randomly or because of convenience reasons. While many studies apply digital CI for efficiency reasons (e.g., Füller et al., 2007), firms specifically emphasize the importance of analog CI for effective interactions (e.g., Schweitzer et al., 2012). Thus, respective to our research call on the effectiveness of CI tools, we encourage researchers to investigate which medium suits which purpose and NPD outcome. Overall, future research needs to investigate the fit effectiveness of different tools and the chosen medium in general and for specific NPD outcomes.

Finally, following contingency theory (Burns and Stalker, 1961), research needs to provide insights regarding how different CI design aspects complement each other best. For example, firms need to know which types of customers fit best with which CI tool at which time in the NPD. Although some studies focus on the interplay of different CI design aspects (e.g., Füller et al., 2010; Schuhmacher et al., 2018), these studies investigate the simultaneous effect of only two CI design aspects. To allow for studying the interplay of several CI design aspects in more depth, research needs to step back from common regression methods enumerating different aspects in isolation. With advancement of statistical methods, research can focus more on the holistic design of CI and turn to the questions of whom, when, how, and how intense to integrate customers holistically rather than focusing on single design aspects. For example, future studies could apply methods such as cluster analyses or qualitative comparative analyses of different CI design aspects to enable the investigation of successful CI designs in NPD.

2.2.8 Performance Outcomes of Customer Integration (Design) in New Product Development – Status Quo

Most CI studies investigate either the impact of CI in general or the role of specific CI design aspects on different performance outcomes. The measured outcomes range from firm-related to new product-related and customer-related performance outcomes (see Figure 2.3).

2.2.8.1 Firm Performance Outcomes

The majority of studies on CI in NPD concentrate on financial or market-related firm performance outcomes. The most frequently used indicators refer to financial indicators, such as sales, revenues, or return on investment (e.g., Bajaj et al., 2004) or overall firm profitability (e.g., Koufteros et al., 2005), market performance, i.e., market share or commercial success (e.g., Hamdi-Kidar et al., 2019), and NPD success in terms of revenue share of new products (e.g., Gesing et al., 2015). Overall, most studies report positive effects of CI on firm performance outcomes (e.g., Keszey and Biemans, 2016; Sulhaini and Sulaimiah, 2017).

2.2.8.2 New Product Performance Outcomes

Studies also portray performance outcomes of CI (design) on the new product level. Here, researchers follow different logics, either focusing on effectiveness-based or efficiency-based new product performance outcomes. With regard to the first, studies zoom in on financial and/or non-financial new product performance outcomes. Researchers operationalize financial new product performance via new product revenue, market share, and profitability (e.g., Cui and Wu, 2016; Tseng and Chiang, 2016), sales performance (e.g., Zhu et al., 2017) or the achievement of profit targets (Tseng and Chiang, 2016). Overall, researchers agree that CI positively affects such new product performance outcomes.

Indicators to measure non-financial performance are the achievement of specific new product attributes, such as innovativeness or quality, time-to-market, or the fulfilment of customer needs (e.g., Yang and Zhang, 2018; Tseng and Chiang, 2016). For stimulating new product demand, several studies investigate effects of CI on the commercial attractiveness of the new product (e.g., Hoornaert et al., 2017; Jensen et al., 2014; Schemmann et al., 2016). Altogether, studies find a positive impact of CI on commercial attractiveness of the new product (Franke et al., 2006), on new product quality (e.g., Füller et al., 2011) or on idea quality (e.g., Blohm et al., 2011; Huang et al., 2014), on new product creativity (e.g., Piller and Walcher, 2006), on the novelty of ideas and solutions (e.g., Nishikawa et al., 2013; Poetz and Schreier, 2012), on new product functionality (e.g., Mahr and Lievens, 2012), on product portfolio innovativeness (e.g., Rubera et al., 2016), and on product innovativeness in general (e.g., Fang, 2008; Roberts and Candi, 2014; Sun et al., 2010). Following a formative understanding of new product performance, Fang et al. (2008) conclude that CI positively affects new product value in terms of improved quality, functionality, innovativeness, and decreased costs. In contrast, other research findings indicate that CI negatively affects new product usability (e.g., Mahr and Lievens, 2012), idea feasibility (Poetz and Schreier, 2012), innovativeness (e.g., Zahay et al., 2018), and design (e.g., Mahr and Lievens, 2012).

Adding to non-financial measures, several studies examine the quantifiable influence of CI in terms of outcome numbers of ideas and new products (e.g., Füller et al., 2011; Stock et al., 2017). Here, studies provide mixed results. For example, while Cruz-González et al. (2015) find no significant effects of CI on the number of new or significantly improved products, Stock et al. (2017) discover such an impact of CI at low and medium levels but this relationship between CI and the quantity of ideas turns negative for high levels of CI. Similarly, studies provide contradictory results about the quantity of ideas that customers provide regarding the implementation likelihood (e.g., Bayus, 2013; Schemmann et al., 2016).

Turning to efficiency-based performance indicators of CI in NPD, most studies agree that CI leads to increased product development speed (e.g., Fang, 2008; Langerak and Hultink, 2008), i.e., reduced time-to-market of the new product (e.g., Mallapragada et al., 2012), and reduced cost of the new product (e.g., Lin and Huang, 2013). Even though most studies agree that CI decreases the overall time needed for developing a new product, some researchers find no effect of CI on time-to-market (e.g., Sun et al., 2010) or demonstrate that CI overload may even lead to an increased time-to-market of the new product (e.g., Datar et al., 1996).

2.2.8.3 Customer-related Performance Outcomes

Several of the sampled studies turn to the customer perspective and conceptualize customer attitudes towards the CI-initiating firm as performance outcomes of CI in NPD. Here, research indicates that CI is likely to enhance customers' perceptions of a firm's innovation ability (e.g., Schreier et al., 2012). In addition, studies find a positive impact of CI on customer attitudes, such as customers' excitement toward the firm and the overall firm image (e.g., Fuchs and Schreier, 2011), customers' loyalty to the firm (e.g., Hidayanti et al., 2018), and tolerance for occasional failure (e.g., Henard and Dacin, 2010). Hence, research also shows that successful CI adds to higher customer satisfaction rates (e.g., Athaide et al., 2003) and strengthen the relationship between integrated customers and the firm (Svendsen et al., 2011).

2.2.9 Performance Outcomes of Customer Integration (Design) in New Product Development – Future Research Directions

Considering the performance outcomes of CI (design) in NPD, we propose two main areas for future research (see Table 2.4). First, the insights of our SLR show that most investigated outcomes do not account for the actual CI process in NPD, but rather measure performance of the entire NPD, e.g., in form of sales (e.g., Cui and Wu, 2016) or profitability (e.g., Tseng and

Chiang, 2016). However, the earlier customers are integrated, the more project developments and decisions are adjusted along the NPD (e.g., Eslami et al., 2018). As a consequence, little of the final innovation performance can be traced back specifically to CI. In other words, CI potentially does not contribute to a high percentage of the final outcome measurement. At first sight, this reflection could question the relevance of CI in NPD. In fact, this consideration might be the reason that some researchers find no effect or even negative impacts of CI on performance outcomes. However, CI can induce potential insights for other projects or solve specific problems along the way. Thus, research needs to conceptualize and operationalize more stage-specific outcomes to precisely measure the impact of CI. Hence, we call for studies investigating how to assign costs and benefits of CI along the NPD and across NPD projects.

Second, with regard to customer-related performance, present studies almost exclusively focus on positive outcomes of CI on customer attitudes (e.g., Fuchs and Schreier, 2011; Henard and Dacin, 2010). However, negative customer attitudes likely result or reinforce if customers perceive CI as non-beneficial. For example, firms reject most customer suggestions in case they receive a lot of input, e.g. on web-based platforms (Fombelle et al., 2016). Here, research shows that firms providing feedback, irrespective of being positive or negative, signal acknowledgement to customers (Wooten and Ulrich, 2017). However, feedback-intervention theory (Kluger and DeNisi, 1996) states that feedback is not always beneficial for performance outcomes because feedback interventions change the locus of attention. More specifically, feedback is highly context-dependent in terms of, e.g., the content and the form of delivery. Depending on the context, customers reveal different coping strategies, which potentially shift the focus from actual performance implications of the given feedback to emotional responses. Thus, following feedback intervention theory, future research should investigate how to frame negative feedback depending on different contexts without impeding the customer-firm-relation, so that customers focus on redoing or improving the task rather than developing

negative emotions based on the CI experience. In addition, we also know that negative emotions, such as dissatisfaction with the CI process itself or the received feedback, can ultimately result in harmful customer behavior, such as negative word-of-mouth (Bougie et al., 2003). In times of social media and rapid information spreading, such behavior can seriously harm a firm's image. Consequently, studies also need to elaborate on how to prevent and counteract negative customer emotions and potential harmful customer behavior.

2.2.10 Moderators/Mediators of Customer Integration in New Product Development – Status Quo

Finally, some studies account for different moderators and mediators affecting the relation between CI and performance outcomes of CI in NPD (see Figure 2.3).

2.2.10.1 External Environment: Market Characteristics

Several studies investigate the moderating role of market-related factors on the relation between CI and performance outcomes. Here, researchers account for the country environment as a potential explanation for the differing relevance of CI in NPD. The meta-analysis by Chang and Taylor (2016) synthesizes that the return on CI is higher for NPD activities in emerging countries than in developed countries. Another investigated market-related factor is the industry. Here, several studies examine the B2B vs. B2C context. Some researchers demonstrate the relevance of CI in B2C contexts (e.g., Bayus, 2013; Huang et al., 2014). However, Chang and Taylor (2016) show that CI is more effective for B2B markets compared to B2C markets. Finally studies show that CI turns out to be more effective for low-tech industries than for high-tech industries (e.g., Chang and Taylor, 2016; Rese et al., 2015).

2.2.10.2 Firm Environment

2.2.10.2.1 Firm Characteristics

Turning to the internal firm environment, several factors are investigated. First, researchers dive deeper into the relevance of specific growth strategies. Here, Feng et al. (2016) find that the impact of CI on new product performance is stronger when the market is new to the firm compared to an already served market. Second, some researchers focus on the firm relationship with the integrated customers. For example, Lai et al. (2011) find that CI is more or less beneficial depending on the firm employees' trust in the participants. In other words, they demonstrate that the higher the trust in collaborative relationships, the higher the positive effect of CI on new product performance. In contrast, Lin and Huang (2013) find inter-organizational collaborative relationships to have a mediating role in the CI - NPD performance relation. Finally, researchers investigate whether the effectiveness of CI depends on firm size. Chang and Taylor (2016) report a greater effect of CI on NPD performance outcomes for small firms than for large firms.

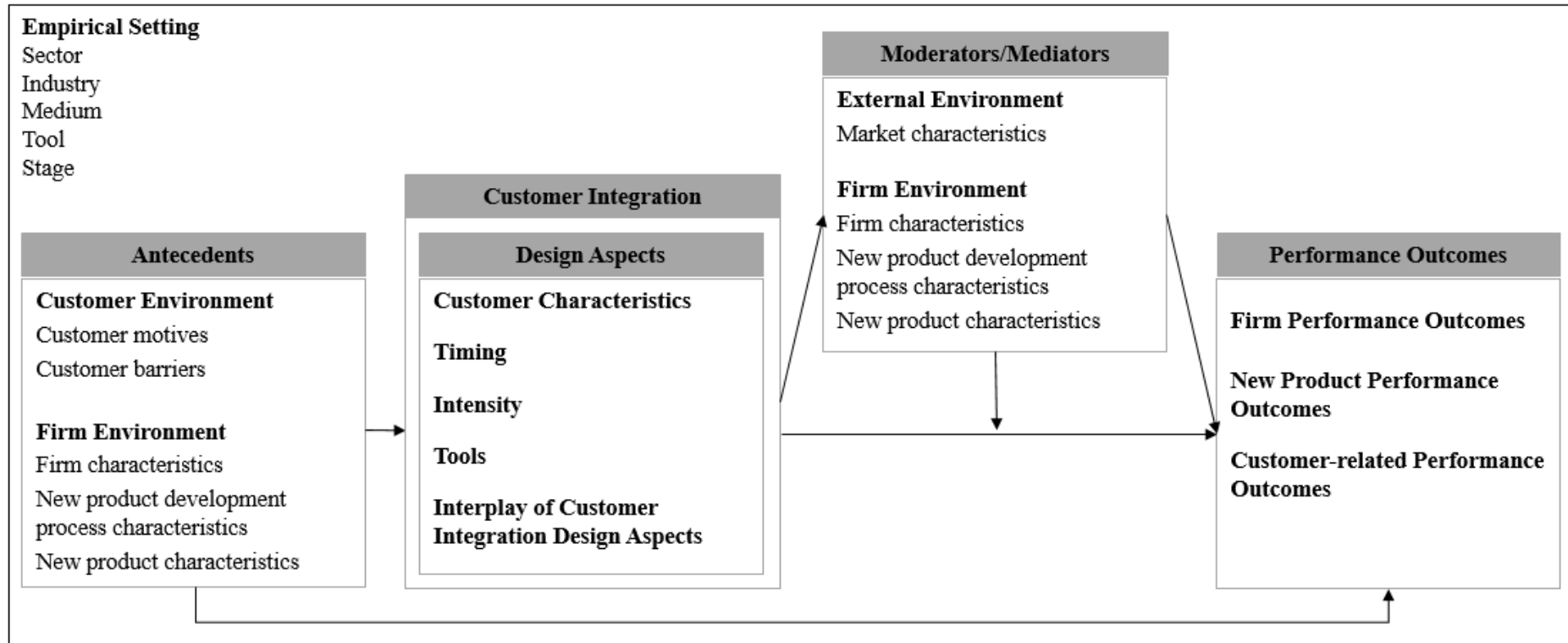
2.2.10.2.2 New Product Development Process Characteristics

In research, the current focus regarding NPD process characteristics is on NPD process flexibility. Depending on theoretical reasoning, researchers have differing views on the role of NPD process flexibility. On the one hand, some researchers show that based on the resource-based theory (Barney, 1991), NPD process flexibility positively moderates the effect of CI on NPD performance outcomes (e.g., Ku et al. 2016). On the other hand, Chien and Chen (2010) take a contingency perspective and show that process flexibility mediates the relation between CI and NPD performance outcomes.

2.2.10.2.3 New Product Characteristics

Most research on internal factors impacting the effectiveness of CI on NPD performance outcomes rests on the investigation of new product characteristics. Here, studies demonstrate a mediating role of product quality (e.g., Koufteros et al., 2005), product modularity (e.g., Lau et al., 2007), or new product innovativeness (e.g., Lau et al., 2010). Several researchers also conceptualize product innovativeness as a moderator and either find that CI is more beneficial for radical than for incremental innovations (e.g., Langerak and Hultink, 2008; Tidd and Bodley, 2002), or vice versa (e.g., Fang, 2008), respective to the investigated performance outcomes. Further, studies also find a moderating role of new product complexity (e.g., Liljedal, 2016), technological newness (e.g., Feng et al., 2016), and stability (e.g., Chang and Taylor, 2016) on the CI - NPD performance outcome relation.

Figure 2.3: Resulting Framework of Customer Integration in New Product Development



2.2.11 Moderators/Mediators of Customer Integration (Design) in New Product Development – Future Research Directions

Overall, we suggest three main areas for future research regarding moderators and mediators affecting the relation between CI (design) and NPD performance outcomes (see Table 2.4). First, with regard to market-related characteristics, we know little about CI effectiveness depending on industry factors. As many studies zoom in on one specific industry, we lack knowledge on the comparative impact of CI for various industries beyond the comparison of B2B vs. B2C (e.g., Huang et al., 2014) or high-tech vs. low-tech industries (e.g., Chang and Taylor, 2016). From a lifecycle management perspective (Levitt, 1965), an industry requires the application of different management strategies and business conduct throughout its different lifecycle stages for continued success (Levitt, 1965). Hence, successful lifecycle management can increase firm performance outcomes. As lifecycles of industries vary, research needs to understand how the specific stage in the industry lifecycle and lifecycle management influences the effectiveness of CI. Thus, a potential research question to address could be whether CI effectiveness differs for different industry lifecycle stages across different industries.

Second, we know little about the influence of general firm characteristics, such as firm size and firm age, on the effect of CI in general and specific CI design aspects on NPD performance outcomes in particular. Large firms possess more capacities, both in terms of facilities and knowledge (e.g., Barney, 1991), potentially increasing CI effectiveness. However, Chang and Taylor (2016) show across studies that the effect of CI on NPD outcomes is greater for small firms than for large firms. The reason for this effect is yet unsolved. Future studies should thus investigate if firm size and/or age per se have an impact on the relation between CI and NPD outcomes or if this effect is the result of specific CI designs, such as who is integrated when, how, and how intense, independent of firm size and age. Applying causation and effectuation principles (Sarvasvathy, 2001), larger firms follow actions on the logic of causation, i.e., they

focus on the outcome rather than on the means and organize their resources accordingly. In contrast, as small firms usually do not have the resources or capabilities to implement CI with the means of established firms, they rely strongly on entrepreneurial effectuation, i.e., they adapt CI based on the means they possess (Sarasvathy, 2001). Hence, if firms build NPD processes with CI following an effectual logic, the effect of CI design on NPD performance outcomes might change, irrespective of firm size and age. Considering that CI is more effective for NPD performance outcomes in small compared to large firms (Chang and Taylor, 2016), future studies need to investigate if it would be beneficial for larger firms to follow an effectuation logic when implementing CI. Thus, future research should take into account firm size and effectuation principles moderating the relation between CI designs on NPD outcomes.

Finally, we find that plenty of studies investigate the general influence of CI on NPD outcomes. As discussed, the CI literature zooms in on different CI design aspects to better understand how to integrate customers in NPD. How and when these design aspects affect specific outcomes differently, however, is rarely addressed. For example, referring to the studies investigating the ideal timing of CI in NPD, authors draw different conclusions in which stage of the NPD process to integrate customers (e.g., Lynch et al., 2016; Schuhmacher et al., 2018). So far, the origin of these opposing results is not understood. Based on contingency theory claiming that optimal actions depend upon both external and internal factors (Burns and Stalker, 1961), we propose that extant studies neglect relevant contingency factors, such as market focus, growth objectives, or innovation strategy, potentially influencing the relation between CI timing and NPD outcomes. For example, firms following a product development or diversification strategy might profit from CI in middle stages of the NPD to test potential solutions quickly and thus, apply a trial-and-error approach (e.g., Cui and Wu, 2017). Overall, future research consequently needs to address how and when CI designs aspects affect outcomes differently respective to present contingency factors.

Table 2.4: Future Research Agenda

Research Topic	Research Gap	Proposed Research Questions	Theoretical / Conceptual Perspectives
Empirical Settings of Customer Integration (Design) in New Product Development			
Sector and CI Implementation	Tools for CI in B2B	Which tools should B2B firms apply to use CI in NPD successfully, specifically with regard to complex and technological product settings?	
CI Implementation	Digital CI tools	- Which digital tools are applicable for investigating CI in which way? - How can specific NPD outcomes or even new outcomes develop from CI based on the application of digital tools?	
Antecedents of Customer Integration (Design) in New Product Development			
Customer Environment	Customer motives and barriers	- Which customer motives drive which NPD outcomes? - Which specific context-related barriers evolve along the NPD process? Why and how do they emerge? - Can we design rivalry mechanisms and/or incentive systems for customers to create motives or to counteract barriers for CI in NPD?	Contest theory (Terwiesch and Xu, 2008)
Firm Environment	Firm characteristics	- How do different leadership styles support CI in NPD? - Do different leadership styles, such as authentic, charismatic, or servant leadership, influence the design and execution of CI?	Cognitive resource theory (Fiedler and Garcia, 1987)
	Agile NPD processes	- Do agile and flexible NPD processes affect the usage of CI and enable specific CI designs? - How can firms foresee and reduce potential internal barriers to CI in NPD with regard to agile NPD processes?	Practice theory (Feldman and Orlikowski, 2011) Force field analysis and planned change theory (Lewin, 1951)

Table 2.4: Future Research Agenda (continued)

	New product characteristics	• Do different types of innovativeness call for different CI designs? • Would these different types of innovativeness change the relation between CI designs and outcomes of CI in NPD?	Contingency theory (Burns and Stalker, 1961)
Customer Integration Design Aspects in New Product Development			
Customer Characteristics	Customer characteristics for digital CI and effective customer teams	• Which specific characteristics do customers, who are willing to participate in and can contribute to CI based on digital technologies, have? • How can firms design effective customer teams, specifically on community-based platforms, for contributing to an effective NPD?	Whole Brain Model (Herrmann, 1996)
Intensity	Operationalization and optimization of CI intensity	• What is CI intensity and how can we best operationalize it in terms of customer engagement in and commitment to the respective CI task? • Is there an optimal degree of CI intensity for specific NPD outcomes?	
Tools/Medium for CI	Tools for specific NPD outcomes	• How can firms implement social media as CI tool more effectively? What are risks and benefits of social media for specific NPD outcomes? • Which social dynamics take place with/within different CI tools? • Which CI tools are most effective for different NPD outcomes? • Which CI medium fits to which purpose and intended NPD outcome?	Social identity theory (Tajfel and Turner, 1979)
Interplay of CI Design Aspects	Configuration of CI in NPD	• Whom to integrate when, how, and how intense?	Contingency theory (Burns and Stalker, 1961)

Table 2.4: Future Research Agenda (continued)

Performance Outcomes of Customer Integration (Design) in New Product Development			
Firm Performance Outcomes	Stage-specific outcomes of CI in NPD	How can research conceptualize and operationalize stage-specific outcomes to measure the costs and benefits of CI along NPD and across different NPD projects?	
Customer-related Performance Outcomes	Negative customer attitudes and behavior	- How can firms design their negative feedback without impeding firm-customer-relations? - How can firms counteract harmful customer emotions and behavior resulting from a negative CI experience?	Feedback intervention theory (Kluger and DeNisi, 1996)
Moderators and Mediators of Customer Integration (Design) in New Product Development			
External Environment	Cross-industrial CI designs	Does CI effectiveness differ for different industry lifecycle stages across different industries?	Product lifecycle management (Levitt, 1965)
Firm Environment	Firm size and CI in NPD for start-ups	- Does firm size per se affect the relation between CI designs and NPD outcomes or are specific CI designs decisive? - Would it be more effective for larger firms to rely on effectuation rather than on causation with regard to the effectiveness of different CI designs?	Causation and effectuation logic (Sarasvathy, 2001)
	Contingency factors in NPD processes	Which contingency factors (e.g., market focus, growth objectives, and innovation strategy) influence the relation between different CI design aspects and NPD outcomes?	Contingency theory (Burns and Stalker, 1961)

2.3 Summary

Due to the relevance of CI in NPD for firms and the strong research body on CI, studies differ in their research foci, leading to a highly fragmented research field. Therefore, the aim of our study was to develop a holistic framework of research insights on CI in NPD using a SLR. Based on this framework and different theoretical perspectives, we outline current research gaps and propose several directions for future research. In the following, we summarize our main insights from our SLR and point to the developed future research agenda.

First, extant research shows researchers' preferred settings for empirically investigating CI to be B2C markets and here, one specific industry. The preferred research medium today is digital, predominantly with tools such as community platforms or user toolkits. These new developments of digital tools will likely result in the increased application of CI in the middle stages of the NPD, i.e., prototyping and testing stages, where little CI research is conducted so far. Overall, we propose that future studies on CI should not neglect the B2B markets, include cross-industrial settings, and focus on digital tools useful in the middle stages of the NPD.

Second, we find a strong body of literature on the relevance of external and internal antecedents to CI. One research stream investigates specific customer motives for or customer barriers against participating in NPD. Here, the relevance of customer motives for specific NPD performance outcomes and especially customer barriers to CI remain unexplored. With regard to internal antecedents, extant studies address firm characteristics, i.e., strategy and leadership (e.g., Stock et al., 2017), NPD process characteristics, i.e., formalization (e.g., Liu and Fang, 2017), and new product characteristics, i.e., innovativeness or complexity (e.g., Allen et al., 2018). So far, we know little on internal barriers to applying CI in NPD. Therefore, we call for research on how to reduce internal barriers potentially deterring the usage of CI in NPD. In addition, future research needs to resolve the role of product innovativeness as antecedent to CI and CI designs by differentiating the type of innovativeness of the intended new product.

Third and synthesizing findings on the actual CI design, we find research on who, when, how, and how intense to integrate customers. First, we find sophisticated insights on customer characteristics and their benefits to CI in NPD. Here, research concentrates on lead users and the integration of ordinary users that possess specific characteristics or skills. So far, extant studies focus on the individual customer rather than on collaborative CI, e.g., in teams, for which we outline several research questions. Second, regarding timing, studies agree on the effectiveness of CI in early stages of the NPD (e.g., Cui and Wu, 2016). Third, even though CI seems to be more beneficial the more intensively it is applied, research remains inconclusive on how to define and measure CI intensity. Finally, studies investigating the usefulness of specific tools for CI in NPD split into tools based on analog or digital mediums. Here, current studies predominantly investigate the effectiveness of digital tools (e.g., Bayus, 2013). However, whether and when CI is more effectively applied with analog vs. digital tools is unexplored. Furthermore, more research is needed on social media integration as CI tool.

Fourth, research on performance outcomes of CI in NPD widely assesses the effect of CI on different firm performance outcomes, for which most studies find a positive influence. However, all these measures refer to the performance at the end of the NPD rather than considering the actual impact of CI at the respective point of integration. Hence, research needs to provide insights on the impact of CI and its different design aspects on stage- or project-specific outcomes to measure CI effectiveness at the time it is intended or required by the firm. In addition, on a customer-related level, CI predominantly leads to improved customer attitudes towards the respective firm. Here, research lacks insights on potential negative outcomes, e.g., with regard to customers receiving rejections on web-based platforms. Hence, future studies should investigate how to frame negative feedback, so that customers do not develop negative emotions or exhibit harmful behavior in form of threatening the firm's image.

Finally, the external environment, i.e., market characteristics, or the internal environment, such as firm characteristics, NPD process characteristics, or new product characteristics, influence the effectiveness of CI on NPD outcomes. Here, we identified gaps with potential for future research, especially regarding the moderating role of firm size and age as well as of different contingency factors, such as market focus or innovation strategy.

3 Paper 2: Investigating Antecedents and Stage-Specific Effects of Customer Integration Intensity on New Product Success

Monika C. Schuhmacher^a, Sabine Kuester^b, and **Anna-Lena Hanker^a**

^aDepartment of Business Administration with the focus on Technology, Innovation, and Start-up Management, Justus-Liebig-University of Giessen, Licher Str. 62, 35394 Giessen, Germany

^bDepartment of Marketing & Innovation, University of Mannheim, Castle, 68131 Mannheim, Germany

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Abstract

This cross-sectional study specifically examines the antecedents and performance consequences of CI intensity for B2C industries. In line with this focus, we extend the notion of market-oriented management by explicitly considering the role of customers and retailers as two distinct facets of the market intelligence perspective. Moreover, for NPD in B2C industries, research says little about when customers should be integrated during the NPD process. First, data from 205 firms and evidence from a validation study of 175 firms indicate that CI intensity in new goods development positively affects overall new product success. Further, the results show that firms can foster the intensity of CI by emphasizing both retailer and customer orientation and by establishing an incentive system that comprises NPD-specific components. Second, additional cross-sectional data from 171 firms show that managers need to integrate customers intensively in the development and launch stage and less in the ideation stage for the successful development of new goods.

Keywords: *Customer integration, market orientation, retailer orientation, new product success, incentive system*

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Customers are a critically important source of external knowledge for B2C firms (Piller and Walcher, 2006). For example, Procter and Gamble, one of the largest B2C firms in the world, actively integrates customers into its NPD through their so-called Connect & Development program. This program has turned out to be very successful since the innovation success rate has increased by more than 50% and the cost of innovation has decreased remarkably (Huston and Sakkab, 2006).

B2C firms vary in their ability to enforce CI in NPD. Our objective is to broaden the understanding of different levers of the CI intensity in NPD, specifically of B2C firms, by investigating its antecedents and performance implications. Furthermore, managers need to apprehend the effect of CI intensity at different stages of the NPD process to best allocate resources. All in all, this study explores how B2C firms can enhance the successful integration of customers in NPD and when CI intensity is effective for new product success.

The term CI refers to the integration of actual and potential users of a product in NPD. Compared to the B2B industry, in which firms usually develop new products for and with specific customers, B2C firms tend to integrate customers who are largely anonymous (Day, 1994; Sheth et al., 2000). Furthermore, in B2C firms, customers often do not proactively participate in the development of new goods but rather firms initiate this interaction (Carbonell et al., 2009; Fang, 2008; Joshi and Sharma, 2004). Firms may integrate customers to a higher or lower extent resulting in different levels of integration intensity. High levels of CI intensity refer to an active and intensive integration of customers in the form of, for example, the lead user method (von Hippel, 1986). Low levels of CI intensity refer to a less thorough and rather passive integration in the form of, for example, customers providing feedback to the firm on new product concepts. Previous research suggests that market orientation is an important organizational lever impacting firms' NPD activities (e.g., Hurley and Hult, 1998; Narver et al., 2004; Ottum and Moore, 1997). Following the understanding of market orientation as a set of

behaviors, market orientation consists of resource allocations reflective of an organization-wide responsiveness to the external environment and as such, to customers' needs and wants (Frambach et al., 2003). Market orientation should also influence to what extent the firm integrates customers in NPD. Hurley and Hult (1998) investigate the effect of organizational antecedents — including market and learning orientation — on a firm's ability to successfully adopt or implement new ideas, processes, or products. Their results imply that market orientation should also influence the intensity at which a firm integrates customers in NPD. Focusing on a B2C context, this study extends the framework of market orientation by considering the role of retailers and customers as two separate stakeholder groups and as additional facets of the market intelligence perspective (Coley et al., 2010). Hence, this paper conceptualizes four market orientation-related antecedents: retailer orientation, competitor orientation, customer orientation, and interfunctional coordination.

Furthermore, based on 19 interviews² with managers from the B2C industry asking for what they suppose drives CI (intensity), this research includes employees' incentive schemes as another organizational antecedent of CI intensity. This inclusion is in line with research suggesting that top managers have to create an appropriate innovation culture and thus, have to find mechanisms to motivate their employees to reach the firm's goals (Jaworski and Kohli, 1993; Song and Parry, 1993). Top managers can design the incentive system for their employees accordingly (Mihm, 2010).

Finally, Gruner and Homburg (2000) show for B2B industries that customers should be integrated at different stages of the NPD process. With regard to the question when firms should integrate customers intensively in NPD, extant research focuses on one specific tool (e.g.,

² We conducted 19 interviews with innovation and marketing managers from B2C firms. With all experts we ran through the same questions: (1) What is the current practice of CI (intensity) across different business units in your firm? (2) (How) do you measure the success of CI in NPD? (3) What drives the decision to integrate customers in NPD and its intensity?

Johnson, 2007; Lagrosen, 2005; Merlo et al., 2014) and thus, on one stage of the NPD process. Still, little is known about the effectiveness of CI intensity for B2C firms across different stages of the NPD process.

The present study extends existing research in several meaningful ways. First, this study focuses on the impact of how and when to integrate customers in NPD. The question of how addresses the intensity of CI into NPD and its antecedents (Study 1). The range of CI across NPD stages (Fang, 2008) refers to the question of when to integrate customers into the NPD process by empirically evaluating the impact of CI intensity on new goods success in different stages of the NPD. (Study 2). Second, an investigation of CI intensity in a cross-sectional B2C industry setting garners insights that are relevant beyond the existing research, which either focuses on a B2B context (e.g., Gruner and Homburg, 2000; Urban and von Hippel, 1988), on specific industries (e.g., Lüthje et al., 2002; Shaw, 1985; Thanasopon et al., 2018) or on specific tools for CI (e.g., Johnson, 2007; Lagrosen, 2005; Merlo et al., 2014). Establishing evidence of the general effectiveness of CI intensity in B2C industries is important because the findings garnered in B2B contexts are difficult to transfer to B2C industries. Third, by analyzing to what extent different key levers influence the intensity of CI in NPD, this study provides implications for the general management of CI. Prior research already addresses the issues of designing CI in NPD (e.g., Füller et al., 2007; Jeppesen, 2005), but the study of antecedents allows to identify the key levers which managers can influence to foster external knowledge exploitation in B2C firms. Fourth, the present article extends the notion of market orientation as a driver of external knowledge exploitation by explicitly considering the orientation on retailers as an additional facet.

3.1 Study 1: Antecedents of Customer Integration Intensity and Its Impact on New Product Success

3.1.1 Conceptual Background and Hypotheses Development

From an organizational behavior perspective, market orientation should drive the acquisition and assimilation of new external knowledge. Market orientation is the strategic alignment of the organization with its external environment in terms of generating, disseminating, and responding to market intelligence (Kohli and Jaworski, 1990). Narver and Slater (1990) also highlight the importance of corporate knowledge acquisition and knowledge development. Previous scholars conceptualize market orientation based on competitor orientation, customer orientation, and interfunctional coordination. For a B2C context, Kohli and Jaworski (1990) imply that firms go to market while considering both the retailers' requirements and the customers' needs. Specifically, researchers advocate that firms "must also balance their demands with (1) the needs of other stakeholders [. . .] and (2) the forces that shape the underlying needs and expectations within a market" (Kohli et al., 1993, p. 474). In this sense, the strategic alignment of B2C firms with the external environment requires them to broaden their base of stakeholders because their markets consist of customers, competitors, and distributors, such as retailers (Coley et al., 2010). Consequently, our investigation of CI intensity in NPD for B2C firms follows the logic that market orientation encompasses retailer orientation, competitor orientation, customer orientation, and interfunctional coordination.

3.1.1.1 Retailer Orientation

Following Kohli and colleagues (1993) in their understanding of market orientation, retailer orientation refers to the acquisition and use of information from retailers about the market. B2C industries imply long distribution channels due to the indirect, multi-step distribution system. Although firms interact directly with their customers through E-commerce or web communities

(Christensen and Raynor, 2003), retailers are still highly relevant for the distribution of goods (Coley et al., 2010). For example, Procter and Gamble sell their products mainly through retailers. Since retailers function as a connecting part between customers and manufacturers, it is of central importance for B2C firms to maintain a high level of cooperation with retailers (Tokman et al., 2016).

On the one hand, retailer orientation might result in lower CI intensity since firms with a high retailer orientation most likely will already have access to market information based on retailer data (Medina and Rufin, 2009). Firms can acquire retail information about customer buying behavior by using external market research data from market research institutes such as Nielsen or GfK (Said et al., 2015). Such data help firms to find out which products customers shop together, how many products customers commonly buy, and which products they buy more or less frequently. By acquiring this data, firms can develop a good understanding of what, where, and how many products customers buy. Consequently, firms being highly retailer oriented can develop an understanding of market needs and behavior so that firms will integrate customers less intensively.

On the other hand, retailers act as gatekeepers providing knowledge which allows B2C firms to learn who their customers are and how to approach them. Hence, a strong retailer orientation should result in an increased ability to improve the firm's position within the marketplace (Tokman et al., 2016). Retailer orientation not only enables close monitoring of customer behavior, but also provides insights on poorly performing products more directly. Furthermore, with data from retailers, firms can draw inferences about what customers buy in bundles. This might be a starting point for firms to adapt their product range (Day, 1994). The resulting, more profound understanding of customer preferences leads to the constant need to develop new superior products, and firms can integrate customers more effectively. One way to develop superior new products is to integrate customers intensively in NPD by listening to their

complaints or suggestions from dissatisfaction with current offerings (Lagrosen, 2005; see also, Cui and Wu, 2016; Poetz and Schreier, 2012). Therefore, firms high in retailer orientation will be more likely to intensify relationships with customers and thus, to integrate customers more intensively in NPD.

H₁: The stronger the retailer orientation, the more intensive the CI into NPD.

3.1.1.2 Competitor Orientation

Competitor orientation is the acquisition and use of information about capabilities, competencies, and strategies of current and future competitors. Developing new goods with superior value is difficult without considering competitor orientation. Competitor orientation implies that the firm discerns the short- and long-term capabilities, competencies, and strategic thrusts of its competitors (Narver and Slater, 1990). Previous studies stress the importance of generating information about current and future competitors, disseminating competitive intelligence, and responding to this intelligence to beat the competition (Jaworski and Kohli, 1993; Kohli and Jaworski, 1990).

On the one hand, the orientation towards competitors and their new product activities provides firms with a source of information for developing new products (Lukas and Ferrell, 2000). When monitoring its competitors, a firm gains valuable insights into customer needs they focus on. Firms can make use of this information even in a way that allows them to outpace the competition (Day, 1994; Kohli and Jaworski, 1990; Narver and Slater, 1990). A firm can observe the trial-and-error efforts of competitors and indirectly learn from their mistakes (Levinthal and March, 1993). The firm might even be able to save its own resources because observing competitors' new product endeavors may also minimize development costs (Ledwith and O'Dwyer, 2009). For example, General Foods ran a test market for their new product toast-ems. Kellogg, observing this competition action, realized the success potential of the new

product, quickly acted upon it, and was able to develop pop tarts. To the surprise of General Foods, Kellogg was able to commercialize their pop tarts before General Foods completed the market test for toast-ems (Crawford and Di Benedetto, 2011). Hence, the overall goal of a competitor-oriented firm is to outperform competitors to satisfy customer preferences more effectively and more efficiently than competitors do (Bendle and Vandenbosch, 2014). On the other hand, being a competitor-oriented firm can also result in a more intensive CI in NPD. As competitor orientation leads to observing competitors closely, firms are able to focus with CI on customer preferences not met by existing competitive offerings.

However, we follow the notion that a competitor-oriented firm focuses on adjusting its innovation activities according to competitor activities (Bandura, 1977; Lam et al., 2010; Slater and Narver, 1995). By observing the competitors' market conduct and learning from their failures and successes, a competitor-oriented firm can judge which new products meet customer needs and expectations (Dean and Bowen, 1994). That way, firms high in competitor orientation are classified as reactive (Frambach et al., 2003; Schnaars, 1994) and focus on improving existing offerings or on inventing cheaper products to reach cost leadership in the market (Porter, 1980). These firms save valuable resources by observing what competitors do rather than integrating customers intensively into the NPD.

H₂: The stronger the competitor orientation, the less intensive the CI into NPD.

3.1.1.3 Customer Orientation

The acquisition and use of external information on customer needs and expectations is the purpose of customer orientation (Kohli et al., 1993). With regard to NPD management and specifically the market pull approach, the main stimulus for NPD comes from the market, that is, via customer knowledge exploitation (Wind and Mahajan, 1997). In contrast, the technology push approach views new products as a result of the technological knowledge developed by and

the internal efforts of corporate R&D (Slater and Narver, 1994). Nowadays, firms combine both approaches, market pull and technology push, to meet the technological and end-user requirements (Mowery and Rosenberg, 1989; Schmoch, 2007). Based on this integrative perspective, all firms focalize customers when developing new products.

As Coley and colleagues (2010) point out, most market-oriented B2C producers, such as Procter and Gamble, enter a market through the so-called global customer-driven supply networks. Such networks enable B2C firms to produce superior value for a market, because the customer “is always involved in the production of value” (Vargo and Lusch, 2004, p. 14). One way to translate customer orientation into NPD is to integrate customers intensively.

H₃: The stronger the customer orientation, the more intensive the CI into NPD.

3.1.1.4 Interfunctional Coordination

Lawrence and Lorsch (1986) define interfunctional coordination as “the quality or state of collaboration that exists among departments that are required to achieve unity of effort” (p. 11). Kahn (1996) emphasizes that interfunctional coordination refers not only to the collaboration but also to the communication among different departments (see also, De Luca et al., 2010; Moenaert and Souder, 1990). Finally, interfunctional coordination is necessary to create superior customer value by leveraging resources available across different departments (Narver and Slater, 1990).

NPD is an interdisciplinary process mainly composed of marketing, production, and R&D (Maidique and Zirger, 1985). To manage this process effectively, departments must interact, exchange information, and collaborate closely (Griffin and Hauser, 1996). As different departments within a firm need to cooperate closely to enhance the probability for new product success, conflict potential is likely to arise (De Clercq et al., 2013; Dyer and Song, 1998; Natter et al., 2001). Some departments are rather market driven while others are more technology

driven. For example, marketing departments primarily focus on market shares and profit whereas production departments rather aim for the lowest possible costs within the production process (Montoya-Weiss and Calantone, 1999; Natter et al., 2001).

Promoting the exchange of information and communication among departments is critical to manage the NPD process effectively. Customer needs change very quickly, and firms as a whole are rather slow in adapting to these changing needs (Narver et al., 2004). On the one hand, to meet and to adapt quickly to rapidly changing demands, departments need to know about feasible technological possibilities (Bianchi et al., 2016). On the other hand, departments need to intensify their relation to customers to speed up decision processes regarding the implementation of such possibilities. Knowing about customer preferences is critical for decision-making in complex organizational structures (Lam and Mayer, 2014). Thus, departments have to collaborate to obtain newest insights on technical feasibility and information about customer needs and wants (Frishammar and Hörte, 2005).

As customer needs change quickly, all departments have become more involved in relationships to customers (Flint and Mentzer, 2000; Rapp et al., 2012). Thus, one goal of interfunctional cooperation in NPD processes is to leverage the external knowledge provided by customers to offer the best possible customer value. Moreover, conducting market research by asking the customer directly about current and future preferences is likely to dissolve contradicting views (Zirger and Maidique, 1990). Only after the clarification of customer needs, different departments can follow their primary tasks, manage the increasing number of innovation cycles, and launch products faster (Cui and Wu, 2016; Prahalad and Ramaswamy, 2000; Zhang et al., 2016). As such, CI in NPD can function as a common language that is critical to avoid internal misunderstandings (Coley et al., 2010). Taken together, intensive CI into NPD is a way to avoid conflicts between departments.

H₄: The stronger the interfunctional coordination, the more intensive the CI into NPD.

3.1.1.5 Incentive System

Numerous researchers recommend that top managers find mechanisms to motivate their employees to reach the firm's goals (e.g., Song and Parry, 1993). Jaworski and Kohli (1993) reason that a firm's incentive system can capture a firm's strategic orientation and guide employees accordingly. With regard to NPD, top managers need to align the incentive system with new product success (Mihm, 2010).

Overall, incentives influence the behavior of individuals (e.g., Eisenberger and Armeli, 1997). On the one hand, researchers argue that incentives can result in dysfunctional behavior and lead to decreased motivation (Bartol and Srivastava, 2002). On the other hand, research has shown that if people pursue incentives in the form of rewards, they are willing to invest time and effort to achieve these rewards (Natter et al., 2001; Zhang and Huang, 2010; Zhang et al., 2011). This is in line with expectancy theory claiming that individuals are motivated to perform better if they perceive a link between efforts and incentives (Baron and Byrne, 1997). Thus, incentives can be powerful control tools as well as drivers of employee motivation and performance (Bartol and Srivastava, 2002). Consequently, if employees are more motivated to achieve firm goals, they are more willing to invest time and effort in doing a task well that will influence the future of the firm (Gassmann et al., 2010).

An incentive system linked to new product success influences employees' sensitivity to novel market information, not only new technologies but also customer needs, and their willingness to obtain such information from customers (Maltz and Kohli, 1996). Therefore, employees seek to cooperate closely with customers to achieve their goal of perceiving precise information about what customers actually want (Prester and Bozac, 2012). By gaining knowledge about customer preferences, employees can effectively suggest new products to their superiors and are rewarded in return. As such, employees motivated by an NPD-specific incentive system will strive to obtain critical market information and to integrate customers

more intensively to find out and to be able to satisfy customer needs, thereby achieving the firm's NPD objectives.

H₅: The more the incentive system depends on NPD, the more intensive the CI into NPD.

3.1.1.6 Performance Implications of Customer Integration into New Product Development

Different views exist regarding the influence of customer input on NPD. One research stream argues that customers who are bounded by their status quo, do not know about technological possibilities (e.g., von Hippel and Katz, 2002), and are less able to develop a prospective view on potential market offerings (Merchant et al., 2014). As a result, information provided by customers can lead to non-innovative NPD and thus, firms should not integrate customers intensively to create new products. Another research stream claims that both customer information and CI are important prerequisites for NPD performance and that gathering information from customers is necessary to make the NPD process both effective and efficient (e.g., Henard and Szymanski, 2001).

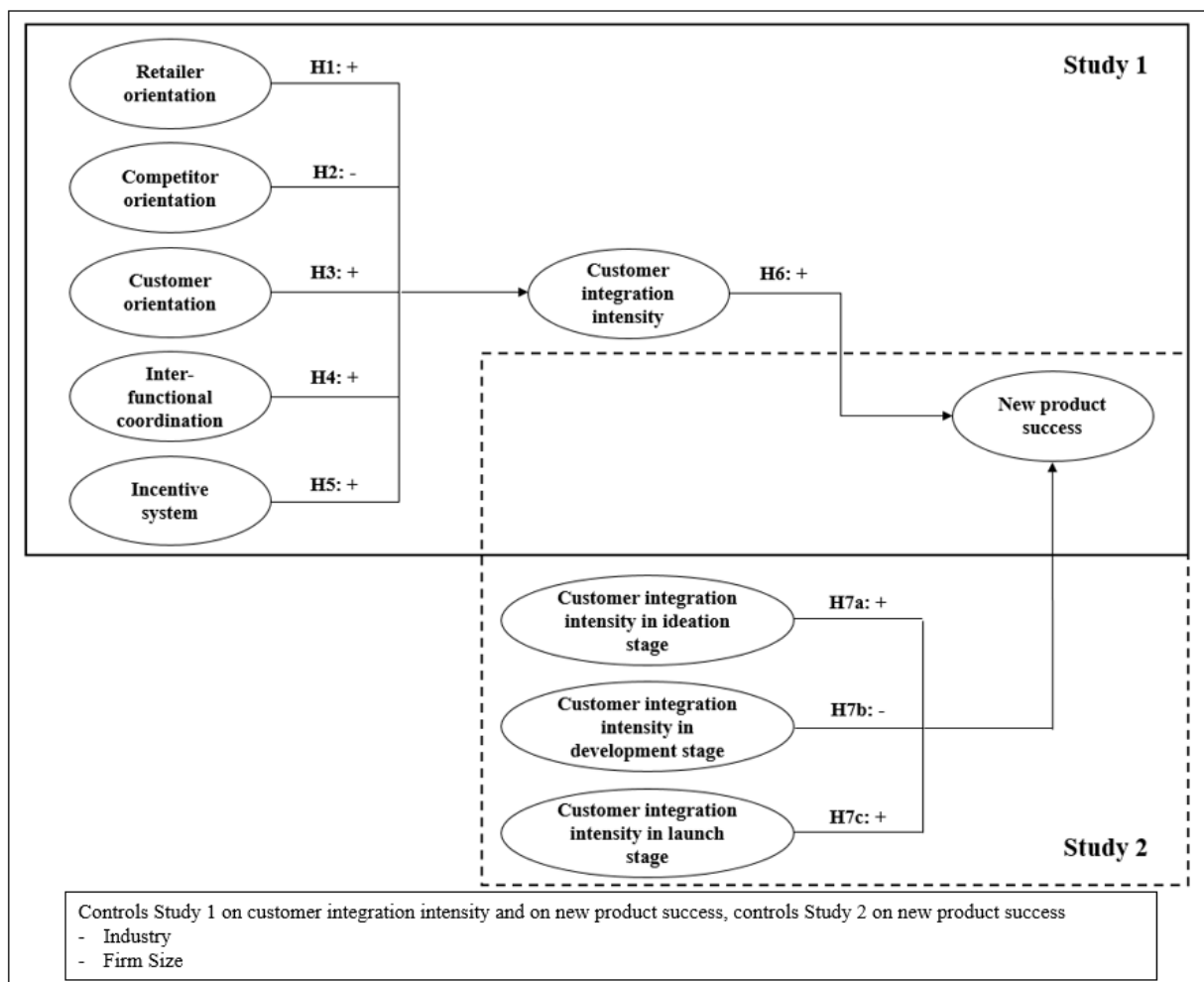
Studies in B2B contexts demonstrate the effectiveness of external knowledge exploitation in NPD (e.g., Gruner and Homburg, 2000; Morrison et al., 2000; von Hippel, 1986). Hanna and colleagues (1995), who investigate B2B as well as B2C firms, and Henard and Szymanski (2001), who perform a meta-analysis in both settings, assert that one of the most important new product success factors is the ability to develop products that meet customer needs and provide superior value (see also, Chang and Taylor, 2016; Cui and Wu, 2016; Maidique and Zirger, 1985). Consequently, to understand and to address customers, B2C firms need to take a customer perspective by talking and interacting with customers, thereby integrating them intensively into NPD. Only then are B2C firms able to adapt to changing customer needs and to provide superior value (Grönroos and Voima, 2013).

Integrating customers in NPD leads to better market acceptance of new products (e.g., Cui and Wu, 2016; Fang, 2008; Poetz and Schreier, 2012). Ultimately, CI can even result in a reduced time-to-market of the new product (e.g., Cui and Wu, 2016; Prahalad and Ramaswamy, 2000; Vargo and Lusch, 2004; Zhang et al., 2016), which ultimately enhances firm performance (Eisingerich et al., 2014). Summarizing, successful NPD calls for an intensive integration of customers in NPD.

H₆: CI intensity positively influences new product success.

Taken together, the upper part of Figure 3.1 presents the conceptual model of Study 1.

Figure 3.1: Conceptual Model



3.1.2 Sample and Data Collection

Our aim was to collect cross-sectional data to be able to derive generalizable implications for CI intensity in NPD for B2C firms. Therefore, we aimed to integrate firms from slow moving as well as from fast moving B2C industries. In our data collection, we focused on medium- and large-sized firms located in Germany, Austria, and Switzerland. Therefore, we used a business and employment-oriented networking service focusing specifically on these three countries. Further, we specified our search for participants on product, innovation, R&D, and marketing managers. Overall, our search resulted in 562 individuals. Next, we contacted these individuals by phone to inform them of the research objectives and to solicit their participation. The managers who agreed to participate received a questionnaire with detailed instructions. Each participant received a voucher for the report of the study's results and two managerial working papers from a list of selected titles. A follow-up to all non-respondents was conducted six weeks later. In this process, out of the 562 contacts, 205 completed the questionnaire yielding an effective response rate of 36.5%. A test for non-response bias indicated that the data does not display a non-response bias.

With regard to the respondents' knowledge of the firm and NPD issues, the data shows that on average, the participants have worked for their firms 6.5 years and have participated in the development of 28 different new products. Thus, the respondents have detailed insights into the general strategic management and NPD processes of their firms. The respondents are from several different B2C industries (see Table 3.1). Overall, 58.5% come from the slow-moving B2C industry, whereas 41.5% come from the fast-moving B2C industry (see Table 3.1 for further descriptive sample information).

Table 3.1: Descriptive Sample Information for Study 1

Sales	%	Number of Employees	%
<5 million €	4	< 200	15
5 < 10 million €	5	200 < 500	27
10 < 20 million €	8	500 < 1,000	15
20 < 50 million €	11	1,000 < 2,000	14
50 < 100 million €	15	2,000 < 5,000	9
100 < 250 million €	17	5,000 < 10,000	11
250 < 500 million €	12	≥ 10,000	9
500 < 1,000 million €	15		
≥ 1,000 million €	13		
Position	%	Industries	%
Marketing manager	30	Fashion	2
Product manager	29	Toys	2
Innovation manager	14	Sport/leisure activities	3
Board of Directors	16	Automotive	5
Others	11	Stationary	5
		Furniture	6
		Beverages	7
		Cosmetics	7
		White goods	7
		Electronics	12
		Food	38
		Others	6

3.1.3 Measures

We chose the firm level as the unit of analysis. Thus, participants evaluated all items with respect to all new product projects from their firms over the last three years. As a result, the survey addressed new product endeavors that represented the respective firms and that also varied with regard to their levels of innovativeness and success. CI intensity and the antecedents of CI are measured reflectively. When a construct is a summary index of its indicators, a formative measurement is recommended (Diamantopoulos and Winklhofer, 2001). Thus, new product success builds a formative conceptualization because the three constructs derived from literature and expert interviews (sales performance, competitive superiority, and NPD speed) are characteristics that are independent of each other.

The scale of CI intensity captures the systematic participation of customers in NPD; the participation is initiated by the producer (Fang, 2008; Gruner and Homburg, 2000; Joshi and Sharma, 2004). The retailer orientation refers to the acquisition and use of information on retailers (adapting Kohli et al., 1993; Narver and Slater, 1990). Competitor orientation focuses on measuring the extent of acquisition and use of information about the capabilities, competencies, and strategies of competitors (Jaworski and Kohli, 1993; Narver and Slater, 1990). Customer orientation addresses the acquisition and use of information on customer needs and expectations (Deshpandé et al., 1993; Kohli et al., 1993; Narver and Slater, 1990). Interfunctional coordination refers to the extent to which different departments interact, exchange information, and collaborate closely (Griffin and Hauser, 1996; Menon et al., 1997). Finally, the scale of the incentive system assesses the form and the degree of the incentives provided to the employees for NPD-specific activities (Page, 1993).

The reliability measures reveal good results for all reflective constructs (see Appendix A2). In addition, discriminant validity is established (Fornell and Larcker, 1981) (see Table 3.2).

Table 3.2: Test for Discriminant Validity

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Retailer orientation	.71								
2. Competitor orientation	.00	.62							
3. Customer orientation	.01	.30	.58						
4. Interfunctional collaboration	.01	.16	.26	.71					
5. Incentive system	.01	.05	.08	.08	.74				
6. CI intensity	.03	.02	.13	.07	.02	.91			
7. Sales performance	.00	.00	.02	.00	.00	.01	.94		
8. Competitor superiority	.03	.12	.15	.11	.06	.08	.00	.85	
9. NPD speed	.03	.03	.04	.01	.03	.01	.00	.11	.92

Notes: The bold values in the diagonal row are the average variance extracted (AVE). The values below the diagonal are the squared correlations.

New product success was measured formatively. Research indicates that new product

success is a multidimensional construct, but studies differ regarding the number of dimensions considered (e.g., Harmancioglu et al., 2009; Langerak et al., 2004; Rodríguez et al., 2008). Overall, studies have the following three basic dimensions in common: financial dimension, also called sales performance (Rodríguez et al., 2008), temporal dimension, also called NPD speed (Harmancioglu et al., 2009), and differentiation, also called customer acceptance (Langerak et al., 2004) or competitive superiority.

Diamantopoulos and Winklhofer (2001) discuss four critical issues required to construct a successful formative index: content specification, indicator specification, indicator collinearity, and external validity. The study's focal construct, new product success, focuses on the dimensions competitive superiority, sales performance, and NPD speed. NPD speed refers to the temporal effectiveness of the marketing activities, which is the pace of activities between idea generation and market launch (Montaguti et al., 2002). Two reflective items assess this dimension (Gruner and Homburg, 2000). A firm's sales performance refers to the economic success of the new product (Langerak et al., 2004; Rodríguez et al., 2008); two items measure this dimension. The scale of competitive superiority also consists of two items and captures the degree to which customer relationships are strengthened and customer acceptance of the new products is facilitated (Olson et al., 1995; Ottum and Moore, 1997). The reliability measures reveal very satisfactory results for the three reflective success dimensions (see Appendix A2).

In an additional analysis, multicollinearity does not cause any problems among the three dimensions. The highest variance inflation factor, which has a value of 1.605, is between competitive superiority and sales performance. This value is below the threshold of 3.0 recommended for formative measurement assessments (Diamantopoulos and Siguaw, 2006). To assess the external validity of the formative measurement, two reflective indicators for each success dimension (see Appendix A2) and for the new product success are included to estimate a multiple indicators and multiple causes (MIMIC) model (Jöreskog and Goldberger, 1975).

MIMIC models are a suitable approach for validating formative measurements (Diamantopoulos and Winklhofer, 2001). The estimation of the PLS model produces a satisfactory explained variance ($R^2 = 0.549$). This R^2 -value indicates that the formative measurement covers the scope of the latent construct in a comprehensive manner.

3.1.4 Analysis and Results

PLS structural equation modeling serves for the analysis of all hypothesized relationships (Ringle et al., 2005). The path model (PLS Graph 3.0) estimates the inner weightings (Chin, 2001) and the bootstrapping procedure estimates the standard coefficients and t-statistics (see Table 3.3). Retailer orientation has a significant positive effect on CI intensity ($\beta = .154$, $p < .05$, H_1). Competitor orientation negatively affects CI intensity, though this effect is not significant ($\beta = -.066$, $p > 0.1$, H_2). As hypothesized, customer orientation has a strong positive impact on CI intensity ($\beta = .313$, $p < .01$, H_3). Interfunctional coordination has a positive impact on CI intensity at $p < 0.1$ ($\beta = .072$, $p < 0.1$, H_4). The results so far indicate that, of the four market orientation facets, customer orientation and retailer orientation exert a pronounced impact on CI intensity. In addition, the incentive system has a significant positive impact on CI intensity ($\beta = .172$, $p < .01$, H_5). Finally, this study finds a significant positive effect of CI intensity on new product success based on measures of corporate operational outcomes and market outcomes ($\beta = .168$, $p < .05$, H_6).

Based on previous findings, firm size and industry sector were added as control variables. The results reveal that firm size does not have a significant impact on CI intensity ($\beta = .026$, $p > 0.1$) and a negative impact on new product success at only $p < 0.1$ ($\beta = -.112$). In addition, because of the cross-sectional nature of the study, an additional control variable was the industry sector. The results do not point to a significant impact of the industry dummy variable on CI intensity ($\beta = -.078$, $p > 0.1$) and the impact of this variable on new product success is

negative at $p < 0.1$ ($\beta = -.116$).

Table 3.3: Path Analysis and β -Coefficients for Study 1

	CI Intensity	New Product Success
Direct Effects		
Retailer Orientation	.154 (2.210)**	
Competitor Orientation	-.066 (.932)	
Customer Orientation	.313 (3.664)***	
Interfunctional Coordination	.072 (1.368)*	
Incentive System	.172 (2.589)***	
CI Intensity		.168 (2.209)**
Controls		
Firm Size (in millions of Euros)	.026 (.349)	-.112 (1.409)*
Industry (slow vs. fast moving)	-.078 (1.105)	-.116 (1.417)*
R ²	.200	.060

Notes: *** $p < .01$; ** $p < .05$; * $p < 0.1$; t-values in parentheses

3.1.5 Further Analysis for Validation Purposes

To validate the findings, performance data from an independent source for each firm's overall performance served as the data source because data on new product success were not publicly available. Out of the 205 respondents, for 35 firms such information was available (17% of the sample). A financial database as well as annual reports from the firms' websites provided information on the sales performance from three consecutive years and were used to calculate the average sales growth. This measurement corresponds to the time horizon of the measure of new product success in the main study. Overall, the objective measure of sales

growth correlates highly with the respondents' assessments of the sales performances of the new products ($r = 0.40$; $p < 0.05$). This correlation is sufficiently high for two reasons. First, the managers assessed the sales performance relative to those of their competitors, but the objective performance information is not comparable. Second, the objective measure of each firm's sales growth highly correlates with the sales performances of its new products. Although the variables pertain to different levels, they still confirm a significant correlation.

To test for a common method bias, a second study tested a different sample of managers handling the development of new products in B2C firms. This sample evaluated CI intensity, competitive superiority, sales performance, NPD speed, and overall new product success on the project level. Through a public social business network, the authors of this study informed relevant managers about the research objectives to solicit their participation. Those managers who agreed to participate received a link to the questionnaire. This procedure resulted in a final sample consisting of 175 managers involved in product and marketing management. On average, the participants have worked for their firms for six years and have participated in the development of 23 different new products in which customers have been integrated. Overall, 42% of the respondents come from the slow-moving B2C industries, and 58% come from the fast-moving B2C industries.

The construct specifications consist of the same measurement scales as employed in the main study. The reliability measures reveal very satisfactory results for the three success dimensions. Additionally, multicollinearity is not an issue. The estimation of the MIMIC model produces a very good explained variance value of new product success ($R^2 = 0.727$). In the analysis, firm size and industry sector again serve as control variables. CI intensity significantly impacts new product success at the project level ($\beta = 0.362$, $p < 0.01$). Thus, the results of this validation study confirm the findings of the main study regarding the performance implications of CI.

3.2 Study 2: Stage-Specific Effects of Customer Integration Intensity on New Product Success

3.2.1 Conceptual Background and Hypothesis Development

Extant research provides evidence that the impact of CI on new product success varies across stages of the NPD process for B2B firms. For example, the meta-analysis on the effectiveness of customer participation in NPD by Chang and Taylor (2016) indicates a U-shaped relation for CI along the different stages of the NPD on the financial performance of a new product. They find that CI in the ideation stage as well as in the launch stage has a positive effect on new product financial performance whereas customer participation in the development stage inhibits speed to market and negatively affects new product financial performance (Chang and Taylor, 2016). Further studies in the B2B context support this U-shaped effect (Brockhoff, 2003; Gruner and Homburg, 2000). Whether these findings are transferable to the B2C context is yet to be investigated. Thus, the aim of the second study is to investigate for B2C firms, when along different stages of the NPD process CI intensity is most effective (see the lower part of Fig. 1 for the conceptual model of Study 2).

While the stage-gate-model by Cooper and Kleinschmidt (1993) introduces five different stages, Gruner and Homburg (2000) present a six-stage model. More recently, research classifies only three main stages to be distinguished in NPD. For example, Chang and Taylor (2016) differentiate the ideation stage, the development stage, and the launch stage. This three-stage approach is in line with the recently introduced conceptual frameworks of CI (Cui and Wu, 2016; Ernst et al., 2010; Frishammar and Ylinenpää, 2007; Lagrosen, 2005). Thus, this study also focuses on these three stages.

Each stage of the NPD process is designed to gather specific information to reduce key project uncertainties (Cooper, 2008; Crawford and Di Benedetto, 2011). Thus, the information requirements for each stage define the purpose of CI intensity. In general, a successful

development of new products involves managing both technical and market uncertainty (Chesbrough, 2007). However, B2C firms mainly integrate customers in NPD to resolve market uncertainty. Hence, the decision when to integrate customers intensively in the NPD process is guided by the answer to the question: When do we need market-related information in the innovation process to maximize new product success (Troy et al., 2001)?

3.2.1.1 Ideation Stage

At the beginning of the NPD process, firms aim to develop a new product idea and to translate it into a product concept (Lin and Huang, 2013). In the ideation stage, innovating firms face high levels of market uncertainty and thus aim to find external knowledge (Van de Vrande et al., 2006), i.e., firms use customers as a valuable information source (Zhang et al., 2016). Market uncertainty in this stage pertains to customer needs or market conditions. Thus, firms can use customers as a source for relevant market information (Chang and Taylor, 2016; Cui and Wu, 2016; Nambisan, 2002) as well as cocreators of concepts. As a result, input from customers in the ideation stage can reduce the risk of new product failure early on by increasing the product-market fit (e.g., Carbonell et al., 2009). In this line, customers are integrated intensively to develop ideas, comment on ideas, and select and develop attractive ideas further (Chang and Taylor, 2016). Intensive CI in the ideation stage can enable firms to minimize both cost and time (e.g., Chien and Chen, 2010). Hence, we propose:

H_{7a}: CI intensity has a positive effect on new product success in the ideation stage.

3.2.1.2 Development Stage

In the development stage, primarily technical information is needed to resolve technical uncertainty with regard to project definition and engineering (Frishammar and Ylinenpää,

2007). Hence, major uncertainties arise from the task performed and from operational issues, such as engineering (Olson et al., 2001).

Although the majority of studies investigating CI intensity in the development stage find negative effects, research on CI in the development stage of the NPD is still rare. Existing studies reveal that customer co-creation during the development stage slows down the production process, and thus, decreases speed to market (Chang and Taylor, 2016). Moreover, customers are required to have a profound technical knowledge to understand and to improve the development of a new product effectively (e.g., Cui and Wu, 2016). Finally, studies show that CI in the development stage does not impact or weaken the overall financial performance of the new product (Chang and Taylor, 2016; Gruner and Homburg, 2000; Pee, 2016).

Taken together, we argue that intensive CI in the development stage is less effective due to the stage-specific needs of reducing technical uncertainty and the limited capabilities of customers in this regard (Chang and Taylor, 2016). Hence, we propose:

H_{7b}: CI intensity has no effect on new product success in the development stage.

3.2.1.3 Launch Stage

Finally, in the launch stage, which includes activities such as testing and market introduction, the output of NPD becomes more defined, and thus the stage is less uncertain with regard to technical uncertainty (Cooper, 2008). However, market uncertainty with regard to product usability and acceptance remains unchanged within the launch stage (Chang and Taylor, 2016; Cooper, 1990). Hence, Frishammar and Ylinenpää (2007) argue that only information about customer needs are associated with higher NPD performance, implying that intensive CI in the launch stage is effective for NPD success.

In this final stage of NPD, customers predominantly act as testers and provide feedback on the new products' usage (Chang and Taylor, 2016). In this way, potential problems of new

products can be uncovered prior to the market launch and can be adjusted accordingly. Customers can assist in positioning a product successfully in the market as well as in finding the best possible marketing mix (Henard and Szymanski, 2001). In addition, Ernst (2002) as well as Chang and Taylor (2016) find a positive influence on speed to market when customers are integrated in the launch stage. Hence, we propose:

H_{7c}: CI intensity has a positive effect on new product success in the launch stage.

3.2.2 Sample and Data Collection

We contacted all participants of Study 1 to invite them to participate again in a survey on CI intensity in NPD. Out of the 205 participants from the first study, 7 were no longer working for the firm and new contact data was not available. Hence, 198 participants were contacted via phone to inform them about the second study and to ask for their participation. Out of these, 171 individuals agreed to participate in the second study (response rate of 86.36%).

This time, the participants had to refer their answers to one specific new product that had been introduced in the market within the last 12 months. Next, they had to indicate when they had integrated customers for the development of this new product. Thus, the questionnaire provided a section on the definition of each NPD stage. For each stage in which they integrated customers, managers were asked for the intensity of CI in that stage.

3.2.3 Measures

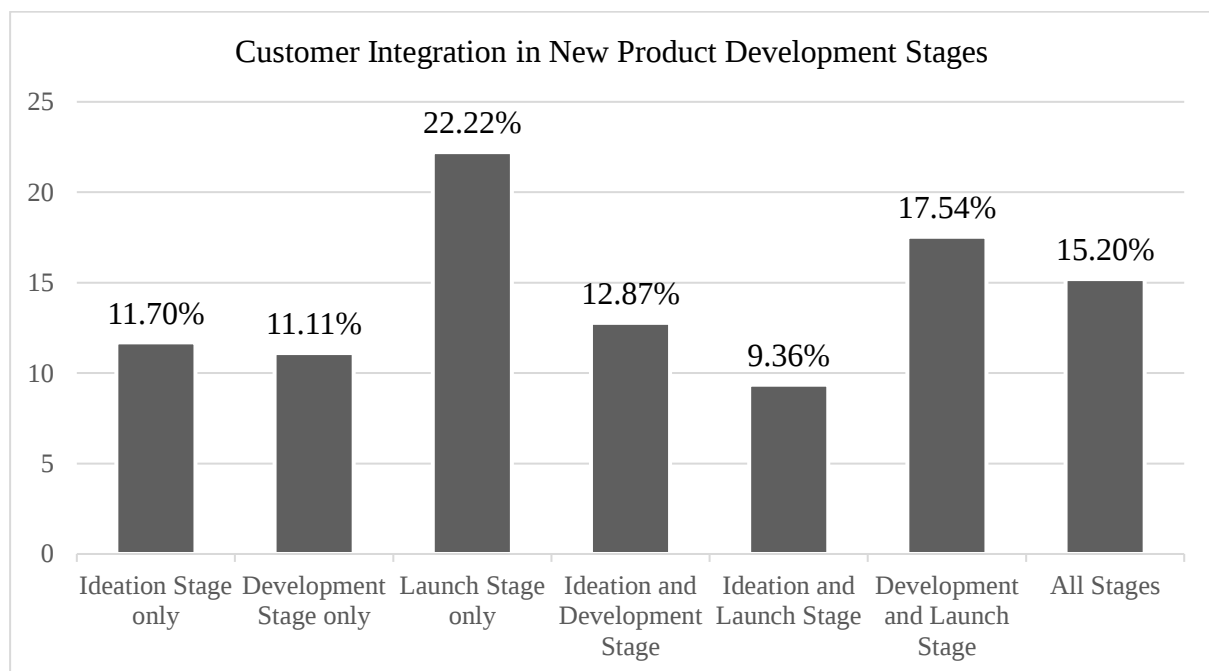
We used the same scales for CI intensity and new product success as in Study 1. However, the participants were now asked about the CI intensity within their firm in each stage of the NPD process. Again, new product success was measured formatively with regard to sales performance, speed to market, and competitive superiority (e.g., Rodríguez et al., 2008; Harmancioglu et al., 2009; Langerak et al., 2004) (see Appendix A3).

3.2.4 Analysis and Results

3.2.4.1 Descriptive Results

For the ideation stage, almost 50% indicated that they integrate customers into this first stage of the NPD. In the development stage, 57% integrate customers, whereas about 64% said they integrate customers in the launch stage. This distribution is surprising since the literature often indicates that CI is used especially in the ideation stage (Chien and Chen, 2010; Schweitzer and Gabriel, 2012; Zhang et al., 2016). More specifically, 77 participants indicated that they only integrated customers in one specific stage: 20 integrated customers only in the ideation stage, 19 in the development stage and 38 in the launch stage. Next, 22 managers said they integrated customers in the ideation stage as well as in the development stage, 16 indicated that CI took place in the ideation stage and in the launch stage, and 30 participants answered that they integrated customers in the development stage as well as in the launch stage. Finally, 26 participants reported the integration of customers in all three stages of the NPD (see Figure 3.2).

Figure 3.2: Descriptive Sample Information for Study 2



3.2.4.2 Hypotheses Testing

The effect of CI intensity in the ideation stage on new product success turns out non-significant ($\beta = .109$, $p > 0.1$), thereby not supporting H_{7a}. For the development stage, the effect of CI intensity on new product success is significant and positive ($\beta = .152$, $p < 0.1$), implying that integrating customers intensively in the second stage of the NPD has a significant effect on new product success. This finding contradicts H_{7b}. Finally, the results for the launch stage show that integrating customers intensively in the last stage of the NPD process significantly improves new product success ($\beta = .228$, $p < .01$), thereby providing support for H_{7c} (see Table 3.4).

Table 3.4: Path Analysis and β -Coefficients for Study 2

<i>Dependent Variable: New Product Success</i>		
	Model 1	Model 2
Direct Effects		
CI Intensity in Ideation Stage		.109 (1.300)
CI Intensity in Development Stage		.152 (1.898)*
CI Intensity in Launch Stage		.228 (2.676)***
Controls		
Firm Size (in millions of Euros)	-.047 (-.611)	-.073 (-.950)
Industry (slow vs. fast moving)	-.117 (-1.510)	-.122 (-1.577)
R ²	.017	.068
F (p)	1.437 (.241)	2.369 (.042)

Notes: *** $p < .01$; ** $p < .05$; * $p < 0.1$; t-values in parentheses

3.2.5 Additional Analysis

To gain a deeper understanding about the results with regard to the first two stages of the NPD process, for which the hypotheses could not be supported, we analyzed the influence of CI intensity on each dimension of new product success. In other words, we examined the effects of CI intensity on NPD speed, sales performance, and competitive superiority for each stage.

In line with Hoyer and colleagues (2010) and Zhang and colleagues (2016), our results for the ideation stage reveal a significant, positive effect of CI intensity on NPD speed ($\beta = .150$, $p < 0.1$) (see also, Chang and Taylor, 2016). In contrast, we find an overall non-significant effect of CI intensity on new product success for the ideation stage because the impact of CI intensity on sales performance, even though positive, is not significant ($\beta = .106$, $p > 0.1$) while the effect on competitive superiority is negative, even though not significant ($\beta = -.073$, $p > 0.1$).

For the development stage, in line with H_{7b} , we find neither a significant effect of CI intensity on NPD speed ($\beta = .067$, $p > 0.1$) nor on competitive superiority ($\beta = .104$, $p > 0.1$). However, in contrast to the overall logic of H_{7b} , we find a slightly significant and positive effect of CI intensity on sales performance ($\beta = .144$, $p < 0.1$), which means that integrating customers in co-production processes is likely to improve the sales performance of new products.

For each stage, the results of the effects of CI intensity on the three dimensions of new product success are shown in Table 3.5.

Table 3.5: Path Analysis and β -Coefficients for Additional Analyses of Study 2

	<i>Dependent Variable: New Product Development Speed</i>		<i>Dependent Variable: Sales Performance</i>		<i>Dependent Variable: Competitive Superiority</i>	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Direct Effects						
CI Intensity in Ideation Stage		.150 (1.860)*		.106, (1.246)		-.073 (-.860)
CI Intensity in Development Stage		.067 (.878)		.144, (1.782)*		.104 (1.296)
CI Intensity in Launch Stage		.343 (4.196)***		.086, (1.003)		.007 (.082)
Controls						
Firm Size (in millions of Euros)	.002 (.020)	-.034 (-.464)	-.081 (-1.043)	-.089 (-1.144)	-.013 (-.169)	-.013 (-.167)
Industry (slow vs. fast moving)	-.146 (-1.914)*	-.124 (-1.674)*	-.014 (-.186)	-.027 (-.346)	-.102 (-1.328)	-.121 (-1.554)
R ²	.021	.114	.007	.031	.011	.029
F (p)	1.853 (.160)	4.332 (.001)	.592 (.555)	1.040 (.396)	.932 (.396)	.994 (.423)

Notes: ***p<.01; **p<.05; *p<0.1; t-values in parentheses

3.3 General Discussion

The motivation for this research is the high relevance of CI for NPD (Franke et al., 2006). So far, quantitative studies exploring holistically CI in the NPD examine mostly the B2B context. However, the B2B compared to B2C industries are different with regard to, for example, the number of interactions, the degree of autonomy, the motives of interaction, and the strength and importance of the relation between firm and customers (Coviello et al., 2002; Fernandes and Proença, 2008). Because of these differences, studies in the B2C industries cannot simply draw on findings from the B2B sector. Hence, our investigation of CI intensity in a cross-sectional B2C industry setting provides results that are relevant beyond the studies focusing on the B2B context.

The present studies provide several contributions to literature. First, this research takes into account how and when customers should be integrated into the NPD to increase new product success. With regard to how to integrate customers intensively in NPD, the empirical findings garnered from a dataset of more than 380 firms demonstrate that CI intensity has a positive effect on new product success. The results determine that overall — in contrast to the B2B context, where NPD projects tend to be more specific and often individualized — intensifying the integration of customers into NPD projects increases the likelihood of new product success.

Second and consequently, the present investigation contributes to the existing literature (Füller et al., 2007; Jeppesen, 2005) by analyzing to what extent different factors influence the intensity of CI into NPD. Hence, our study identifies key levers, which managers can influence to foster external knowledge exploitation via CI in NPD. Following a call to balance the demands of key stakeholders (Kohli et al., 1993), this paper explicitly addresses the importance of distribution intermediaries in the B2C setting and thus contributes to the literature on market orientation by explicitly considering the role of retailers as an additional facet of the market intelligence perspective. Our research reveals that both retailer orientation and customer

orientation are separate dimensions of market orientation impacting CI intensity. Further, our results demonstrate that also interfunctional coordination and incentive systems have a significant effect on CI intensity. The only antecedent that shows an insignificant effect on CI intensity is competitor orientation.

Third, we demonstrate that the effectiveness of CI intensity on new product success is highly dependent on the timing of CI intensity along the NPD process. As such, our study contributes to the discussion about when to integrate customers into the NPD (e.g., Chang and Taylor, 2016; Ernst, 2002; Hoyer et al., 2010; Smets et al., 2013; Zhang et al., 2016). Overall, we find that the effect of CI intensity in the ideation stage has no influence on new product success, while success rates can be improved when integrating customers in the last two stages of the NPD.

Contrary to previous literature, which states that CI is especially useful in the ideation stage of the NPD (Chang and Taylor, 2016), integrating customers in this stage is not necessarily the best option for every B2C firm. With regard to NPD speed, we find, in line with previous literature, a positive effect of CI intensity in the ideation stage (e.g., Zhang et al., 2016). Some researchers argue that customers provide ideas for new products based on their needs with regard to currently available products (e.g., Da Mota Pedrosa, 2012; Zhang et al., 2016). As a consequence, information provided by customers in the ideation stage might lead to only slightly improved new products (Brockhoff, 2003), which can explain the non-significant effect of CI intensity on sales performance in this stage. The negative effect for competitive superiority hints towards an overuse of CI in the ideation stage. B2C firms might follow the conventional wisdom to especially integrate customers in the ideation stage due to its relative ease of implementation (e.g., Chang and Taylor, 2016; Cui and Wu, 2016). However, if every firm does integrate customers intensively, no competitive advantage can be gained.

Unlike previous literature (Brockhoff, 2003; Chang and Taylor, 2016; Gruner and Homburg, 2000; Pee, 2016), our results implicate that CI intensity in the development stage has a significant effect on new product success. Specifically, there is a significantly positive effect of CI intensity on sales performance. A possible reason for the overall positive effect of CI intensity in the development stage is that customers have a more profound knowledge of development processes than firms assume beforehand since they spend time on gathering information about and on understanding the respective product and its production process, thereby initiating actions of greater depth (Lin and Huang, 2013). Customers understand themselves as co-developers in this context, which leads to a high sense of responsibility and motivation for the product development. Therefore, customers might act as co-designers of aspects relevant to customers such as product naming or packaging (Sanders and Stappers, 2008; Whitla, 2009), thereby enhancing sales performance.

3.4 Managerial Implications

Our study demonstrates that managers responsible for NPD in B2C firms can positively impact new product success by increasing CI intensity. However, managers should not integrate customers intensively in all stages of the NPD process. Specifically, managers should integrate customers intensively in the development and launch stage of the NPD process. Respective to the goals the firm has when developing a new product, a stronger focus should rest on the specific stages of CI. For example, if managers aim to accelerate NPD speed, they should especially focus on integrating customers in the ideation stage and launch stage of the NPD process, while managers who aim for a better sales performance should rather concentrate on integrating customers into the development stage. Aiming for competitive superiority of new products, managers should desist from spending resources on intensive CI.

To intensify CI in NPD, top management has to consider different levers. First, B2C firms need to live a culture of collecting and using information from retailers about customer behavior. B2C firms still often do not directly receive information concerning customers' needs with regard to new products and complaints about existing products. Rather, the retailers as channel and supply chain partners receive this information (Kohli and Jaworski, 1990; Tokman et al., 2016). B2C manufacturers often complain that retailers do not forward this important information proactively. As a result, manufacturers often blame retailers for their own inabilities to develop new products that meet end-user needs. Hence, the results of this study show that firms need to become proactive themselves and focus more on retailers. To do so, firms should establish long-term partnerships with retailers. Such partnerships should not only follow a product-push logic, but such a cooperation should also allow for a customer-information-led exchange.

Second, firms can combine both market pull and technology push approaches to meet the technological and end-user requirements. Thus, by focusing on customers, i.e., by being customer oriented, and by different departments working together closely, i.e., by being interfunctionally coordinated, firms will integrate customers more intensively into NPD, thereby enhancing their chances for new product success.

Third, top management needs to design the incentive system in a way that it motivates employees to integrate customers intensively. Hence, the incentive system of employees working in NPD should connect their financial performance also with their activities in NPD and new product success. For example, the incentive system should financially support the development of unique ideas and products (Page, 1993). Finally, to integrate customers intensively in NPD, B2C firms should not follow a culture of collecting and using as much information as possible about competitive moves.

3.5 Limitations and Future Research

Extant studies suggest that customers only compare current products from a firm to existing products from competitors (e.g., Lagrosen, 2005), which will lead to incremental innovations rather than to radically new products. In this sense, the present study made no distinction between radically new products and incrementally new products. Thus, future studies should further investigate in general but also stage-specifically whether the effect of CI intensity on new product success reveals different results when accounting for different degrees of product innovativeness.

Furthermore, although the idea of listening to and integrating customers into the NPD is not new, many firms shy away from customer participation since they fear, for example, that they lose both time and focus if they pay too much attention to and rely too much on customer feedback (Merlo et al., 2014). In addition, some firms would like to integrate customers more intensively, but simply do not know how to approach them and what to do with the given feedback afterwards (Merlo et al., 2014). Therefore, future studies should focus on how firms can reduce possible barriers and uncertainties about CI and how to derive strategies for effectively approaching customers and efficiently integrating them into the NPD.

4 Paper 3: The Show Must Go On – The Influential Role of Ideators' Psychological Ownership in Idea Contests for Value Co-Creation

Anna-Lena Hanker^a and Monika C. Schuhmacher^a

^aDepartment of Business Administration with the focus on Technology, Innovation, and Start-up Management, Justus-Liebig-University of Giessen, Licher Str. 62, 35394 Giessen, Germany

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Abstract

Even though there is plenty of research on open innovation in the front end of innovation development, extant studies provide very little insights on how early CI tools enable a continuous process of VCC. Idea contests are such an early CI tool, which contest holders apply for asking interested people to submit ideas on how to solve a specific problem or challenge. So far, research provides insights on why people participate in idea contests, how to increase the quality and quantity of submitted ideas, and whom to integrate. Surprisingly, extant studies neglect that ideators emotionally bond to and develop PO for their submitted idea during contest participation. We propose that this emotional bonding drives VCC and is manageable by contest design. Overall, we conduct four idea contests to investigate the role and management of PO in idea contests for VCC. First, across all four field experiments, we find that developed PO for a submitted idea impacts ideators' VCC intention for that idea beyond the contest. Second, we find that the level of PO developed for an idea depends on contest design elements. Specifically, a textual contest task, a broad task specificity, and contestant visibility via unblind contests increase ideators' levels of PO and hence, their VCC intention. Consequently, this study advances idea contest research by demonstrating the role of PO in idea contests for VCC.

Keywords: *Idea contest design, contest theory, psychological ownership, value co-creation*

Firms use idea contests to facilitate CI for leveraging external knowledge into their innovation development (Chesbrough and Brunswicker, 2013; Kruft et al., 2019). In idea contests, seeker firms typically post a given problem or challenge and call solvers to submit ideas on how to solve the challenge (e.g., Afuah and Tucci, 2012). As such, idea contests are competitive in nature as participants compete against each other to win a prize (Terwiesch and Ulrich, 2009).

Extant studies investigating idea contests predominantly focus on advantages of receiving external ideas for internal innovation development (e.g., Ihl et al., 2019). For example, research demonstrates that idea contests enable firms to receive diverse ideas to a given problem or challenge at low costs and in a short period (e.g., Zhu et al., 2019). Thus, solvers submitting ideas in contests provide firms with external information, which they can internally use for further innovation development (Piller and Walcher, 2006). Here, research focuses on the primary goal of idea contests, i.e., to receive ideas for the front-end of innovation development. Other researchers investigate whom to invite to idea contests (e.g., Björk and Magnusson, 2009; Schuhmacher and Kuester, 2012) and how to design idea contests (e.g., Gatzweiler et al., 2017; Hofstetter et al., 2018) to increase idea quality and in turn, innovation performance (Kruft et al., 2019; Lau et al., 2010).

In addition, we know that firms make use of open innovation with the aim of VCC (e.g., Prahalad and Ramaswamy, 2004). We define VCC as a long-term collaboration between a firm and actively involved users from idea development to actual value delivery (Ranjan and Read, 2016; see also, Cui and Wu, 2017; Lusch and Vargo, 2006; Prahalad and Ramaswamy, 2004). In fact, a multitude of studies stresses that customers should actively participate in the entire innovation development process to foster innovation success (e.g., Zimmerling et al., 2017). In other words, to capture value out of users' ideas and to deliver value by creating meaningful innovations, firms aim to co-create value with users beyond idea development throughout the

entire innovation development until innovation launch (Kohler, 2015; Ranjan and Read, 2016). However, research pauses on the questions whether and how early CI via, for example, an idea contest allows firms to engage contest participants in VCC (Lynch et al., 2016).

Nevertheless, first insights show that users develop an inclination to continue with their idea once the contest is finished (e.g., Piller and Walcher, 2006). However, we expect that contest participants differ in their interest in VCC activities after their idea submission. We propose that the interest in VCC is manageable by the idea development setting, i.e., the contest design. Literature shows that different contest design elements allow shaping contest outcomes (Lazear and Rosen, 1981; Terwiesch and Xu, 2008), such as the number of idea submissions (e.g., Bockstedt et al., 2016), idea quality (e.g., Piller and Walcher, 2006), or active user engagement in open contest formats (e.g., Ihl et al., 2019). We go one step further and propose that contest design impacts VCC interest via the emotional attachment of contestants, i.e., the PO developed for their submitted idea.

Our proposition rests on the combination of two theoretical viewpoints: contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003). First, contest theory states that the decision to participate in a contest and to exert effort into the contest task, i.e., the generation of a solution to the given challenge, depends on two contest design factors: (1) the probability to win the contest prize and (2) the expected return of the contest (Lazear and Rosen, 1981). Thus, respective to how contest holders design a contest, contest participants become ambitious to win the contest, as they are eager to outperform other contestants and to receive the prize (Becker and Huselid, 1992). Hence, the contest design affects contestants' effort into idea development and as a result, contestants develop PO for their idea (Pierce et al., 2003). Second, PO theory indicates that individuals develop an emotional attachment to a tangible or intangible target, resulting in a feeling of ownership (Pierce et al., 2003). Drawing on PO theory, we argue that users develop an inclination to continue with their idea and to co-create value through the

emotional attachment, i.e., PO, for their developed idea (Gray et al., 2020). Extant studies pause on the role of PO in idea contests and as a driver of VCC. However, studies from other fields of open innovation research show that users in fact develop PO when collaborating with firms on innovation projects (e.g., Dawkins et al., 2017; Fuchs et al., 2010). For example, Franke et al. (2010) demonstrate that individuals develop PO when using mass customization toolkits as they enable to be the creator of an innovation. Taken together, the aim of the present study is to understand the role and management of PO in idea contests as a starting point for VCC. Specifically, we address the research question: How can firms manage the development of ideators' PO for their idea through contest design to increase ideators' VCC intention?

We conduct four idea contests to investigate the role of PO for contestants' interest in VCC due to contest design. In each contest, we manipulate a specific contest design element, for which we hypothesize an impact on the development of PO for the submitted idea and consequently, on VCC interest: (1) the contest task, i.e., in which format - textual or visual - participants are asked to complete the task (Adamczyk et al., 2012); (2) the task specificity, i.e., whether the task requirements are restricted or broad (e.g., Gillier et al., 2018); (3) the contest competitiveness, i.e., whether the number of competitors submitting ideas is low or high (e.g., Boudreau et al., 2011); and (4) the contestant visibility, i.e., whether or not participants know about the number of submitted ideas (e.g., List et al., 2020).

Overall, our study contributes to theory in several ways. First, we add to idea contest research by combining the theoretical lenses of contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003). Specifically, we demonstrate that contest participants develop a feeling of PO for their submitted ideas due to specific contest design elements. Hence, we bridge two theoretical lenses and extend research results on idea contests by accounting for participants' development of PO for their idea.

Second, existing studies on idea contests predominantly focus on idea submission and the output, i.e., the quality of submitted ideas (e.g., Mack and Landau, 2020). We add to idea contest literature by showing that the design of idea contests does not only influence the direct contest output, but also affects ideators' emotional bond to the developed idea and their interest in VCC.

Third, by applying PO theory, we are able to show that ideators develop a feeling of ownership for their submitted idea in idea contests (Pierce et al., 2003), which enables firms to bind ideators for VCC. So far, extant research shows that users develop PO in other open innovation formats, for example when using mass customization toolkits (Franke et al., 2010). We add to these insights by demonstrating the role of PO in idea contests and as a driver of VCC.

Finally, we extend contest theory to demonstrate how specific contest design elements can affect contest participants' intention for further VCC with the contest holder. So far, studies draw on contest theory to explain contest design-driven motivators to show why users participate in idea contests (e.g., Hofstetter et al., 2018). We show that in addition to the probability to win and the expected return (Lazear and Rosen, 1981), contest design influences contestants' PO for their idea and hence, their VCC intention for that idea. In investigating the role of contest design for PO development, we account for possibilities how firms can manage the development of PO via idea contests. By examining four specific contest design elements, we add to the continuous discussion on how to design idea contests (e.g., Terwiesch and Xu, 2008).

4.1 Theoretical Background

4.1.1 Contest Theory

Lazear and Rosen (1981) introduced contest theory, also known as rank-order tournament, as an alternative compensation design for labor contracts. In this context, contest theory provides explanations for the effects of promotion tournaments within firms (Bognanno, 2001). Generally, contest theory accounts for individual behavior in contests when contest participants compete for resources that contest holders, i.e., firms, allocate based on participants' relative rank rather than on their absolute output (Hofstetter et al., 2018).

First, contest theory postulates that contest participants adapt their individual behavior, i.e., their effort, to gain specific resources offered as a contest prize, predominantly in form of monetary rewards (e.g., Hofstetter et al., 2018). In this regard, Lazear and Rosen (1981) suggest that the prize announced in a contest requires an adequate level for users to participate. On a more general level, contest theory proposes that contests require a specific design, i.e., structures and conditions, to incentivize effort of participants (Ehrenberg and Bognanno, 1990).

Second, contest theory stresses that contest participants' effort during contests arises from the competitive nature of contests, i.e., the probability to win. Specifically, the contest holder allocates the announced resources based on the relative rank of one participant's output compared to the other participants' outputs and not based on the participant's absolute output (Becker and Huselid, 1992; Lazear and Rosen, 1981). Thus, participants' effort during the contest depends on the contest competitiveness (Körpeoğlu and Cho, 2018). In fact, researchers demonstrate the design of idea contests to trigger participants' sense of winning and thus, their desire to outperform other contestants (Boudreau et al., 2011; Li and Hu, 2017; Terwiesch and Xu, 2008). Essentially, the contest competitiveness influences participants' effort in the contest to increase chances of winning a prize by outperforming competitors (Becker and Huselid, 1992; Hofstetter et al., 2018).

4.1.2 Psychological Ownership Theory

Pierce et al. (1991) introduced PO theory to investigate employee behavior in organizations. The main point of PO theory is that individuals develop an emotional bond to a target, resulting in a feeling of ownership. In this sense, the authors define PO as “a state in which individuals feel as though the target of ownership or a piece of that target is theirs” (Pierce et al., 2003, p. 86). Essentially, individuals can develop feelings of ownership for both tangible and intangible targets (Pierce et al., 2003), such as ideas (Gray et al., 2020).

PO theory provides three routes individuals take to develop PO (Pierce et al., 2003). The first route to PO development is via ‘controlling the ownership target’. The higher the amount of control over a target, the higher the psychological involvement and thus, PO. The second route ‘coming to intimately know of the target’ implies an active interaction with the target, resulting in an intensive relationship and thus, a feeling of PO for the target. The third route ‘investing the self into the target’ refers to the shaping or creating of something through time and effort, again leading to PO. Overall, PO theory demonstrates control, knowing, and investing as central routes for the development of PO for a target, which in turn increases the perceived value of that target (Fuchs et al., 2010). Transferring these routes of PO theory to idea contests, in which participants exert control and put knowledge and effort into idea development to solve a given challenge, we argue that idea contest participants experience the same process, i.e., they develop PO for the idea they create.

4.2 Literature Review

4.2.1 Value (Co-) Creation via Idea Contests

To investigate the value of idea contests, extant studies either take a contest holder perspective by investigating benefits and costs of idea contests for the seeker firm (e.g.,

Gatzweiler et al., 2017), or take a solver perspective and examine why ideators participate in idea contests (e.g., Fuchs et al., 2010).

On the one hand, from a contest holder perspective studies show that seeker firms use idea contests as a method to integrate external knowledge by engaging users in firm-internal challenges with the ultimate aim of value creation (e.g., Terwiesch and Xu, 2008). Consequently, extant studies investigate how idea contests add to firms' value creation. Here, research predominantly focuses on the value firms create at the front-end of innovation development. For example, research findings indicate that idea contests enable firms an efficient idea generation as costs are generally low and firms receive many ideas quickly (Jeppesen and Frederiksen, 2006). In this sense, idea contests provide contest holders with a high number of diverse ideas to choose from for further innovation development (Afuah and Tucci, 2012).

Transferring these insights to studies addressing user integration in general, VCC with users in later stages of the innovation development process is beneficial since more successful innovations result compared to further developing ideas without users (e.g., Lau et al., 2010). Therefore, idea contest holders should aim to bind users for continuous innovation development after idea submission. So far, however, research does not examine how firms can effectively manage to win over users via idea contests to continue VCC after idea submission.

On the other hand, from a solver perspective and drawing on contest theory (Lazear and Rosen, 1981), current studies demonstrate that different motivators are crucial for users' decision to participate in an idea contest. Individuals weigh possible benefits from competing in a contest against the costs they have to invest to decide on contest participation (Fuchs et al., 2010). Consequently, current research taking a solver perspective predominantly investigates users' motivators for competing in idea contests prior to actual participation, such as prizes (e.g., Terwiesch and Xu, 2008) or rank (e.g., Loch et al., 2000). In addition, first insights also

demonstrate the competitive impact of idea contests on individuals during the contest. For example, Hutter et al. (2011) show that participants' interest in innovation activities enhances through the competitive nature of idea contests. As contest theory predicts, users aim to outperform other participants in competitive environments, such as idea contests (e.g., Becker and Huselid, 1992). Hence, solvers develop a competitive attitude during idea contests. However, so far, idea contest research does not investigate the influence of solvers' competitive attitude for the emotional attachment during the contest and hence, for their attitude, i.e., VCC intention, after the contest participation.

In addition, some studies indicate that users have an interest in continuing with their idea after contest participation (e.g., Hutter et al., 2011). In fact, researchers propose that users have an intrinsic desire to attain an outcome for themselves from their contest participation experience at the front-end of innovation development, such as a final product (Gebauer et al., 2010). Literature refers to this phenomenon as prosumption and shows that users likely develop a desire to prosume their idea, i.e., they become producers and consumers at the same time (e.g., Toffler, 1980). Thus, prosumers are essentially co-creators of value with a desire to produce their own output (Toffler, 1980). In this line, contest participants aiming to develop their idea further can either progress their idea on their own or collaborate with the contest holder (Tucker et al., 2018). Research lacks insights on how to foster contest participants' intention to continue with their idea after the idea contest and hence, to co-create value with the contest holder, i.e., the firm.

4.2.2 Design of Idea Contests

Drawing on contest theory (Lazear and Rosen, 1981), contests require specific designs to motivate participants' effort during the contest and hence, to increase the chance for receiving suitable solutions (Ehrenberg and Bognanno, 1990). Consequently, extant research examines

how to design idea contests and focuses on different design aspects (e.g., Piller and Walcher, 2006; Terwiesch and Xu, 2008).

First, a large group of studies investigates motivation structures, such as incentives and prizes, and the effects of those motivators on solvers' participation decision and on idea contest outputs (e.g., Connelly et al., 2014). Overall, these studies demonstrate that contest holders need to include extrinsic motivators, such as rewards, to induce participation and stimulate participants' effort and involvement during contests (e.g., Hofstetter et al., 2018; Terwiesch and Xu, 2008). To address in more depth how and which rewards foster individuals' participation and contest outputs, extant studies cover different reward designs and investigate acceptable prize spreads for idea contests (e.g., Connelly et al., 2014). For example, the fundamental study on innovation contest design by Terwiesch and Xu (2008) focuses on prize designs for different project and solver characteristics. The authors demonstrate that for ideation projects, contest holders should grant one single reward to the solver submitting the best idea. Simultaneously, a multiple-prize reward design is more attractive to solvers with less expertise in the task domain than a single reward structure (Terwiesch and Xu, 2008). Similarly, Hofstetter et al. (2018) show that multiple prizes lead to higher participation rates and to better contest outcomes in successive open innovation contests.

Second, another group of studies addresses the actual contest task, i.e., how contestants are required to present their idea to the contest holder (Adamczyk et al., 2012). As firms mostly host idea contests on web-based platforms, most seeker firms ask for textual ideation in form of written descriptions (e.g., Gatzweiler et al., 2017). Text-based ideation allows contest holders to filter relevant information quickly and provide feedback on how to elaborate on the idea further (Kruft et al., 2019; Luo and Toubia, 2015). In contrast, some contest holders require solvers to ideate visually to 'prove' highly elaborated solutions, e.g., with the use of web-based toolkits (e.g., Piller and Walcher, 2006). In this line, contest holders may ask ideators to

visualize sketches (Bullinger et al., 2010). Research finds that ideating simple prototypes, such as sketches, can facilitate ideation as ideators do not need to transfer their imaginary picture into a text (Ferguson, 1977; Oster, 2011).

Third, several studies address the role of task specificity, i.e., how restrictively contest holders formulate the task or challenge participants have to solve. Extant studies use different terminologies for this contest design element, such as breadth of solution space (e.g., Erat and Krishnan, 2012), topic specificity (Bullinger et al., 2010), or problem specification (e.g., Felin and Zenger, 2014). On the one hand, research investigates idea contests in form of open calls without specifying a task or restricting contestants to a particular problem (Stetler and Magnusson, 2015). Hence, possible solution spaces are very broad in nature. On the other hand, some firms initiate idea contests by clearly specifying their own expectations towards solvers' ideas to increase the chances that contestants stay in promising solution spaces (Erat and Krishnan, 2012). In such restricted contests, contest holders ask participants to concentrate on specified expectations and follow certain predetermined requirements (Mo et al., 2018). Overall, most studies on task specificity find that specifying a problem heavily is suboptimal as ideators feel too restricted and disregard the full breadth of the (still) available solution space (e.g., Gillier et al., 2018). In contrast, an increased breadth of the solution space usually results in more diverse and creative solutions (Erat and Krishnan, 2012; Stetler and Magnusson, 2015).

Finally, a multitude of studies deals with contest intensity in terms of low or high numbers of other contest participants and their submitted ideas. In this line, most idea contests come in an unblind format, i.e., firms actively inform participants about the number of already submitted ideas in the respective contest. Hence, in line with contest theory (Lazear and Rosen, 1981), ideators come to think about their own success chances respective to the contest size, i.e., the number of their competitors (e.g., List et al., 2020). Thus, participants conclude from unblind contest formats how intense competition is (Li and Hu, 2017). In contrast, some contest holders

use a blind contest format, which does not provide any information about the presence or number of contestants. Hence, the perception of the contest intensity is zero (Bockstedt et al., 2016). Consequently, participants have to ideate without insights into the competitive environment and thus, without any indication of the number of contestants. Some studies investigate these aspects and concentrate on how the visibility of other participants influences the perception of one's own skills. For example, Darmody et al. (2017) show that contestant visibility impacts solvers' perception regarding their own capabilities. In addition, research results demonstrate that in an unblind contest format with a high competition intensity, the high number of competitors decreases potential contestants' motivation prior to actual contest participation since the chance of winning reduces (Boudreau et al., 2011).

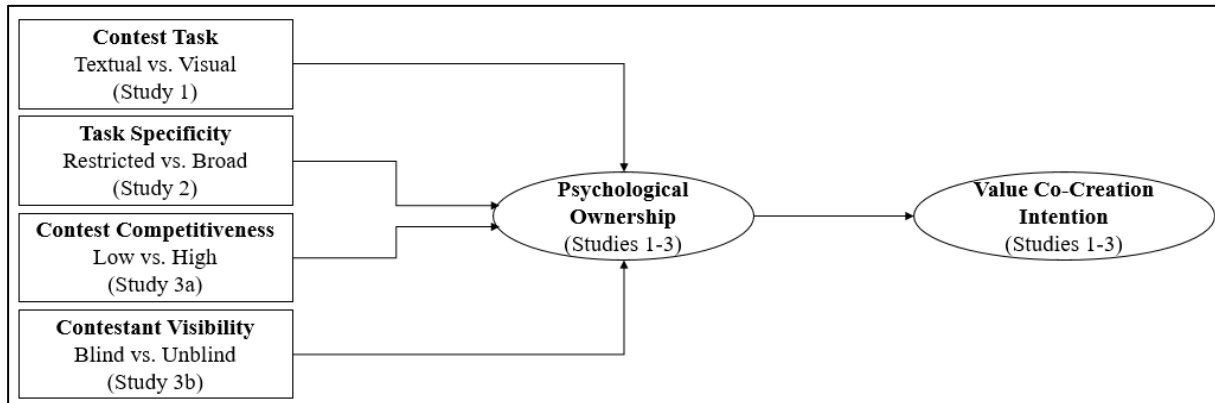
Overall, across the different literature streams on contest design, the focus is predominantly on how to design specific contest elements to manage idea quality or idea quantity as contest outputs (Coskun et al., 2000; Erat and Krishnan, 2012). Extant research does not address how different contest design elements affect contest participants' emotional attachment to their idea and behavior after idea contest participation.

4.3 Overview of Studies

Overall, we address the role and management of PO in idea contests as a starting point for VCC. Specifically, we argue that PO is a central factor for the development of contest participants' interest in VCC with the firm and is manageable with specific contest design elements. Specifically, based on contest theory and previous literature, we propose four design elements of idea contests, i.e., contest task, task specificity, contest competitiveness, and contestant visibility, to impact the development of PO and ultimately, to leverage users' VCC interest. Thus, we run four studies in which we hypothesize and test the different design

elements and their influence on the development of PO and ultimately, VCC intention (see Figure 4.1).

Figure 4.1: Organizational Framework



4.4 The Impact of Psychological Ownership on Value Co-Creation

Combining contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003), we argue that participants emotionally bond to and develop PO for their idea within the competitive environment of idea contests. One central argument of contest theory is that contest participants establish a desire to outperform their competitors (Lazear and Rosen, 1981). Consequently, contestants devote time and effort into developing their idea in idea contests (Becker and Huselid, 1992), leading to an emotional attachment to the target they create in form of PO (Pierce et al., 2003). In fact, research shows that individuals reveal their self-identity through and develop PO for something they develop and create (Chun and Davies, 2006; Harmeling et al., 2017).

In addition, we know that participants' commitment in idea development increases prospective VCC in form of attaining an outcome from the co-creation experience (Gebauer et al., 2010; Norton et al., 2012). Thus, with increasing levels of PO developed for the submitted idea, participants as producers of ideas simultaneously develop the desire to be able to consume

that same idea at one point in time (Nagel et al., 2018; Toffler, 1980). In fact, ideators know that VCC enables them to engage in an interactive production process based on cooperation and mutualism, resulting in joy and satisfaction (Troye and Supphellen, 2012; Ranjan and Read, 2016). The already known contest holder provides the infrastructure and tangible resources needed for VCC (Lusch and Vargo, 2006; Paredes et al., 2014) and calls for ideators to provide their intangible knowledge to further develop the submitted idea, which makes ideators feel valued (Füller et al., 2007). Thus, ideators realize that VCC with the contest holder enables and facilitates idea realization (Ranjan and Read, 2016), which ultimately enables ideators to consume their idea (Toffler, 1980). Consequently, the higher the level of developed PO, the higher should be the interest in VCC. Hence, we hypothesize:

H₁: The higher users' PO for their submitted idea in an idea contest, the higher their VCC intention for that submitted idea.

4.5 Study 1: The Role of Contest Task

Generally, idea contests require participants to complete an ideation process, for which firms need to specify the format in which contestants should submit their idea (Bullinger et al., 2010). The two formats mostly used in idea contests are a textual or a visual format. On the one hand, some contest holders ask contest participants to write down their ideas, i.e., to use a textual format (Gatzweiler et al., 2017). On the other hand, other contest holders ask for idea visualization, such as sketches (e.g., Bullinger et al., 2010). Visualization allows for a quick translation of visual thinking into explicit ideas (Oster, 2011). As such, visualization tasks facilitate idea creation as they skip the step to transfer human visual thinking into text formulation (Ferguson, 1977; Oster, 2011), which textual idea contest formats ask for. In addition, studies highlight that sketches have a higher degree of elaboration and detail compared to text-based ideation (e.g., Bullinger et al., 2010).

Visualizing something does not only have an instrumental value, but also contains psychological value for contest participants, which likely fosters their emotional attachment to the target (Franke et al., 2010). Visual prototyping allows for a high flexibility and adaptability in the ideation process, as ideators are quickly able to adapt an image or a sketch to any new thought, which positively affects ideator responsiveness and commitment (Tih et al., 2016). Further, ideators spend more time and effort into shaping their idea via visual sketches, leading to the investment of their selves into the target, i.e., the idea (Belk, 1988; Hulland et al., 2015). In essence, contestants invest more of their selves into visual contest tasks compared to textual contest tasks, which results in higher effort in idea development and thus, a higher level of PO for the developed idea. Hence, we hypothesize:

H₂: Visual contest tasks lead to a higher level of PO for the submitted idea than textual contest tasks.

4.5.1 Control Variables

We include age and gender to control for differences in individual characteristics (Harmeling et al., 2017; Ihl et al., 2019). For age, prior research shows that age increases use experience over the years, thereby affecting user innovativeness and behaviour in VCC (Faullant et al., 2012; Mack and Landau, 2020). For gender, studies demonstrate that gender affects domain-relevant knowledge and skills that become relevant in VCC (Amabile, 1998; Faullant et al., 2012). Finally, we also control for ideation time, i.e., the time between contest task specification and idea submission. We assume that the time taken for the idea development likely influences PO and VCC interest, independent of the experimental manipulation.

4.5.2 Method

4.5.2.1 Participants and Design

To test H_1 and H_2 , we conducted an idea contest on the topic of 'our lecture halls'. Specifically, we conducted a 2 (contest task: textual vs. visual) x 1 between-subjects design field experiment. We recruited participants via an online advertisement on the university website and additionally promoted the contest in several lectures. Based on contest theory and research, we offered rewards to contest participants (e.g., Hofstetter et al., 2018). Thus, we designed the contest as a rewards-based contest and informed all participants that the best three ideas will receive 20€ each. Further, we informed participants that the department for technology, innovation and start-up management runs the idea contest for the university. Once people indicated interest in the idea contest, we invited them to our campus lab, in which the actual contest took place and which was open several times a week over a time span of four weeks. From 73 university members coming to our lab and participating in the idea contest, 68 submitted an idea (62.3% female, average age: 23.54 years).

4.5.2.2 Procedure

Once participants arrived at the lab, they received more information on the idea contest. Both contest tasks, textual and visual, included the same instructions as we asked all participants to provide ideas for a novel concept of a lecture hall. Furthermore, we explained that submitted ideas should tackle flexible and effective concepts for such a new lecture hall. As a starting point, we provided some exemplary questions, such as: "How would you imagine the ideal lecture hall of the future?" In addition, we told participants about the evaluation criteria to assess their ideas, which were uniqueness as well as economic and technical feasibility. In the textual group, participants received paper and pen to write down their idea(s) whereas in the visual group, participants received a poster-size paper and several drawing utensils to visualize their

idea. We made sure that only participants from the same experimental group were present in the lab at the same time.

After completion of the ideation task, both groups of participants completed a short survey where we asked them about their level of PO with five items on a 7-point Likert scale (Fuchs et al., 2010; Van Dyne and Pierce, 2004) (see Appendix A4 for measurements). In addition, we provided participants with one item on a 7-point Likert scale asking them about their VCC intention for their submitted idea ("I would like to further co-create my idea together with the department."). Finally, participants filled out a manipulation check and evaluated several demographics to complete the contest.

4.5.3 Results

4.5.3.1 Manipulation Check

On average, participants took a similar amount of time for the idea contests in the textual ($M = 40.49$ minutes) and the visual ($M = 42.19$) contest task ($F(1, 66) = 1.251$; $p > 0.1$). As intended, participants in the textual contest task indicated on a no (= 1) versus yes (= 2) scale they had to ideate textually ($M = 1.97$; "In this idea contest, it was my task to formulate my idea on a textual basis") compared to participants in visual contest task condition ($M = 1.46$; $F(1, 66) = 26.947$; $p < .001$).

4.5.3.2 Main Results

First, to test H_1 , we investigated the direct effect of contestants' developed PO on their VCC intention for their submitted idea. As hypothesized, we find a significant and positive effect ($\beta = .488$, $p < .000$). Thus, H_1 is supported; the higher users' developed PO for their idea, the higher their VCC intention for that idea. Second, to test H_2 , we ran an ANOVA. The analysis reveals a significant difference of the level of users' developed PO between the textual contest task

($M_{\text{textual}} = 4.74$) and the visual contest task ($M_{\text{visual}} = 3.90$) ($F(1, 66) = 5.545$; $p < .05$); however, in the opposite direction as hypothesized. An ANCOVA with the covariates age, gender, and ideation time reveals a similar pattern of results ($F(1, 63) = 5.932$; $p < .05$). Thus, we find no support for H_2 .

4.5.3.3 Mediation Analysis

Additionally and accounting for the control variables, we ran a mediation analysis using the bootstrap test (5,000 resamples) by Preacher and Hayes (2004) for the role of PO in the task format – VCC intention relation (see Table 4.1). First, we again find a positive and significant effect of PO on VCC intention ($\beta = .421$; $p < .001$). Second, the effect of contest task on PO is again negative and significant ($\beta = -.294$; $p < .05$). Third, the indirect path from contest task to VCC intention through PO is negative and significant ($\beta = -.246$) with a 95% confidence interval excluding zero $[-.501; -.039]$. Further, the direct effect of contest task on VCC intention is significantly negative ($\beta = -.353$; $p < .01$). Finally, with a constant level of PO, the direct path between contest task and VCC intention is significant, but reduced ($\beta = -.229$; $p < .05$), pointing towards a partial mediation in the opposite direction than hypothesized (Zhao et al., 2010).

Table 4.1: Mediation Model: Effect of Contest Task on Value Co-Creation Intention via Psychological Ownership

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Dependent Variable: Psychological Ownership				Dependent Variable: Value Co-Creation Intention					
	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)
Controls										
Age	-.085	(.052)	-.089	(.050)	-.151	(.070)	.145	(.065)	.183	(.060)
Gender	.085	(.391)	.086	(.376)	.144	(.522)	.145	(.491)	.109	(.447)
Time	.092	(.000)	.133	(.000)	.049	(.000)	.098	(.000)	.042	(.000)
Direct Effects										
CT			-.294*	(.364)			-.353**	(.475)	-.229*	(.475)
PO									.421***	(.149)
Indirect Effect ⁺										95% C.I.
CT→PO→VCCI									-.246	[-.501 -.039]
R ²	.016		.101		.052		.174		.333	
Adj. R ²	-.030		.044		.008		.122		.280	
F	.356		1.771		1.172		3.321*		6.201***	

Notes: *** p<.001; ** p<.01; * p<.05

CT = Contest Task; PO = Psychological Ownership; VCCI = Value Co-Creation Intention; C.I. = Confidence Interval

⁺As the predictor variable is dummy coded, the indirect effect is in partially standardized form (Hayes, 2018).

4.5.4 Discussion

Adding to the field of VCC, we are the first to show that participants in idea contests develop PO for their submitted ideas, which increases their VCC intention. In line with PO theory, contestants emotionally bond to the idea they develop during contest participation as ideation fulfils the routes of knowing, controlling, and investing into the target, i.e., the idea contestants create (Pierce et al., 2003). Consequently, the higher the level of PO, the less willing ideators are to entirely give up control over their idea and the more they are willing to continue to develop the idea further with the firm.

Furthermore, we demonstrate that in line with contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003), the contest design determines PO development. In addition, we find that PO mediates the effect of contest task on participants' VCC intention. Specifically and with regard to task format, we find that textual ideation is more favourable for the development of PO than visual ideation. Potentially, contest participants perceive ideation in form of visualization as less satisfying compared to a text-based ideation process and consequently, develop a weaker emotional bond to their idea. In fact, research indicates that visualization processes are more likely to result in participants' dissatisfaction than textual descriptions because they demand more investment of ideators (Lee and Chen, 2011; Oster, 2011). Hence, if ideators feel unable to cope with the challenge as the task is too demanding, they have less control over the task (Franke et al., 2010; Pierce et al., 2003). As a result, ideators are not able to reveal their self-identity via the submitted idea (Gray et al., 2020). Consequently, a visual idea representation is less likely to fulfil the routes of control and investment to PO (Pierce et al., 2003).

4.6 Study 2: The Role of Task Specificity

Idea contest holders do not only determine how they ask participants to solve an ideation task, but also differ in how precisely they specify the task. Firms can initiate idea contests with a broad task specificity, i.e., they specify only basic task conditions, or they determine precise task requirements, thereby restricting contestants largely (e.g., Boudreau et al., 2011; Erat and Krishnan, 2012). Overall, we know that different degrees of task specificity in contests influence participants' effort (e.g., Felin and Zenger, 2014).

Since unlimited possibilities of ideas in form of a broad task specificity potentially overwhelm contestants, some researchers call for restricted tasks for idea development (e.g., Hirunyawipada and Paswan, 2013). Erat and Krishnan (2012) find that a restricted task specificity reduces participants' uncertainty regarding their accuracy in solving the task while the chances to follow a meaningful innovation path grow. In fact, participants can fully concentrate their effort on the specific domain predetermined by the contest holder (Mo et al., 2018), which fosters participants' simulation for ideas within the given domain and potentially increases individuals' investment of the self (Porteous, 1976).

In contrast, some studies show that a broad task specificity promotes innovativeness by generating an atmosphere of freedom (Stetler and Magnusson, 2015). Further, a broad task encourages participants to explore novel paths and solution spaces (Amabile, 1998; Erat and Krishnan, 2012). In addition, we know that individuals seek for control in task fulfilment (Bandura and Locke, 2003). In broad compared to restricted tasks, the perceived control over the outcome is higher since participants perceive their potential solution as less predefined by the contest holder and therefore conceive to have control over what to focus on in their idea development. Consequently, they perceive their idea as their own (Zheng et al., 2011). Following PO theory (Pierce et al., 2003), we know that one route to PO development is via controlling the ownership target. With a rising level of control over the outcome, the feeling of

self-efficacy and experiencing the outcome as part of the self is reinforced (Bandura and Locke, 2003; Harmeling et al., 2017). Hence, contestants interact more with the target and come to know the target better (Pierce et al., 2003). Consequently, participants perceive their own competences as higher (Fuchs et al., 2010), which increases participants' motivation and thus, they invest more time and effort into idea development (Boudreau et al., 2011; Felin and Zenger, 2014). Thus, a broad task specificity should lead to higher levels of PO developed for the submitted idea. Thus, our hypothesis is as follows:

H₃: A broad task specificity leads to higher level of PO for the submitted idea than a restricted task specificity.

4.6.1 Method

4.6.1.1 Participants and Design

We used a 2 (task specificity: restricted vs. broad) x 1 between-subjects field experiment and recruited participants via an online consumer panel to an online idea contest on seating furniture for a city beach bar. We randomly assigned participants to one of the two contest conditions. In sum, 223 interested solvers participated in the idea contest. Due to missing or inappropriate idea submissions (N = 30) and response patterns (N = 16), the final sample consists of 177 participants and ideas (41.8% female, average age: 45.59 years). Thereof, 88 participants followed a restricted task specificity and 89 a broad task specificity. Furthermore, we informed all participants that the best idea will receive a reward of 200€.

4.6.1.2 Procedure

Building upon the findings of Study 1, we asked contestants for text-based ideation. We conducted the idea contest in the name of a local start-up selling tropical cocktails, which at the time of the idea contest was considering opening a flagship store in form of a city beach bar. In

the idea contest, the start-up called for ideas on 'seating furniture for a city beach bar'. In the broad task specificity condition, solvers received the very general task of submitting ideas for seating furniture for the flagship beach bar to underline an atmosphere of relaxation and creativity. We asked participants to be creative and submit any idea that would invite beach bar visitors to enjoy the cocktails in a newly designed flagship store with innovative interior. In the restricted task specificity condition, the start-up additionally specified requirements within the task description. For example, the start-up required participants to design colourful and conspicuous seating furniture that combines beach experience and bar feeling, which should be promotable under the headline 'colourful summer in the city'. In both experimental conditions, the start-up told participants that they would evaluate ideas based on their uniqueness as well as economic and technical feasibility. We structured the remainder of the survey similarly to the previous study. However, this time we used several items for measuring contestants' VCC intention, adapted from Bhattacharjee (2001) and Zhou et al. (2012) (see Appendix A4 for measurements).

4.6.2 Results

4.6.2.1 Manipulation Check

As intended, participants in the broad task specificity condition perceived the restrictions as broad ($M = 6.31$; "The task in this idea contest was to develop and describe an innovative seating furniture for [name of start-up]. For this task, I was not given any restrictions or specific requirements") compared to participants in the restricted task specificity condition ($M = 4.69$; $F(1, 175) = 35.847$; $p < .001$).

4.6.2.2 Main Results

Again, we ran an ANOVA revealing that the two task specificities are significantly different in terms of the level of participants' developed PO for their idea; in fact, in the hypothesized direction ($M_{\text{restricted}} = 4.49$; $M_{\text{broad}} = 5.06$; $F(1, 175) = 7.164$; $p < .05$). An ANCOVA with the covariates age, gender, and idea generation time yielded the same pattern of results ($F(1, 172) = 7.738$; $p < .05$). Hence, we find support for H_3 .

4.6.2.3 Mediation Analysis

We again used the bootstrap test (5,000 resamples) by Preacher and Hayes (2004) to run a mediation analysis (for results see Table 4.2). The effect of task specificity on PO is positive and significant, again indicating that a broad task specificity fosters PO more than a restricted task specificity ($\beta = .206$; $p < .05$). We also find a significant positive effect of users' PO on their VCC intention for their idea ($\beta = .584$; $p < .001$), additionally supporting H_1 . Further, the direct effect of task specificity on VCC intention is positive and significant ($\beta = .288$; $p < .001$). The indirect effect from task specificity to VCC intention via PO is positive ($\beta = .240$) and significant with a 95% confidence interval excluding including zero [.060; .414]. In addition, with a constant level of PO, the direct path between task specificity and VCC intention is also positive and significant, but reduced ($\beta = .168$; $p < .05$), pointing towards a partial mediation (Zhao et al., 2010).

Table 4.2: Mediation Model: Effect of Task Specificity on Value Co-Creation Intention via Psychological Ownership

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Dependent Variable: Psychological Ownership				Dependent Variable: Value Co-Creation Intention					
	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)
Controls										
Age	-.126	(.008)	-.134	(.008)	-.206**	(.009)	-.217**	(.009)	-.139*	(.007)
Gender	-.017	(.223)	-.008	(.219)	-.008	(.248)	.004	(.238)	.009	(.190)
Time	-.093	(.000)	-.103	(.000)	-.012	(.000)	-.025	(.000)	.035	(.000)
Direct Effects										
TS			.206**	(.216)			.288***	(.235)	.168**	(.192)
PO									.584***	(.066)
Indirect Effect ⁺										95% C.I.
TS→PO→VCCI									.240	[.060 .414]
R ²	.021		.063		.042		.124		.444	
Adj. R ²	.004		.041		.025		.104		.427	
F	1.224		2.888*		2.513		6.097***		27.257***	

Notes: *** p<.001; ** p<.01; * p<.05

TS = Task Specificity; PO = Psychological Ownership; VCCI = Value Co-Creation Intention; C.I. = Confidence Interval

⁺As the predictor variable is dummy coded, the indirect effect is in partially standardized form (Hayes, 2018).

4.6.3 Discussion

First, we can again demonstrate that PO plays a positive role for the interest of contest participants in further VCC. Second, we find that the contest design in terms of task specificity allows contest holders to influence the development of contestants' PO for their idea. Third, we find that PO mediates the relation between task specificity and participants' VCC intention. Specifically, a broad task specificity fosters participants' developed PO for their submitted idea compared to a restricted task specificity. Essentially, a broad task specificity restricts solvers less in their ideation process as it opens up wide solution spaces (e.g., Erat and Krishnan, 2012) and allows contestants more freedom to invest their self into their idea (e.g., Harmeling et al., 2017). In turn, contestants have a higher control over the outcome, are more motivated and thus, put more effort into idea development (Boudreau et al., 2011; Pierce et al., 2003).

4.7 Study 3: The Role of Competition in Idea Contests

In Study 3, we investigate the role of competition in idea contests for PO development. First, we are interested in whether the number of contest participants, i.e., contest competitiveness, impacts developed PO for an idea, and in turn, interest in VCC. Therefore, we compare the effect of indicating a low number of contest competitors versus a high number of contest competitors (Study 3a). Second, we explore the overall relevance of contestant visibility, i.e., blind vs. unblind idea contests, on users' PO and in turn, their VCC intention. Therefore, we explore the relevance of revealing the number of contest competitors to participants versus indicating no such information (Study 3b).

4.7.1 Study 3a: The Role of Contest Competitiveness

Overall, research demonstrates that the number of contest competitors is an indication of one's own success chances (List et al., 2020). However, extant studies reveal conflicting

opinions in terms of the role of contest competitiveness, i.e., the number of competitors in idea contests. On the one hand, researchers propose that the overall success expectancy decreases with an increasing number of contest competitors (e.g., Li and Hu, 2017). Thus, in contests with a high number of competitors, participants expect a lower probability of winning (Boudreau et al., 2011). Furthermore, with a high number of competitors, participants expect the firm to receive a multitude of ideas, which leads each further participant to perceive the own potential impact and efficacy as less (Li and Hu, 2017; List et al., 2020). Consequently, participants are potentially less motivated and invest less effort into idea development (e.g., Casas-Arce and Martínez-Jerez, 2009). Hence, ideators decrease interaction with and self-investment into the target, thereby developing a low level of PO for the idea (Pierce et al., 2003). Consequently, PO should be lower with a high number of competitors and fostered with a low number of competitors.

On the other hand and drawing on contest theory implying that outperforming competitors in contest situations is key to success (Lazear and Rosen, 1981), high competitiveness between participants is likely to emerge in contests. According to strategy research, the higher the competitiveness and the more intense the competition, the higher the motivation to outperform competitors (Kilduff, 2014). Thus, participants exert more effort to win a contest with a high number of competitors (Körpeoğlu and Cho, 2018). In this line, Orrison et al. (2004) demonstrate that contest participants have an intention to reduce their effort if the probability of winning the contest increases, i.e., in contests with a low number of competitors. Consequently, a higher number of competitors and thus, a higher contest competitiveness increases psychological involvement (To et al., 2018), i.e., interacting with and investing into the target, which leads to the development of higher levels of PO compared to a lower contest competitiveness (Pierce et al., 2003). Hence, we hypothesize:

H₄: High contest competitiveness leads to a higher level of PO for the submitted idea than low contest competitiveness.

4.7.1.1 Method

4.7.1.1.1 Pilot

To determine specific numbers for a low level of competitiveness and a high level respectively, we conducted a pilot study prior to the main experiment. In general, the level of perceived competitiveness depends on the nature of the contest and the contest holder (e.g., Boudreau et al., 2011; List et al., 2020). Therefore, we randomly invited 40 interested people to participate in our pilot study. We presented our contest scenario - searching for innovative toys for pets for a pet store - and asked them to indicate which number of competitors they would perceive as low and high. 87.5% of participants indicated a number around 20 contestants to represent a low level of competitiveness. For the upper level, 92.5% of the participants reported a number between 300 and 350 contestants to resemble a high level of competitiveness for this contest. To ensure credibility, we chose odd numbers and indicated 12 competitors for the low and 321 competitors for the high competitiveness condition in the main experiment.

4.7.1.1.2 Participants and Design

For the pet store, we ran an online idea contest and were allowed to conduct a 2 (contest competitiveness: low vs. high) x 1 between-subjects design experiment. In this field experiment, we manipulated high contest competitiveness by indicating: "We are grateful for the numerous ideas we have received so far! Your idea is the 321st submission in this idea contest." In contrast, the low contest competitiveness group read: "We are looking forward to your idea! So far, we received a few ideas. Your idea is the 12th submission in this idea contest."

We invited pet owners to the idea contest. A total number of 205 individuals clicked on our contest link and were randomly assigned to one of the two conditions. From the 205 interested people, 116 completed the contest, from which we had to exclude 28 data sets due to missing ideas and response patterns. Thus, our final sample comprised 88 contestants (56.8% female, average age: 43.62 years), of which 48 received the low contest competitiveness condition and 41 the high competitiveness condition. Again, participants could win a prize of 200€ for the best idea.

4.7.1.1.3 Procedure

Overall, the idea contest focused on ideas for innovative pet toys. Based on the previous insights of Study 1 and Study 2, we designed the idea contest with a broad task specificity and invited participants to submit text-based ideas. The pet store invited participants to develop ideas for an innovative pet toy for an enjoyable activity with their pet(s). Specifically, we asked participants to be creative and include anything they could imagine to have a fun time with their pets. Again, we informed participants that the pet store would evaluate submitted ideas based on uniqueness as well as economic and technical feasibility. After completing idea submission, all participants completed the subsequent survey identical to Study 2 (see Appendix A4).

4.7.1.2 Results

4.7.1.2.1 Manipulation Check

As intended, participants in the low competitiveness condition perceived the number of competitors as low ($M = 5.83$; “The number of contest competitors in this contest is low since less than 20 ideas were submitted so far”) compared to participants in the high competitiveness condition ($M = 2.88$; $F(1, 86) = 55.994$; $p < .001$).

Table 4.3: Mediation Model: Effect of Contest Competitiveness on Value Co-Creation Intention via Psychological Ownership

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Dependent Variable: Psychological Ownership				Dependent Variable: Value Co-Creation Intention					
	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)
Controls										
Age	-.067	(.014)	-.046	(.014)	-.116	(.014)	-.111	(.014)	-.087	(.012)
Gender	-.030	(.362)	-.033	(.363)	-.022	(.365)	-.023	(.367)	-.005	(.312)
Time	.098	(.001)	.110	(.001)	.154	(.001)	.157	(.001)	.099	(.001)
Direct Effects										
CC			.096	(.353)			.023	(.358)	-.028	(.305)
PO									.531***	(.095)
Indirect Effect ⁺										95% C.I.
CC→PO→VCCI									.101	[-.138 .348]
R ²	.015		.023		.039		.039		.314	
Adj. R ²	-.020		-.024		.004		-.007		.272	
F	0.425		0.499		1.125		0.845		7.508****	

Notes: *** p<.001; ** p<.01; * p<.05

CC = Contest Competitiveness; PO = Psychological Ownership; VCCI = Value Co-Creation Intention; C.I. = Confidence Interval

⁺As the predictor variable is dummy coded, the indirect effect is in partially standardized form (Hayes, 2018).

4.7.1.2.2 Main Results

An ANOVA shows no significant effect of the indicated number of contest competitors on the level of participants' developed PO for their submitted idea ($M_{\text{lowcomp}} = 4.40$; $M_{\text{highcomp}} = 4.68$; $F(1, 86) = 0.698$; $p > 0.1$). An ANCOVA with the covariates age, gender, and ideation time reveals similar results ($F(1, 84) = 0.538$; $p > 0.1$). Thus, we find no support for H_4 .

Again, we ran the bootstrap analysis by Preacher and Hayes (2004) and accounted for age, gender, and ideation time (see Table 4.3). In support of H_1 , we again find a significant, positive effect of PO on VCC intention ($\beta = .531$; $p < .001$). In addition to an insignificant effect of contest competitiveness on PO ($\beta = .096$; $p > 0.1$), we find an insignificant effect of contest competitiveness on VCC intention either ($\beta = .023$; $p > 0.1$).

4.7.2 Study 3b: The Role of Contestant Visibility

In light of these results, we propose that drawing contest participants' attention to their competitors - independent of a low or high number of competitors -, thus showing the number of competitors in the contest in form of an unblind idea contest increases their PO and consequently, the VCC intention for their submitted idea. In other words, following the logic of contest theory, being aware of the presence of competitors motivates participants to outperform other participants (Lazear and Rosen, 1981). This motivation should increase participants' effort (e.g., Casas-Arce and Martínez-Jerez, 2009; Lazear and Rosen, 1981). Following PO theory, such an increase in effort leads to a higher level of PO for contestants' submitted ideas compared to a blind idea contest (Pierce et al., 2003). Hence, we hypothesize:

H₅: Unblind contests lead to a higher level of PO for the submitted idea than blind contests.

4.7.2.1 Method: Participants, Design, and Procedure

For this follow-up study, we invited to the same idea contest scenario as in Study 3a. All else being equal, the participants in the unblind group simply received the information that the pet store would like to thank for the X^{th} submission of ideas submitted by contestants so far. Contestants in the blind group could not see any information on their competitors, but simply received a note saying: “We are looking forward to your idea, thank you for your submission!” All contestants again had to complete the same questionnaire as in Study 3a (see Appendix A4). In total, 234 invited pet owners, who were not part of the previous idea contest, started the idea contest, from which we had to exclude 52 data sets due to inappropriate or missing ideas and 21 surveys due to response patterns. Thus, our total sample comprises 161 ideas. Thereof, 76 participants are in the blind contestant visibility condition and 85 participants in the unblind contestant visibility condition (53.9% female, average age: 45.14 years). Again, all participants were able to win a prize.

4.7.2.2 Results

4.7.2.2.1 Manipulation Check

As intended, participants in the blind contest condition agreed to have no information on the number of their competitors in the contest ($M = 5.92$; “I have no information about other contestants or the number of previously submitted ideas within this idea contest”) in comparison to participants in the unblind contest condition ($M = 3.42$; $F(1, 159) = 55.713$; $p < .001$).

4.7.2.2.2 Main Results

An ANOVA reveals that the two contest scenarios are significantly different in the level of users' PO, with a stronger impact of an unblind contest compared to a blind contest ($M_{\text{blind}} = 4.14$; $M_{\text{unblind}} = 4.78$; $F(1, 159) = 6.226$; $p < .05$). An ANCOVA with the covariates age, gender,

and ideation time yielded the same pattern of results ($F(1, 157) = 6.144; p < .05$). Hence, we find support for H_5 .

4.7.2.2.3 Mediation Analysis

Controlling for age, gender, and ideation time, the impact of PO on VCC intention remains again positive and significant ($\beta = .472; p < .001$) (see Table 4.4). The indirect effect from contestant visibility to VCC intention via PO is significant ($\beta = .183$) with a 95% confidence interval excluding zero [.036; .341]. Whereas the effect of blind versus unblind contestant visibility on PO is positive and significant ($\beta = .194; p < .05$), the direct path between contestant visibility and VCC intention is negative but turns not significant with a constant level of PO ($\beta = -.125; p > .05$). Hence, we find evidence for a full mediation (Zhao et al., 2010).

4.7.2.3 Discussion

In contrast to our expectation, the contest competitiveness in terms of a low versus a high number of contest competitors in idea contests does not affect users' developed PO for their submitted idea nor their VCC intention for that idea. In fact, participants seem to respond more on competitiveness per se, i.e., on the contestant visibility, than on the actual number of contest competitors (e.g., List et al., 2020). Thus, drawing participants' attention to the fact that there are competitors who have already submitted ideas – independent of how many competitors – turns out to influence the development of PO for the submitted idea and in turn, users' VCC intention. Hence, we demonstrate that knowing about contestants leads to a higher level of developed PO for the submitted idea than having no such information, thereby determining VCC intention through developed PO.

Table 4.4: Mediation Model: Effect of Contestant Visibility on Value Co-Creation Intention via Psychological Ownership

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Dependent Variable: Psychological Ownership				Dependent Variable: Value Co-Creation Intention					
	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)
Controls										
Age	-.073	(.010)	-.083	(.009)	-.119	(.011)	-.118	(.011)	-.078	(.010)
Gender	.132	(.267)	.122	(.263)	.075	(.296)	.077	(.297)	.019	(.266)
Time	.037	(.000)	.044	(.000)	-.066	(.000)	-.067	(.000)	-.068	(.000)
Direct Effects										
CV			.194*	(.258)			-.033	(.291)	-.125	(.264)
PO									.472***	(.080)
Indirect Effect ⁺										95% C.I.
CV→PO→VCCI									.183	[.036 .341]
R ²	.026		.063		.028		.029		.238	
Adj. R ²	.007		.039		.009		.004		.213	
F	1.382		2.625*		1.511		1.171		9.662***	

Notes: *** p<.001; ** p<.01; * p<.05

CV = Contestant Visibility; PO = Psychological Ownership; VCCI = Value Co-Creation Intention; C.I. = Confidence Interval

⁺As the predictor variable is dummy coded, the indirect effect is in partially standardized form (Hayes, 2018).

4.8 Discussion

4.8.1 Summary

Idea contests are a popular method firms apply to integrate users in innovation development (e.g., Gatzweiler et al., 2017). Prior research indicates that idea contest design has an impact on contest outputs (e.g., Björk and Magnusson, 2009). Thus, contest holders need to induce participants' effort to achieve valuable results for further innovation development (e.g., Ebner et al., 2009). Drawing on contest theory, idea contests require specific designs and conditions to incentivize the effort of participants, which then influences the individual contest performance (Lazear and Rosen, 1981). Hence, participants put effort into idea development during idea contests to outperform their contest competitors (e.g., Hofstetter et al., 2018). According to PO theory (Pierce et al., 2003), investing effort into a target leads to the development of PO for that target, such as the developed idea. Thus, combining contest theory with PO theory insights, we reasoned that contest design influences PO development, which in turn impacts participants' VCC intention.

Across four experimental studies, we demonstrate that the development of participants' PO for their idea plays a role for their respective VCC intention and hence, for successful innovation development (e.g., Prahalad and Ramaswamy, 2004). Based on our organizational framework, we conducted four idea contests with different contest designs to demonstrate how firms can manage contest participants' level of PO and thus, their VCC intention. Our findings demonstrate that contest task, task specificity, and contestant visibility affect contest participants' PO and hence, their VCC intention whereas contest competitiveness has no effect. Specifically, we show that textual compared to visual contest tasks, a broad versus a restricted task specificity, and unblind contestant visibility in comparison to blind contests significantly increases the level of participants' developed PO for their idea, ultimately resulting in an

increased VCC intention. With these insights, we are able to advance research on PO in open innovation (e.g., Fuchs et al., 2010) and specifically, idea contests (e.g., Krufft et al., 2019).

4.8.2 Theoretical Implications

Overall, our contribution to theory is fourfold. First, we combine insights from contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003) to demonstrate that ideators develop PO for their submitted ideas in idea contests. As literature on idea contests so far ignores this emotional attachment, we add to this gap by showing that contest participants put effort into idea development and thus, develop PO for that idea. Hence, we add to idea contest research by showing that contestants emotionally bond to their submitted idea in idea contests.

Second, most studies examining outcomes of idea contests focus on how to foster idea quality (e.g., Piller and Walcher, 2006). While this knowledge is important for effective idea generation at the front-end of innovation development, research needs to create a better understanding on how early CI allows for VCC beyond idea contests. We show that idea contests represent a directional starting point for further VCC, potentially leading to successful collaborative innovation development (Prahalad and Ramaswamy, 2004) and ultimately, to value delivery (Ranjan and Read, 2016). Contest participants develop an intention for VCC during idea submission, which the development of PO for their idea can increase. Hence, contestants likely engage more in the contest and potentially contribute to idea realization afterwards if they develop PO for their idea. Thus, we advance current research on idea contests by demonstrating that firms can increase VCC beyond the contest by triggering the development of contestants' PO.

Third, we extend the application of PO theory in open innovation studies to idea contest research, which existing studies so far did not consider. Based on PO theory, we are able to show that ideators develop a feeling of ownership for a target that they know, control, and invest

their self into (Pierce et al., 2003), i.e., ideators develop PO for their submitted idea (Gray et al., 2020). Consequently, PO enables firms to bind ideators from idea contests for VCC, which prior studies investigating PO in other open innovation formats do not consider.

Finally, we extend contest theory and add to discussions on how to design idea contests (e.g., Terwiesch and Xu, 2008) by demonstrating how specific contest design elements can influence ideators' developed PO and ultimately, their VCC intention. So far, studies draw on contest theory to explain why users participate in idea contests and mainly focus on reward design (e.g., Hofstetter et al., 2018). We show that in addition to the probability to win and the expected return (Lazear and Rosen, 1981), other contest design elements affect contestants' developed PO and VCC intention. Consequently, we account for possibilities how firms can manage the development of PO via contest design. Hence, we add to prior studies on PO in open innovation and reveal possibilities on how to leverage PO for the submitted idea.

4.8.3 Managerial Implications

This study provides managerial implications for firms hosting idea contests. First, as we show that users develop PO for their submitted ideas when participating in idea contests, firms interested in VCC need to account for the development of PO for the submitted idea in idea contests. As various studies indicate, the collaboration between firm and users frequently ends once the contest is over (e.g., Hofstetter et al., 2018). However, not only do ideas provide value to firms' innovation development at the front-end, they also allow firms to bind users for further VCC and thus, for successful collaborative innovation development (e.g., Prahalad and Ramaswamy, 2004).

Second and based on the previous implication, we advise firms to spur participants' PO for their submitted idea to increase users' VCC intention. We show that firms can influence users' PO for their submitted idea and thus, their VCC intention via contest design. Specifically, we

provide several design elements, which firms can apply when hosting idea contests. First, firms need to pay attention to the task format. Here, they should ask for a textual rather than a visual ideation. Second, contest holders have the task specificity at their disposal. Here, they should formulate the task broadly rather than in a restricting way to facilitate users' control of and investment into their idea (e.g., Hulland et al., 2015). Third, firms should consider the visibility of competitiveness in their idea contest. Overall, firms need to draw ideators' attention to their competition and thus, create awareness that other people already participated in the contest and submitted an idea. Here, it does not matter whether this number is high or low, so the firm can indicate the real number of participants.

4.8.4 Limitations and Future Research

Our study reveals some limitations that provide fruitful avenues for future research. First, we measured PO on a general level applying common measurement scales instead of considering each single route – controlling, knowing, and investing - for the development of PO from contest design. Hence, future research could precisely elaborate which contest design element triggers which specific route(s) to PO development and which route is most determining for VCC interest.

Second, as we are the first to investigate the role of PO in idea contests, we were interested in contestants' first encounter with the contest challenge and consequently, the development of PO during ideation. Hence, we did not investigate the effect of PO along the entire innovation development process. For future studies, it would be interesting to examine whether and how PO changes from ideation during actual VCC until innovation launch and how this impacts further VCC.

5 General Discussion

The fifth and final chapter of this dissertation presents an overall summary of findings, outlines theoretical contributions and managerial implications, and stresses strengths and limitations, which simultaneously provide meaningful directions for future research.

5.1 Summary of Findings

The overall aim of this dissertation project is to advance theory and managerial practice on CI in innovation development as an important facet of external knowledge integration within the open innovation paradigm (Chesbrough, 2003). This way, the present dissertation seeks to deepen the academic knowledge and practical application on how to integrate customers effectively and efficiently into innovation development.

Even though a multitude of studies on CI and its advantages and disadvantages exist, current findings are often contradictory (e.g., Lynch et al., 2016; Rohrbeck et al., 2010) or neglect a profound picture of CI regarding current developments, such as digitization processes (e.g., Nambisan and Baron, 2009). Hence, the purpose of paper 1 (**chapter 2**) was to shed light on the fragmented field of research on CI in NPD and its current research gaps by providing a holistic framework of CI design in NPD and its antecedents, outcomes, moderators, and mediators. Thus, I conducted a SLR based on 358 empirical papers covering a time span of 42 years to synthesize results on CI design in NPD and to reveal conflicting findings and interdependencies of different CI design aspects. Hence, this SLR provides an aggregate overview of the current status quo of the literature on CI in NPD. Furthermore, the systematic approach allowed for the identification of current research gaps, for which I conceptually and theoretically derived corresponding research questions and future research directions.

Within the first paper, I first outlined empirical settings of existing studies on CI in NPD, which potentially explain contradictory findings of current studies. Overall, most studies focus

on the B2C sector (e.g., Huang et al., 2014) rather than the B2B sector and apply one specific industry as empirical setting (e.g., Schweitzer et al., 2015) rather than considering cross-industrial contexts. Considering the actual integration of customers as empirical setting, most studies apply digital tools, such as community-based web platforms (e.g., Füller et al., 2007). In addition, CI happens predominantly in early stages of the NPD process, such as the ideation stage (e.g., Schweitzer et al., 2014). From these findings, I suggest that future studies should shift the focus to B2B sectors and apply cross-industrial designs for generalizing existing findings. In addition, the continuing use of digital tools as empirical setting needs to shift the focus to CI in middle stages of the NPD. Currently, research lacks insights on effective usage of CI in middle stages with tools such as prototyping.

Second, the SLR shows that researchers address both external and internal antecedents to CI and its design in NPD. External antecedents refer to the customer environment, where researchers predominantly focus on customer motives for participating in NPD (e.g., Füller, 2010). Still, the role of specific customer motives for specific NPD performance outcomes is unclear. Besides, research has started to examine customer barriers against participation in NPD (e.g., Simula and Vuori, 2012), for which researchers lack an understanding of context-specific barriers, such as data privacy concerns (e.g., Rust et al., 2002). Overall, the reasoning of contest theory (Terwiesch and Xu, 2008) could help to investigate whether different rivalry mechanisms or incentive systems can counteract customer barriers to participate in CI in NPD. Turning to internal antecedents, i.e., the firm environment, extant studies address firm characteristics, such as different leadership styles (e.g., Stock et al., 2017), NPD process characteristics, such as formalization (e.g., Smets et al., 2013), and new product characteristics, such as innovativeness (e.g., Lau et al., 2010). Considering firm characteristics, future research should draw on cognitive resource theory (Fiedler and Garcia, 1987) to investigate the influence of different leadership styles on the design and execution of CI. Turning to NPD process

characteristics, research needs to address internal barriers to CI in NPD and how to reduce them based on insights from force field analysis and planned change theory (Lewin, 1951). Finally, based on contingency theory (Burns and Stalker, 1961), future studies should differentiate the type of innovativeness of the intended new product to understand whether different types of innovativeness require different CI designs.

Third, the status quo on the actual CI design reveals plenty of findings on customer characteristics, i.e., whom to integrate in NPD. For example, researchers address when and why to integrate lead users (e.g., Schreier and Prögl, 2008) or users with specific characteristics (e.g., Marchi et al., 2011). Overall, due to the increasing use of web platforms for collaborative CI (e.g., Schemmann et al., 2016), future research has to shift the focus from the individual customer and investigate the effectiveness of customer teams, e.g., based on the Whole Brain Model (Herrmann, 1996). Regarding the timing of CI, i.e., the question when to integrate customers, extant studies emphasize the effectiveness of CI in early stages of the NPD process (e.g., Cui and Wu, 2016). Based on the increasing usage and efficiency of digital integration tools for later stages of the NPD (e.g., Bayus, 2013), future research should focus on how to use CI with digital integration tools in middle and late stages of the NPD effectively. In addition, the rise of social media calls for in-depth research on the usage of social media as a CI tool (e.g., Roberts and Candi, 2014). Corresponding studies could draw on social identity theory (Tajfel and Turner, 1979) as customers (may fear to) reveal their identities in social media. Finally, research should (re-)consider the operationalization of CI intensity and elaborate on the optimal CI intensity for specific NPD performance outcomes. Currently, studies lack insights on how to accurately portray commitment and psychological involvement of customers as important aspects of CI intensity.

Fourth, researchers and managers alike measure the performance outcomes of CI at the end of the NPD, for which most studies find a positive impact (e.g., Keszey and Biemans, 2016).

To measure CI effectiveness more precisely, I demand research to investigate stage-specific impacts of CI. Moreover, CI research concentrates on positive customer attitudes resulting from CI (e.g., Fuchs and Schreier, 2011), but lacks an understanding of negative outcomes. However, negative outcomes are likely to arise especially on web-based platforms with a high traction rate. For this reason, researchers and managers alike need to understand how to frame negative feedback that does not result in negative customer attitudes and thus, harmful behavior. Here, feedback intervention theory (Kluger and DeNisi, 1996) provides a promising approach for future studies to examine how to frame negative feedback accordingly.

Finally, the SLR shows that studies examine moderators and mediators shaping the relation between CI and its NPD performance outcomes. On the one hand, such moderators and mediators are present in the external environment, i.e., different market characteristics (e.g., Chang and Taylor, 2016). On the other hand, moderators and mediators are part of the internal environment, i.e., firm characteristics (e.g., Feng et al., 2016), NPD process characteristics (e.g., Ku et al., 2016), or new product characteristics (e.g., Liljedal, 2016). Overall, future research should draw on contingency theory (Burns and Stalker, 1961) to provide a more generalized picture on contingency factors. In addition, researchers need to understand the role of different firm characteristics, such as size or age, for which the logic of causation and effectuation could help as a starting point (Sarasvathy, 2001).

Resulting from diverse findings regarding different CI design aspects, the aim of paper 2 (**chapter 3**) was to shed light on the role of CI intensity as a driver for new product success. Thus, paper 2 investigated antecedents and performance outcomes of CI intensity. In addition, the aim was to provide meaningful insights on when to integrate customers intensively in the NPD process to spur different new product success measures. Hence, I conducted two studies in a cross-industrial B2C context to answer the questions of how and when to integrate customers intensively into the NPD process to foster new product success.

The first study of paper 2 investigates how to spur CI intensity by surveying 205 managers active in distinct B2C industries. Hence, study 1 conceptualizes five different antecedents to CI intensity and explicitly considers customers and retailers as two distinct facets of the market intelligence perspective (Kohli and Jaworski, 1990). Overall, I demonstrate that both customer and retailer orientation have a positive impact on CI intensity. In addition, interfunctional coordination and incentive systems significantly affect CI intensity whereas competitor orientation revealed no influence on CI intensity. In turn, study 1 shows the overall positive impact of CI intensity on new product success, which is further substantiated in a separate validation study.

In the second study of paper 2, additional cross-industrial data from 171 firms demonstrates that the impact of CI intensity on new product success depends on the timing of CI intensity in NPD. Specifically, CI intensity in the development and launch stages positively affects new product success. CI intensity in the ideation stage has no effect and thus, might be less important – at least for the specific contextual factors given – than previous studies outline (e.g., Schweitzer et al., 2012; Gruner and Homburg, 2000). Furthermore, the study provides detailed insights on the different facets of new product success, which was measured formatively. Essentially, CI intensity in the ideation stage increases NPD speed whereas there is no effect of CI intensity on sales performance and even a negative effect on competitive superiority. Moreover, although CI intensity in the development stage reveals no significant effects on NPD speed and competitive superiority, the results show that CI intensity in the development stage positively influences overall NPD success. The reason is that the study reveals a significant effect of CI intensity on sales performance. Finally, CI intensity in the launch stage has a highly significant effect on NPD speed, resulting in an overall positive effect of CI intensity on new product success in the final stage of the NPD process.

In the third paper (**chapter 4**), I focused on idea contests as a CI tool that has increased in popularity throughout the last years due to the increasing usage of internet platforms for CI (e.g., Schemmann et al., 2016). Specifically, the aim was to demonstrate that idea contests do not only enable contest holders to receive a high number of external ideas for internal innovation development (e.g., Erat and Krishnan, 2012), but that contests also represent a valuable starting point for VCC between contest holders, i.e., firms, and contest participants, i.e., customers or users.

Two theoretical perspectives from different literature fields and management areas substantiate this aim: contest theory from designing labor contracts in human resource management (Lazear and Rosen, 1981) and PO theory from observing employee behavior in organizations (Pierce et al., 2003). On the one hand, the main insights from contest theory are that contestants' decision to participate in a contest depends on two factors: the probability to win a previously announced contest prize and the expected return of the contest (Lazear and Rosen, 1981). On the other hand, PO theory explains why and how individuals emotionally bond to a tangible or intangible target, such as an idea (Pierce et al., 2003). Reasoned on the three routes used in PO theory, namely controlling, interacting with, and investing into the target, I therefore argue that ideators emotionally bond to their submitted idea during idea contest participation and thus, develop PO for that idea. In fact, previous studies show that customers develop PO when collaborating in open innovation projects with firms (e.g., Franke et al., 2010; Gray et al., 2020).

Furthermore, I propose that this emotional bonding drives VCC and is manageable by contest design as previous idea contest literature suggests that specific contest designs influence contest outcomes (e.g., Terwiesch and Xu, 2008). Thus, based on theoretical perspectives and previous findings, firms can likely foster contestants' VCC intention by applying specific contest designs. Specifically, four contest design elements are investigated: contest task, task

specificity, contest competitiveness, and contestant visibility. Hence, I conducted four idea contests in form of field experiments, in which I respectively manipulated the four contest designs to investigate the proposed role of PO in the relation between contest design and VCC. Across all four idea contests, the findings show that the level of PO developed for a submitted idea increases ideators' VCC intention for that idea beyond the actual contest. Moreover, the level of PO developed for an idea depends on three of the four contest design elements investigated. Specifically, in the first field experiment with ideators for a future lecture hall, the results show that a textual contest task fosters the level of PO more than a visual contest task. In a second field experiment with a local start-up calling for ideas on how to design a flagship store, the findings underline that a broad task specificity is more favorable for the development of PO than a restricted task specificity. Finally, the results of the third field experiment on idea generation for pet toys demonstrate that contestant visibility via unblind contests increase ideators' levels of PO irrespective of the number of competitors.

5.2 Theoretical Contributions

The theoretical contributions of the present dissertation are manifold. Overall, the dissertation provides new insights on integrating customers in innovation development as one central stakeholder group frequently discussed in open innovation research (e.g., Chang and Taylor, 2016; Chesbrough, 2003). Specifically, the findings of the three different papers outlined advance theory in various research fields discussed in the following.

First, even though there is plenty of research on CI in NPD and increasing publication numbers demonstrate an ongoing interest in the topic, most of these studies address only singular aspects of the design of CI in NPD. Therefore, interrelations of CI design aspects are currently unclear, revealing a major drawback of existing studies on CI design in NPD. In fact, the systematic procedure applied in paper 1 even reveals contradictory findings on different CI

design aspects and related antecedents, outcomes, moderators, and mediators. For example, the role of innovativeness both as an antecedent to CI design and as a moderator affecting the relation between CI design and its performance outcomes is currently unclear (Langerak and Hultink, 2008; Lau et al., 2010). Paper 1 outlines potential reasons for these conflicting findings, such as differing research foci, a variety of empirical settings, or the differences in applying CI in NPD.

Besides, due to the multitude of studies on the design of CI in NPD, reviews on the research field already exist. However, existing reviews either treat CI in NPD as a subtopic of, e.g., open innovation (e.g., Randhawa et al., 2016), or they address one specific CI design aspect, such as user toolkits as a tool for CI (e.g., Goduscheit and Jørgensen, 2013). Thus, research lacks a holistic understanding of different aspects of CI (design) in NPD, its antecedents, outcomes, moderators, and mediators. By systematically synthesizing the findings on different CI design aspects in NPD, I provide an up-to-date status quo, resulting in a holistic framework on the topic. This holistic framework results in specific research gaps with corresponding theoretically derived future research questions, which existing reviews do not provide. Therefore, based on the systematic procedure, I am able to outline meaningful future research directions for different CI design aspects and antecedents, performance outcomes, moderators, and mediators of CI in NPD. Thus, the SLR does not only advance the current understanding of CI in NPD, but also provides valuable starting points for future studies.

Second, paper 2 provides in-depth insights on antecedents affecting CI intensity as one central aspect of CI design in NPD (e.g., Gruner and Homburg, 2000). In addition, the second paper sheds light on when to integrate customers intensively for increased new product success (e.g., Chang, 2019). Thus, paper 2 considers three aspects of CI design discussed in the SLR: (1) firm characteristics as part of internal antecedents to CI design (e.g., Keszey and Biemans, 2016), (2) CI intensity as one central CI design aspect (e.g., Gruner and Homburg, 2000), and

(3) new product success as one performance outcome measure addressed in previous literature (e.g., Cui and Wu, 2016). By combining these different aspects of CI design, paper 2 contributes valuable insights on the role of CI intensity for increased new product success. Specifically, I reveal how to leverage CI intensity in B2C firms for enhancing new product success based on different internal and external key levers, i.e., customer orientation, retailer orientation, incentive system, and interfunctional coordination. In addition, paper 2 advances the general understanding on when to integrate customers for specific and objective measures of new product success, i.e., NPD speed, competitive superiority, and sales performance.

Third, the given dissertation advances theory and research on idea contests as one potential tool outlined in the SLR addressing the question of how to integrate customers in NPD. Specifically, paper 3 extends contest theory (Lazear and Rosen, 1981) and PO theory (Pierce et al., 2003) by combining these two previously unrelated theories to argue that idea contest holders can manage ideators' PO for the generated and submitted idea. This potential arises with different contest designs that ultimately affect ideators' VCC intention for that idea. Hence, contest design does not only influence contest output, such as idea quality (e.g., Mack and Landau, 2020) or idea quantity (e.g., Erat and Krishnan, 2012). Rather, different contest design elements can shape ideators' emotional attachment to their developed idea and thus, their interest in long-term VCC as an intentional outcome of the CI process. In essence, VCC is the ultimate aim of firms when integrating customers in innovation development (e.g., Ranjan and Read, 2016). In fact, paper 3 demonstrates that different contest design elements allow contest holders to shape ideators' PO and thus, their VCC intention for their idea. Across four idea contests in form of field experiments, I am able to show that idea contests represent an important starting point for VCC between contest holders and contest participants along the innovation development process. Consequently, the third paper of this dissertation project

advances idea contest research by outlining the role of PO in idea contests and its role as a driver for VCC as the ultimate aim of CI in innovation development.

5.3 Managerial Implications

From the findings and theoretical contributions of this dissertation project, I advise managers to consider important practical implications before and during the integration of customers into innovation development. First, paper 1 provides profound insights for managers, considering the status quo of CI practices in both research and management. By outlining interdependencies of different CI design aspects, the SLR provides a holistic picture on how different CI design aspects in NPD interweave. Hence, managers can derive valuable implications of their actions and can steer operations in a desired direction when leveraging specific aspects of CI design in NPD. Furthermore, the research gaps and directions for future research may encourage managers of innovation development processes to consider the questions I outline for trial-and-error approaches when integrating customers. This way, scholars and managers can profit from each others' insights to further improve the current understanding of CI in innovation development.

Second, the dissertation shows that firms have the ability to enhance new product success via increasing CI intensity. By focusing on antecedents to CI intensity, the first study of paper 2 demonstrates that customer orientation and retailer orientation are important levers of CI intensity. Consequently, I advise managers of B2C firms to focus less on competitors, but to rather stress the relevance of gaining information from both retailers and customers on customer behavior to employees responsible for CI in NPD. B2C firms hardly receive direct customer complaints or suggestions for improvement as retailers act as intermediaries and hence, have better access to this information (Kohli and Jaworski, 1990; Tokman et al., 2016). As a consequence, managers of B2C firms need to proactively address retailers to enable a fruitful

exchange on current customer needs in order to improve the product-market fit. In addition, by emphasizing a well-organized interfunctional coordination and by applying an appropriate incentive system, B2C managers have the power to motivate employees to focus on a high CI intensity in NPD. Thus, managers need to incentivize their employees financially for developing ideas and products with customers. Hence, I advise managers of B2C firms to focus on both market pull, i.e., customer and retailer orientation, as well as on technology push, i.e., interfunctional coordination and incentive systems, as origins of an innovation.

Furthermore, stage-specific effects influence the impact of CI intensity on new product success. Managers can enhance these effects when integrating customers intensively in the development and launch stage of the NPD process. On top, based on the formative measurement of new product success, I am able to advise managers to even emphasize and increase CI intensity in different stages to affect specific objective goals with regard to the NPD process. Specifically, if a firm wants to accelerate NPD speed, managers should concentrate on integrating customers in the ideation and launch stages of the NPD process. If managers aim for a better sales performance, they should focus on a higher CI intensity in the development stage instead. Finally, if the competitive superiority of new products is central for managers, they should restrain from spending resources on intensive CI as there is no effect of CI intensity on competitive superiority in any NPD stage. Overall, paper 2 provides valuable insights on when to adjust CI intensity for reaching which specific and objectively measurable firm goals.

Third, the final paper of this dissertation provides important managerial implications for firms initiating idea contests. Specifically, paper 3 is the first to show managers that they can apply idea contests as an important starting point for long-term VCC rather than ‘simply’ using idea contests to gather ideas to firms for internal innovation development. To successfully use idea contests for VCC, managers need to be aware of the role of ideators’ PO for their idea as it allows them to bind contestants to the firm. Contest holders are actually able to steer

contestants' PO with specific contest designs. Overall, I provide contest holders with three specific contest design elements they need to account for in order to spur contestants' VCC intention via PO: the contest task, its specificity, and the contestant visibility. In particular, managers of idea contests should emphasize textual rather than visual ideation and thus, ask for text-based ideas rather than for visualizations of ideas. In addition, contest holders need to formulate the task broadly rather than in a restrictive way to leave room for ideators' creativity. Finally, managers of idea contests should enable contestants to be aware of their competitors by explicitly stating the presence of such competitors, irrespective of the number of overall participants. Hence, I provide hands-on implications for firms initiating idea contests on internet-based platforms.

5.4 Strengths, Limitations, and Future Research Directions

The present dissertation project includes some notable strengths, but also reveals limitations, which simultaneously provide gaps and meaningful avenues for future research. Considering the strengths, this dissertation is based on rich data samples analyzed with mixed-method-approaches. In the first paper, I provide a quantitative and qualitative SLR based on 358 peer-reviewed academic papers, from which I additionally derive theoretically reasoned research gaps and corresponding future research questions. Paper 2 consists of two quantitative field studies with 205 and 171 B2C managers respectively, supplemented by a quantitative validation study with further 175 managers. In addition, a qualitative analysis of 19 interviews provides in-depth insights into managers' understanding of CI intensity. For paper 3, I conducted four idea contests in the form of field experiments with 494 potential users of submitted ideas. Thus, the dissertation provides insights on CI in innovation development from different perspectives, i.e., from managers (paper 2) or users (paper 3) or both (paper 1). Finally, whereas the first two

papers explicitly focus on NPD, the third paper also includes ideas for new service innovations provided by ideators who participated in the different idea contests.

Nonetheless, the present dissertation reveals potential limitations that need to be noticed when drawing conclusions from its findings. First, the first paper of this dissertation reviews existing findings and thus, provides no new empirical insights on CI in NPD (e.g., Palmatier et al., 2018). However, I classified these existing findings into a holistic framework of CI, which future studies could follow when investigating the interrelations of the various CI (design) aspects, which this holistic understanding of CI in NPD reveals. In addition, I provide a multitude of theoretically derived research gaps that scholars need to address in the future as the answers to these gaps will further contribute to a holistic, yet more detailed, picture of CI in NPD.

Second, the empirical data collected, analyzed, and interpreted in papers 2 and 3 of this dissertation are predominantly based on samples of German-speaking managers and users from the DACH region (Germany, Austria, and Switzerland) due to the geographic location of the authors. However, in the second paper, the data points represent managers of multinational firms, thereby allowing for a certain generalizability and transferability of findings to other economies. Still, due to this focus on Western cultures, the generalizability of this dissertation's empirical findings are debatable to a certain extent.

Third, all four studies on idea contests within paper 3 investigate ideators' PO at the time of idea development, which reveals some limitations that provide fruitful avenues for future research. First, I measured PO on a general level by applying common measurement scales instead of considering each single route – controlling, knowing, and investing – for the development of PO from contest design (Fuchs et al., 2010; Van Dyne and Pierce, 2004). Hence, future research could precisely elaborate on which contest design element triggers which specific route(s) to PO development and which route is most deterministic for VCC

intention. Second, paper 3 is the first to investigate the role of PO in idea contests, I was interested in contestants' first encounter with the contest challenge and consequently, the development of PO during ideation. Hence, I did not investigate the effect of PO along the entire innovation development process. However, extant findings on PO stress that the feeling of PO may develop and change over time (e.g., Pierce et al., 2003). For future research, it would be interesting to examine whether and how PO changes from ideation until innovation launch and how this impacts further VCC. Consequently, future research should account for a potential change in ideators' feeling of PO along different stages of innovation development.

6 References

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7 Appendices

Appendix A1: Key Word Search and Number of Hits (Paper 1)

Key Words	Additional Search Term	Number of Hits
Customer Integration	New Product Development	68
User Integration	New Product Development	13
Consumer Integration	New Product Development	9
Customer Involvement	New Product Development	87
User Involvement	New Product Development	36
Consumer Involvement	New Product Development	27
Customer Participation	New Product Development	65
User Participation	New Product Development	8
Consumer Participation	New Product Development	46
Co-Creation	New Product Development	96
Co-Production	New Product Development	8
Co-Development	New Product Development	28
Crowdsourcing	New Product Development	60
User Innovation	New Product Development	125
Voice of Customer	New Product Development	18
Co-Ideation	New Product Development	1
Co-Design	New Product Development	26
Customer Feedback	New Product Development	55
Consumer Feedback	New Product Development	9
User Feedback	New Product Development	13
Customer Empowerment	New Product Development	2
Service Dominant Logic	New Product Development	13
Collaborative Product Development	New Product Development	154
Consumer Design	New Product Development	91
Co-Innovation	New Product Development	10
Customized Products	New Product Development	35
Customization	New Product Development	183
Customer Input	New Product Development	30
Consumer Input	New Product Development	15
User Input	New Product Development	10
External Innovation Source	New Product Development	15
Lead User	New Product Development	87
Multi-stakeholder Collaboration	New Product Development	1
Collaborative Prototyping	New Product Development	4
Open Innovation	New Product Development	249
User Communities	New Product Development	41
Customer-Oriented Learning	New Product Development	3
Consumer-Oriented Learning	New Product Development	0
User-Oriented Learning	New Product Development	0
39	39	1,741

Appendix A2: Measurement and Item Reliability (Paper 2: Study 1)

Construct Name and Measurement Item	Indicator Reliability	AVE	Cronbach Alpha	Composite Reliability
<i>CI Intensity</i>				
(adapted from Gruner and Homburg, 2000)		.91	.91	.95
In NPD we initiate actions so that...				
...customers participate intensively.	.82			
...customers are integrated heavily.	.83			
...customers work together intensively.	.84			
...there are several meetings with customers.	.79			
...a large number of different customers is integrated.	.62			
...customers are integrated over a long period.	.69			
<i>Customer Orientation</i>				
(adapted from Atuahene-Gima, 2005; Deshpandé et al., 1993; Narver and Slater, 1990)		.58	.75	.84
Regarding our customers...				
...we collect information systematically & regularly.	.57			
...we quickly know about radical changes (e.g., changing customer needs).	.72			
...our employees spent time to share information with other departments.	.49			
...we react promptly, if something important happens.	.52			
<i>Retailer Orientation</i>				
(adapted from Narver and Slater, 1990)		.71	.87	.91
Regarding our retailers...				
...we collect information systematically & regularly.	.82			
...we quickly know about radical changes (e.g., changing retailer needs, retailer strategies).	.75			
...our employees spent time to share information with other departments.	.66			
...we react promptly, if something important happens.	.61			
<i>Competitor Orientation</i>				
(adapted from Atuahene-Gima, 2005; Narver and Slater, 1990; Jaworski and Kohli, 1993)		.62	.73	.83
Regarding our competitors...				
...we quickly know about radical changes (e.g., competitive strategies).	.60			
...we react promptly, if something important happens.	.80			
...we change promptly our activities, if the intended results are not achieved.	.49			

Appendix A2: Measurement and Item Reliability (Paper 2: Study 1) (continued)

Construct Name and Measurement Item	Indicator Reliability	AVE	Cronbach Alpha	Composite Reliability
<i>Interfunctional Coordination</i>				
(adapted from Ernst, 2002; Kahn, 1996)		.71	.92	.94
Different departments...				
...try to reach objectives together.	.64			
...have a good understanding of each other.	.79			
...collaborate also informally.	.67			
...share ideas, information and resources.	.67			
...share the same vision of the firm.	.63			
...work together as a team.	.84			
<i>Incentive System</i>				
(adapted from Page, 1993)		.74	.91	.94
The incentive system for our employees...				
...consists of components depending on new products' success.	.73			
...supports and rewards active participation in NPD.	.83			
...is strongly based on output factors like new products' success.	.79			
...supports individual creativity.	.70			
...supports financially the development of unique ideas and products.	.68			
<i>Sales Performance</i>				
(adapted from Langerak et al., 2004; Rodríguez et al., 2008)		.94	.93	.97
Compared to competitors' new products...				
...our new products reached the market share goals.	.94			
...our new products reached the targeted profit goals.	.94			
<i>Competitive Superiority</i>				
(adapted from Rodríguez et al., 2008)		.85	.82	.92
Compared to competitors' new products...				
...our customers were satisfied with the quality of our new products.	.84			
...our new products satisfied the customer needs.	.85			
<i>NPD Speed</i>				
(adapted from Gruner and Homburg, 2000)		.92	.91	.96
Compared to competitors' new products...				
...the development time of our new products is short.	.91			
...the development process of our new products is fast.	.93			

Appendix A3: Measurement and Item Reliability (Paper 2: Study 2)

Construct Name and Measurement Item	Indicator Reliability	AVE	Cronbach Alpha	Composite Reliability
<i>CI Intensity in the Ideation Stage</i>				
(adapted from Gruner and Homburg, 2000)		.64	.88	.91
In the ideation stage, we initiate actions so that...				
...customers participate intensively.	.74			
...customers are integrated heavily.	.79			
...customers work together intensively.	.84			
...there are several meetings with customers.	.73			
...a large number of different customer is integrated.	.41			
...customers are integrated over a long period.	.65			
<i>CI Intensity in the Product Development Stage</i>				
(adapted from Gruner and Homburg, 2000)				
In the product development stage, we initiate actions so that...		.63	.87	.91
...customers participate intensively.	.78			
...customers are integrated heavily.	.75			
...customers work together intensively.	.80			
...there are several meetings with customers.	.71			
...a large number of different customers is integrated.	.39			
...customers are integrated over a long period.	.63			
<i>CI Intensity in the Launch Stage</i>				
(adapted from Gruner and Homburg, 2000)		.63	.88	.91
In the launch stage, we initiate actions so that...				
...customers participate intensively.	.76			
...customers are integrated heavily.	.77			
...customers work together intensively.	.79			
...there are several meetings with customers.	.74			
...a large number of different customers is integrated.	.50			
...customers are integrated over a long period.	.58			
<i>Sales Performance</i>				
(adapted from Langerak et al., 2004; Rodríguez et al., 2008)		.89	.95	.94
Compared to competitors' new products...				
...the new product reached the market share goals.	.91			
...the new product reached the targeted profit goals.	.91			
<i>Competitive Superiority</i>				
(adapted from Rodríguez et al., 2008)		.78	.81	.88
Compared to competitors' new products...				
...our customers were satisfied with the quality of the new product.	.69			
...the new product satisfied the customer needs.	.69			

Appendix A3: Measurement and Item Reliability (Paper 2: Study 2) (continued)

Construct Name and Measurement Item	Indicator Reliability	AVE	Cronbach Alpha	Composite Reliability
<i>NPD Speed</i> (adapted from Gruner and Homburg, 2000)		.87	.86	.93
Compared to competitors' new products...				
...the development time of the product was short.	.76			
...the development process of the new product was fast.	.76			

Appendix A4: Construct Measurements (Paper 3: Study 1/Study 2/Study 3a/Study 3b)

Measurement / Items	Cronbach Alpha	AVE	CITC
Value Co-Creation Intention^a (adapted from Bhattacharjee, 2001; Zhou et al., 2012)	n.a./.93/.93/.95	n.a./.79/.81/.87	
If I could, I would like to develop my idea further with ' <i>start-up name</i> ' in the future.			n.a./.87/.85/.94
My intention is to continue developing my idea together with ' <i>start-up name</i> ' rather than (seeking) any alternative ideas.			n.a./.86/.83/.89
I intend to continue developing my idea with ' <i>start-up name</i> ' rather than discontinue its development.			n.a./.84/.89/.89
Psychological Ownership^a (adapted from Fuchs et al., 2010; Van Dyne and Pierce, 2004)	.89/.91/.91/.93	.71/.65/.66/.74	
It is easy for me to think of the idea I developed as mine.			.70/.70/.67/.72
I felt that the idea I developed belongs to me.			.79/.79/.80/.85
The developed idea incorporates a part of myself.			.56/.81/.75/.83
I feel a strong sense of closeness with my idea.			.84/.82/.83/.89
I feel a very high degree of ownership for the idea I developed.			.82/.71/.80/.80

Notes: ^a 7-point Likert scale with anchors 1 = “disagree strongly” and 7 = “agree strongly”

AVE = average variance extracted

CITC = corrected item-total-correlation

Web Appendix – Final Sample of Articles Included in the Systematic

Literature Review

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Affidavit

Ich erkläre hiermit, dass ich die vorgelegten und nachfolgend aufgelisteten Aufsätze selbstständig und nur mit den Hilfen angefertigt habe, die im jeweiligen Aufsatz angegeben oder zusätzlich in der nachfolgenden Liste aufgeführt sind. In der Zusammenarbeit mit den angeführten Koautoren war ich mindestens anteilig beteiligt. Bei den von mir durchgeführten und in den Aufsätzen erwähnten Untersuchungen habe ich die Grundsätze guter wissenschaftlicher Praxis, wie sie in der Satzung der Justus-Liebig-Universität Giessen zur Sicherung guter wissenschaftlicher Praxis niedergelegt sind, eingehalten.

- Hanker, A.-L., and M. C. Schuhmacher (2021). Customer Integration in New Product Development – A Systematic Literature Review and Future Research Agenda. Working Paper.
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Anna-Lena Hanker