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The impact of customer involvement on innovation outcomes

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Doctoral dissertation

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Acknowledgements

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1 INTRODUCTION

External knowledge — that derives from outside the company actors — is a particularly valuable element of the firm's knowledge asset, as it brings insights into the company that are unique and often not available within the boundaries of the firm (Mintzberg, 1983). Customers are unique sources of external knowledge, as they are those stakeholders whose willingness to pay over the firms' goods determines the business performance of a company. Customers' are willing to pay for products if those meet their needs and desires. To make a product meet customer expectation firms need to understand their own customers, in which external knowledge from customers plays a pivotal role (Chichkanov, 2021).

The role of customers has dramatically changed in recent years. Marketing theory and practice have both recognized the increasing importance of customer participation as the new opportunity of competitive advantage (Prahalad and Ramaswamy, 2004). I am aware of customers are not only buyers and users of products and services, however they also actively engage in value co-creation with firms. In the context of innovation, customers participate in co-creation by playing and acting a more active role in new product development (NPD). Companies are finding ways to actively involve customers in their innovation processes and efforts. (Cui and Wu, 2016). As part of this paradigm shift, firms tend to less see customers as mere source of information, but increasingly as partners and co-creators, especially in the process of innovation (Prahalad and Ramaswamy, 2004). For example, Sony developed its PlayStation 2 in collaboration with customers, and the Lego Group involves customers in innovation processes (Saldanha et al., 2017). In the business-to-business (B2B) sector, Boeing develops new aircraft models with airline carriers by incorporating customer representatives in its new product development (NPD) team and Hilti develops innovative construction tools by collaborating with its customers (Cui and Wu, 2016). As recent Deloitte (2021) report summarizes, firms can stay ahead of the competition by engaging customers by means of customer involvement at its deepest levels. For several decades, the innovation literature emphasizes that successful innovation requires a clear

marketing focus, furthermore a superior understanding of customers and their needs. (Keszey and Biemans, 2016)

Given the recognized relevance of customer involvement (hereinafter CI) in innovation, first I define the concept of CI and distinct it from related, but different concepts. Then I provide a systematic literature review of both the Hungarian and English language studies with the aim of enriching the domain of external knowledge management theory and practice. Specifically, my review study investigates the following research questions:

- what is CI (and what is not) and how it can be operationalized;
- what is the effect of CI on innovation and
- how does CI exert its effect on innovation
- what is the state-of-art in of the research topic in the Hungarian language literature.

The findings from this review offer four key contributions to the extant literature. First, extant research organised around various fields — such as knowledge management, marketing, innovation, enterpreneurship, information systems — considers several aspects of CI but lacks a clear and inclusive typology that delineates CP's domain, scope, or boundaries. Multitude of conceptualizations of CI co-exists, which limits effective accumulation of domain knowledge. For example, some CI research refer to the concept as the ability of the firm to create the environment for the customer to have direct interaction (Anning-Dorson, 2018), while others as activities where customers participate in firm-initiated practices (Menguc et al., 2014). Moreover, CI is often referred to together with other concepts such as value co-creation, customer co-creation, customer integration, open innovation, just to mention but a few, even as a synonym. This conceptual confusion and overlap may be the source of inconsistent results. To fill this void, this study offers an integrated definition for CI, resolves definitional ambiguities and outline the scope of the topic.

Second, there is a surprisingly lack of understanding of the underlying mechanisms how CI exerts its effect on innovation outcomes. An early, but well known study proposes that CI influences innovation outcomes upgrading firm's external knowledge by bringing in relevant, but not really new insights (Mahr et al.,

2014). Recent research draws attention to an alternative route of impact mechanism, namely that customer participation creates value for the firm not only through the acquisition of relevant external knowledge, but also through the value of building and deepening relationship with the customers (Nardi et al., 2020). Against this backdrop, my study aims to inject a theoretical perspective into the relatively atheoretic, but empirically well-researched field, and develop a meta framework to reconcile past research on how CI exerts its effect on innovation.

Third, my systematic literature review identifies existing gaps and proposes an agenda to direct future research. I advance the field of CI by pointing new methodological considerations, outline ambiguities in extant research and propose new research directions in a digitally enabled environment. For the Hungarian systematic literature review I used boarder concept, because this topic is a gap in the local research. However I would like to highlight a few related study.

Fourth, the diversity of domestic research is an excellent confirmation of the relevance of the study, related to my first three statements. The current 3rd generation theoretical approach that is increasingly appreciated and represents an integral link between innovation and marketing, and the practice aimed at ensuring the competitiveness and market success of innovation performance can be considered an era of marketing-driven innovation, where marketing itself becomes innovative and innovation-driven . Today, the conditions for innovation have also changed significantly: new intellectual content is created through joint thinking and cooperation between people with different knowledge (Baksa and Báder, 2020). That firms that place a priority on proper product development management and introduce new products in their competitive markets are commercially successful (Kiss, 2008).

The data collection for my thesis were collected through a mail survey that was sent to firms operating in Hungary. The business information database of the Hungarian Central Statistical Office was used and selected firms that belong to the top ten percent of firms in terms of sales revenue, as reported in the quarterly. Altogether, 2500 questionnaires were sent out by mail with an alternative option of filling out the questionnaire online. In order to improve the response rate, follow-up phone calls were made. These phone calls gave the opportunity to inquire

whether the questionnaire had reached the competent key respondent and to gain further insights about the causes of potential non-response. Respondents were ensured of the confidentiality of their data. The data collection resulted into 296 usable responses (response rate of 11.8%). Companies in the sample represent a great variety of industries. The key informants for the survey are marketing executives and marketing managers, who are typically top managers or one level below top management, supposedly with decision-making authority and with a mean company-specific experience of 12.1 years.

At the end of my thesis I present my empirical research. First, I present the aim of the research, the research questions and hypotheses and I also highlight the results and present the relevance of the findings.

2 CONCEPTUAL BACKGROUND AND LITERATURE REVIEW

2.1 DEFINING AND THEORETICAL POSITIONING OF CI

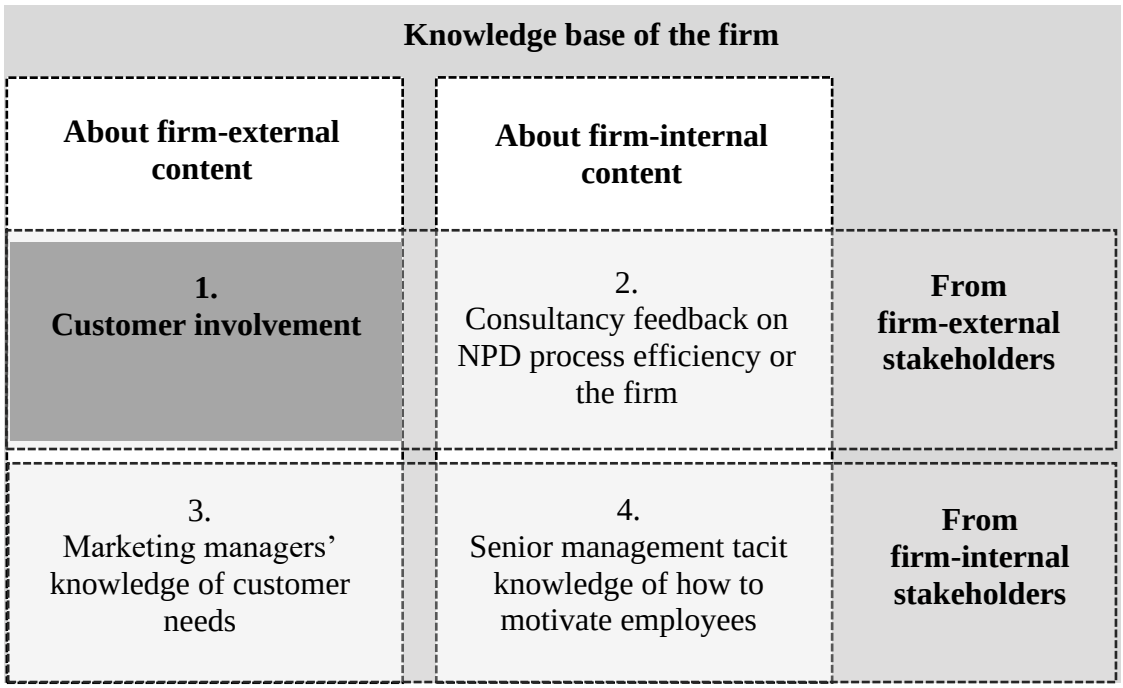
2.1.1 The position of CI within the firms' knowledge base

Based on the integration of the extant definitions detailed in my study, I conceptualize customer involvement along four key definitional elements, as the firm's (1) intensive, frequent and bidirectional collaboration with the (2) customers, initiated and encouraged by the firm, in order to (3) cultivate valuable customer knowledge (4) for improved innovation outcomes at various stages of the new product development.

Customer knowledge from CI forms a specific part of the company's entire knowledge base. As Figure 1 shows, it represents knowledge from and about an external stakeholder within the firm's knowledge base (quadrant number 1 in the upper left corner). In terms of source, the firms' knowledge may derive from within the boundaries of the focal firm, such from employees or from the firm's information technology systems. Yet, some of the firms' knowledge derives directly from external stakeholders such as consulting firms, market researchers, suppliers, or directly from customers — this body of knowledge is acknowledged as external knowledge.

I further specify knowledge by adding another dimension, content of knowledge. In terms of content, knowledge can be internal or external. Internal knowledge focuses on processes, individuals, firms, relationships within the firm, whereas external knowledge on stakeholders outside the company. External stakeholders are individuals, firms, organizations, systems — customers, suppliers, competitors, regulatory bodies, authorities — that affects or can be affected by a firm's actions.

1. Figure: The position of CI in knowledge base of the firm



Source: own compilation

2.1.2 Distinction of CI from other concepts

Recent years saw a surge of new practices that are changing the role of customers in innovation. According to the traditional approach, customers are solely subject to the extraction of economic value, who needs to be persuaded to buy by means of unidirectional flow of communication. This approach, however has been shifted towards a more complex view which suggests customers are also value co-creators, co-designers of innovative solutions, co-producers of value propositions, and co-developers of valuable knowledge (Prahalad and Ramaswamy, 2004). This transformation has also given rise to a proliferation of research organized around how firms interact and share resources with customers, and other stakeholders. It is therefore important to conceptually distinguish CI from these related, but different concepts.

1. Table Conceptual distinction of customer involvement - What is customer involvement?

Concepts	Definitional elements			
	C[a]	I[b]	K[c]	N[d]
What is customer involvement?				
Customer involvement in new product development: (1) intensive, frequent and typically bidirectional collaboration with the (2) customers, initiated and encouraged by the firm, in order to (3) cultivate valuable customer knowledge (4) for improved innovation outcomes at various stages of the new product development	yes	yes	yes	yes

Source: own compilation

As table 1 posist according to the systemathic literature review I've found that the customer involvement is the following: intensive, frequent and typically bidirectional collaboration with the customers, initiated and encouraged by the firm, in order to cultivate valuable customer knowledge for improved innovation outcomes at various stages of the new product development. CI can be differentiated from the following concepts along the four definitional elements.

Conceptual distinction of customer involvement presents that, what is not customer involvement? According to my concept I've found narrower concept than CI (Customer co-creation). I've found Broader concept than CI (Customer integration, Crowdsourcing, Value co-creation, Open innovation), furthermore different from CI, but related concept (Customer participation, Value in use, Value co-destruction).

2. Table Conceptual distinction of customer involvement - What is not customer involvement?

Concepts	Definitional elements			
	C[a]	I[b]	K[c]	N[d]
What is customer involvement not?				
Narrower concept than CI				
Customer co-creation: active, creative and social collaboration process between the firm and customers during the innovation, facilitated by the company (Piller and Walcher, 2006)	yes	yes	yes	yes
Broader concept than CI				
Customer integration: combining of customer resources (persons, possessions, nominal goods, and/or personal data) with the company resources, in order to transform customer resources (Moeller, 2008)	yes	yes	nlte	nlt
Crowdsourcing: Crowdsourcing is a participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a variety of task (e.g., gathering financial resources for a project) (Estellés-Arolas and González-Ladrón-de-Guevara, 2012)	nlt	yes	yes	nlt
Value co-creation: Joint, collaborative, concurrent, peer-like process of co-creating new value through customer	yes	yes	nlt	nlt

experience and competence. Value creation is an all-encompassing process including provider and customer activities (design, delivery, manufacturing, delivery, and usage) (Grönroos, 2011)				
Open innovation: Distributed innovation process based on purposively managed knowledge flows with a variety of actors across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model (Chesbrough et al., 2014)	nlt	yes	yes	yes
Different from CI, but related concept				
Customer participation: the degree to which the customer is involved in producing and delivering the service (Dong et al., 2008)	yes	nlt	nlt	no
Value in use: Joint, collaborative, concurrent, peer-like process of co-creating new value through customer experience and competence. Value in use **co-creation is** limited to creating value during the customers' usage of the product (Grönroos, 2011)	yes	yes	nlt	no
Value co-destruction: Interactional process between service systems that results in a decline in at least one of the systems' well-being (Plé and Chumpitaz, 2009)	yes	yes	nlt	no

[a] Customers; [b] Interaction, collaboration; [c] Customer knowledge; [d] New product development, innovation; e Not limited to / not focal

Source: own compilation

As Table 2 posits, CI can be differentiated from these concepts along the four definitional elements. CI typically takes the form of a bidirectional, collaborative mode (e.g., Anning-Dorson, 2018). Some scholars, however, also

refer to forms of CI in which customers are regarded as sources of information in contrast to more collaborative forms of involvement (e.g., Cui and Wu, 2017). Customer co-creation is by definition an active, creative and social collaboration process between the firm and customers during the innovation, facilitated by the company (Piller and Walcher 2006), therefore, it is difficult to draw a sharp boundary line between the two concepts. The term co-creation may refer to a somewhat more active contribution than CI, which may also take a more passive form. Based on these arguments, I conceptualize co-creation as a subset of CI. The rest of the concepts are either broader, or different from CI.

2.2 METHODS OF THE SYSTEMATIC LITERATURE REVIEW

For the systematic literature reviews I followed the well-developed guidelines of Tranfield et al. (2003). my methodological procedure has three stages, (1) identification of potentially relevant papers, (2) relevancy identification and detailed coding of relevant papers, and (3) analysis of relevant papers.

These stages are presented in Figure 2.

2.2.1 Systematic literature review of the leading international academic journals

2.2.1.1 Identification of potentially relevant articles

As a first step of the systematic literature review, I identified the potentially relevant papers. I conducted search using search strings “customer co-creation” OR “customer involvement” AND “innovation” OR “NPD” OR “new product development” OR “new service development”. For complete coverage, I used two databases, Scopus and Web of Science, widely used in systematic literature reviews. In order to surely capture every single potentially relevant paper, as Figure 2 shows, I also run queries for alternative search strings (for the alternative search strings, I only checked survey types of studies). The searches performed resulted in a total of 752 potentially relevant papers, which I checked one by one.

2.2.1.2 Relevancy identification and detailed coding of relevant papers

Considering the lack of uniform conceptualization of co-creation, or customer involvement in the existing literature, I needed to pay special attention to identifying relevant papers. As Figure 2 posits, I established detailed inclusion and exclusion criteria that I fine-tuned as I discussed articles that were in doubt. After the exclusions, 26 of the 752 potentially relevant articles were identified as relevant.

The exclusion criterias were the following:

1) Duplicate, mishit (e.g., book chapters, conference proceedings);

2) Low-ranked academic journal (lower than Q1);

3) Non-survey papers (e.g., qualitative, editorial, viewpoint, conceptual, and review papers);

4) Studies that do not investigate the link between co-creation and product innovation;

- Unit of discussion and analysis is not the firm (e.g., industry, sector, economy)
- Studies on firm's collaboration with other stakeholders (e.g., suppliers, competitors, consultants, universities, research labs, or with 'generic' external stakeholders, without specifying customers)
- Studies on the antecedents of customer co-creation behaviour, without discussing innovation-related outcomes (e.g., drivers of commitment to participate in co-creation, intention of future participation, etc.)
- Studies on technical aspects of co-creation (platforms used for involving customers, the role of online reviews in co-creation, the characteristics of customer co-creation compared to market research, etc.)
- Studies on how firms organize their co-creation processes (e.g., how firms motivate customers to co-create, whether firms should communicate to customers that the product is co-created, the role of salesperson's emotional intelligence in establishing customer co-creation behaviour, etc.)
- Studies on the customer-side outcomes of co-creation (e.g., how customers respond when a co-created service fails, the characteristics of co-created service recovery, how customer co-creation in product development creates an emotional connection, satisfaction, and subsequent loyalty towards the co-created product, adoption intention toward co-created products, etc.)
- Studies on process innovation outcomes of co-creation (the role of co-creation in supply chain innovations, manufacturing system innovations, etc.)

5) Papers that investigate the link between co-creation and product innovation, but scale items are not reported (conceptual unclarity).

2. Figure Systematic literature review procedure and process

Phase I: Identification of potentially relevant papers (N=752)

Search for potentially relevant papers

Search strings: "customer co-creation" OR "customer involvement" OR "customer integration" OR "customer participation" OR "Crowdsourcing" OR "Value co-creation" OR "Value in use" OR "value co-destruction" OR "open innovation" AND "innovation" OR "NPD" OR "new product development" OR "new service development"; *Databases:* Scopus, Web of Science; *Closing date of data collection*: 13.04.2021.

Phase II: Relevancy identification and detailed coding of relevant papers (N=26)

Exclusion criteria establishment

1) Duplicate, mishit (e.g., book chapters, conference proceedings)
2) Low-ranked academic journal (lower than Q1, https://scimagojr.com)
3) Non-survey papers (e.g., qualitative, editorial, viewpoint, conceptual, and review papers)
4) Studies that do not investigate the link between co-creation and product innovation:
   - Unit of discussion and analysis is not the firm (e.g., industry, sector, economy)
   - Studies on firm's collaboration with other stakeholders (e.g., suppliers, competitors, consultants, universities, research labs, or with 'generic' external stakeholders, without specifying customers)
   - Studies on the antecedents of customer co-creation behaviour, without discussing innovation-related outcomes (e.g., drivers of commitment to participate in co-creation, intention of future participation, etc.)
   - Studies on technical aspects of co-creation (platforms used for involving customers, the role of online reviews in co-creation, the characteristics of customer co-creation compared to market research, etc.)
   - Studies on how firms organize their co-creation processes (e.g., how firms motivate customers to co-create, whether firms should communicate to customers that the product is co-created, the role of salesperson's emotional intelligence in establishing customer co-creation behaviour, etc.)
   - Studies on the customer-side outcomes of co-creation (e.g., how customers respond when a co-created service fails, the characteristics of co-created service recovery, how customer co-creation in product development creates an emotional connection, satisfaction, and subsequent loyalty towards the co-created product, adoption intention toward co-created products, etc.)
   - Studies on process innovation outcomes of co-creation (the role of co-creation in supply chain innovations, manufacturing system innovations, etc.)
5) Papers that investigate the link between co-creation and product innovation, but scale items are not reported (conceptual unclarity)

Development of detailed coding scheme and coding of relevant papers

Type of empirical data, country of data origin, industry context, B2B / B2C, key informant, sample size, analytical method, scale items used for capturing co-creation, and innovation, mediating and moderating variables tested, underlying theoretical explanation for hypotheses

Phase III: Analysis of relevant papers

Overview and comparison of prior definitions and measurement of CI

Iterative grouping of scale items and definitional elements

Overview of measurement of innovation outcomes

Iterative grouping of scale items

What is the effect of CI on innovation?

Content analysis of prior papers

How does CI exert its effect on innovation outcomes?

Creating a meta-framework that synthesizes prior findings within the framework of one model

Source: own compilation

2.2.1.3 Analytical procedure

This research results into (1) the overview and comparison of prior definitions and measurement of CI; (2) the overview of measurement of innovation outcomes; (3) the presentation of the effect CI has on innovation; and (4) the presentation of how CI exerts its effect on innovation outcomes. Table 3 summarizes the contributions I expect from the respective analyses, the data sources, and the analytical procedures. As Table 3 shows, I used the iterative grouping, a procedure during which the units of the pool are reviewed one by one and similar elements are categorized. The purpose of the procedure is to create well-separable categories, while all units within the pool can be classified into one of the categories.

3. Table Analytical procedure

(1) Overview and comparison of prior definitions and measurement of CI (Table 5)
Aim of analysis: provide an updated, more accurate and comprehensive definition for CI; give guidance to managers on how to evaluate and measure CI
Analytical sub-procedure for overview of definitions **Data source:** Manuscript, definitions as (if) presented **Unit of analysis:** Elements of definitions **Analytical method:** Iterative grouping

Analytical sub-procedure for overview of prior measurements

Data source: Manuscript, scale items

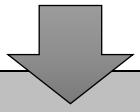
Unit of analysis: Items in the measurement scale used for capturing CI

Analytical method: Iterative grouping

Analytical sub-procedure for comparison

Unit of analysis: Categories of definitional elements, and of measurement items

Analytical method: Contrasting the categories of prior definitions and measurement items



(2) Overview of measurement of innovation outcomes (Table 6)

Rationale of analysis: illustrate the aspects of CI's innovation outcomes that were priorly considered, provide guidence to managers on how to evaluate the outcomes of CI's involvement in innovation

Analytical sub-procedure for overview of definitions

Data source: Manuscript, scale items

Unit of analysis: Items in the measurement scale used for capturing innovation outcomes

Analytical method: Iterative grouping

(3) What is the effect of CI on innovation?

Rationale of analysis: Present the state-of-the-art of what is known about the effect of CI on innovation outcomes

Data source: Coding scheme, manuscript

Unit of analysis: Manuscript

Analytical method: Content analysis

(4) How does CI exert its effect on innovation? (Table 7, Figure 3)

Rationale of analysis: Uncover and inject a theoretical perspective into understanding the underlyling mechanisms

Analytical sub-procedure for overview of underlying mechanisms (Table 7)
Data source: For empirically untested mechanisms: Manuscript, theoretical reasoning of articles as presented in argumentation of hypotheses of how CI has an impact on innovation outcomes For empirically tested mechanisms: coding scheme, recorded mediating and moderating variables **Unit of analysis:** Arguments of theoretical reasoning, empirically investigated mediating and moderating variables **Analytical method:** Iterative grouping
Analytical sub-procedure for theorizing of underlying mechanisms (Figure 3)
Data source: Table 7 **Unit of analysis:** Identified groups of underlying mechanisms **Analytical method:** Compliance of the units with the Knowledge Based View and the Relational View (Theory of Market Based Resources)

Source: own compilation

2.2.2 Systematic literature review of the leading Hungarian journals

I have applied a much wider perspective when looking through the Hungarian academic literature than in case of the international literature since the topic of „ The impact of customer co-creation on innovation outcomes" has not been as widely researched in Hungary in the last two decades. However, in my research, I have not made a deeper content analysis of books on this theme.

2.2.2.1 Identification of potentially relevant Hungarian articles

I have looked at whether there have been any publications in the Hungarian professional journals on researches which dealt with the involvement of Hungarian consumers in product development and innovation processes. I have searched for the following key phrases in the Hungarian researches in marketing context: „co-creation", „customer involvement", product development" and „innovation". It must be highlighted that this theme does not appear in the Hungarian researches as an individual research topic, nevertheless I believe that it is important to gain knowledge about the related Hungarian academic literature by widening the perspective. During my work, I found that most Hungarian researches in this field focus mainly on innovation, knowledge management and product development. The involvement of consumers into innovation and product development processes has not been thoroughly researched in Hungary. My analysis is different from the Hungarian researches conducted so far, and strives to provide an insight into the examined problems by connecting the academic literature on innovation, product development and knowledge management.

I have found altogether 147 key phrases which I organised into a table and worked on systematically. First of all, I filtered out those phrases which appeared more times in the searches. Secondly, I have ordered the journals into different categories. As a third step, I conducted a content analysis which further narrowed down the list of scores. During my research, I looked for articles in the theme which have been published in Hungarian „A", „B" and „C" category journals in the last two decades. When selecting the journals, I relied on the Hungarian list of the

Hungarian Academy of Sciences, Department IX. (www.mta.hu). During the process, I found altogether 14 relevant professional articles which can be related to my research area because of the wider Hungarian perspective.

4. Table The Hungarian list of Department IX. of the Hungarian Academy of Sciences

MTA Category	Journal	Number of relevant articles
A	Statisztikai Szemle (Statistic Review)	3
B	Vezetéstudomány (Management science)	9
C	Marketing & Management	2

Source: own compilation

2.2.2.2 Relevancy identification and detailed coding of relevant papers

Strictly speaking, I have not found relevant research in the topic of the connection between CI and innovation outcomes. In Hungary, the main focus of the researches has been innovation, knowledge management and product development. Below, I will provide an overview of the relevant Hungarian academic literature, slightly widening the perspective to researches which are not in direct connection with the theme of my dissertation. I follow this approach in order to introduce the results appearing in Hungarian journals and to review the Hungarian publications in his theme a broader sense.

2.2.2.3 Analytical procedure

When analysing the national literature, I was able to classify the writings on this topic into three groups. In the first group, there were works dealing with the nature and concept of innovation in general, as well as its organisational and managerial aspects. The second group focuses on knowledge management and the effective use of knowledge for innovation. The third explores the nature and relationship between product development and innovation in different approaches. These domestic publications help to understand the basic concepts that frame the topic and highlight the present situation regarding the research on the subject in Hungary.

2.3 RESULTS OF THE SYSTEMATIC LITERATURE REVIEW

2.3.1 Measurement of CI and innovation outcomes

2.3.1.1 Customer involvement

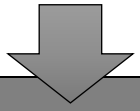
Table 5 highlights exemplary definitions of CI; and compares and confronts the questionnaire items for measuring CI with the elements of the definitions in the articles. This comparison allows pinpointing of missing but important aspects of the definition and the creation of an updated, integrated new definition of CI. The definitional elements and items alike are organized around specific aspects of CI, relational, knowledge and outcome. While prior definitions have partially addressed these aspects, as exemplary definitions illustrate, they are far from complete, therefore, I have created an updated definition based on the integration of prior papers.

5. Table Overview and comparison of prior definitions and measurement of CI

Definition of CI
Integrated new definition
CI is the firm's (1) intensive, frequent and bidirectional collaboration with the (2) customers, initiated and encouraged by the firm, in order to (3) cultivate valuable customer knowledge (4) for improved innovation outcomes at various stages of the new product development.

Exemplary prior definitions

- Customers' active contribution to the development of new products, for instance by suggesting innovative ideas for new products or testing developed prototypes (Keszey and Biemans, 2016)
- Both the breadth and depth of the customer participation in the firm's NPD (Anning-Dorson, 2018)
- The extent to which service producers interact with current (or potential) representatives of one or more customers at various stages of the new service development process (Carbonell et al., 2009)



Relational aspect of CI (Definitional element 1, 2)

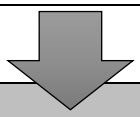
Relational aspects in prior definitions

- Frequent, bidirectional, and face-to-face customer communication process (Gustafsson et al., 2012)
- Dialogue, mutual influence and understanding of customers rather than one-way listening (Hsieh and Hsieh, 2015)

- Brings different parties together (i.e., a group of customers) (Tseng and Chiang, 2016)

- Direct interaction and engagement of the customer (Anning-Dorson, 2018)

- Customers actively contribute to the development of new products (Keszey and Biemans, 2016)



Relational aspects in measurement items

Intensity

- Our customers were actively involved in a variety of product designs and development activities (Cui and Wu, 2017)

- Active customer involvement (Gustafsson et al., 2012)

- Customers were actively engaged with this project (Storey and Larbig, 2018)

- There were extensive consultations with customers (Carbonell et al., 2009)

Frequency

- The transfer of information about customers' needs and preferences took place frequently (Cui and Wu, 2016)

- Our customers frequently interacted with the new product team during the development process (Cui and Wu, 2016)

- Our customers provided frequent feedbacks and inputs on product designs (Cui and Wu, 2016)

- The frequency of the meetings with customers was high (Carbonell et al., 2009)

- Our key customers are involved in periodically reviewing operations with us (Lin et al., 2010)

Bidirectionality

- Major customer was an integral part of the design effort for the new product development (Feng and Wang, 2013, Li et al., 2019, Kang et al., 2020)

- We partnered with major customer for developing new product (,) (Feng and Wang, 2013, Li et al., 2019)

- To reduce lead time, I have focused on collaboration (Gustafsson et al., 2012)

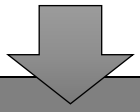
- This product was developed in close co-operation with a potential or current main customer (Stendahl, 2009)

- Specific customers were invited to join the project as team members (Carbonell et al., 2009)

- A high degree of face-to-face communication (Gustafsson et al., 2012)

Initiated and encouraged by the firm (aspect neglected in definitions)

- My company encourages customers to express their opinions on my services on social media (e.g. Facebook, Twitter, LinkedIn) (Mitrega et al., 2020)
- We always encourage my customers to help us in the production of the quality service (Anning-Dorson, 2018)
- Our employees are encouraged to monitor the internet to search for customer opinions on my company (Mitrega et al., 2020)



Intellectual [knowledge] aspect of CI (definitional element 3)

Intellectual [knowledge] aspects in prior definitions

- Customers providing feedback, information, and knowledge to firms (Menguc et al., 2014)
- Suggesting innovative ideas for new products or testing developed prototypes (Keszey and Biemans, 2016)
- Creative problem solving (Gustafsson et al., 2012)

Intellectual [knowledge] aspects in measurement items

Knowledge sharing of firm with customers (aspect neglected in definitions)

- We explain the ideas in a meaningful way to customers (Hsieh and Hsieh, 2015)
- Provide customers with professional knowledge in fields with which they are not already familiar. (Tseng and Chiang, 2016)
- We actively provide information to reply customers' suggestions (Hsieh and Hsieh, 2015)

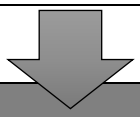
Knowledge gaining of firms from customers

- We always gather market insights from customers through face-to-face customer meetings, visits, workshops, or customer suggestions (Anning-Dorson, 2018)

Cultivate customers as valuable sources of external knowledge (aspect neglected in definitions)

- Our customers' involvement as co-developers of the product was significant (Cui and Wu, 2016)
- Customers give lots of feedback for the new ideas (Hsieh and Hsieh, 2015)
- NPD is governed to a large extent by customer feedback (Keszey and Biemans, 2016)
- We used customers as a key information source (Cui and Wu, 2017)

- Our key customers have major influence on the design of new products (Feng et al., 2012)
- Customers were my main data providers (Zhang and Xiao, 2020a)
- Communication and interaction leading to novel ideas (Gustafsson et al., 2012)



Outcome aspect of CI (definitional element 4)

Outcome aspect in prior definitions

- The extent to which service producers interact with customers at various stages of the innovation process (Carbonell et al., 2009)
- Leverage customer communication and enable this communication to be transformed into input into [service] innovations (Mitrega et al., 2020)
- Manufacturers incorporate their customers into their product development and continuous improvement programs (Feng et al., 2014) (Yang and Zhang, 2018)
- Breadth and depth of the customer participation in the firm's innovation (Carbonell et al., 2012)

Outcome aspect in measurement items
Stages • We consulted major customer early in the design efforts for the new product (Feng and Wang, 2013) • Customers were involved early in the development process (Gustafsson et al., 2012) • To what extent were customers involved in the design stage? (Melton and Hartline, 2015) • Customers were involved at every stage (Storey and Larbig, 2018) **New product development** • There is a strong consensus in my firm that customer involvement is needed in product design/development (Yang and Zhang, 2018) • We used information about my customers' needs in the development of the new product (Cui and Wu, 2016) • We utilized product designs that were created by customers (Cui and Wu, 2016) • Our customers' involvement constituted a significant portion of the overall product development effort (Cui and Wu, 2017) • Our project team acted on data from customers (Zhang and Xiao, 2020a)

Source: own compilation

2.3.1.2 Innovation outcomes

Within the broader domain of innovation, this paper reviews studies that look at new product and service innovation. Table 6 presents the items used in relevant studies to measure the innovation outcomes of CI. As Table 6 shows, these items can be further divided into three subsets, according to which aspect innovation outcome of CI is captured. The first subset refers to innovation process related outcomes (speed, novelty, sustainability, technical superiority), typically compared to standards set by the company.

Most research has measured financial outcomes of innovation, such as return on investment, on assets, market share, profitability, costs, revenue commercial success of the new product using firm-internal goals or competitors as bases of comparison. The third subset of items are organized around new product perception of customers, or compared to competitors in terms of satisfaction, benefits, similarity, or novelty.

6. Table Measurement of innovation outcomes of CI

NPD process
Projection base: Firm
NPD Speed • The speed of new product development of my firm is far ahead of my project timeline (Morgan et al., 2019) • The speed of new product development of my firm is much faster than I expected (Morgan et al., 2019)

- The speed of new product development of my firm is much faster than my typical product development time (Morgan et al., 2019)

NPD process novelty

- The new service exploited a technology that was totally new to the firm (Carbonell et al., 2012)

Green product innovation

- Using environmentally friendly material (Zhao et al., 2018)
- Improving and designing environmentally friendly packaging for existing products (Zhao et al., 2018)

Projection base: Competitors

Technical superiority

- Fewer technical problems than my nearest competitors (Carbonell et al., 2009)

Financial results of new product

Projection base: Firm

- Return on investment relative to its stated objective (Yang and Zhang, 2018, Tseng and Chiang, 2016, Cui and Wu, 2016, Zhang and Xiao, 2020a)

- Return on assets (Keszey and Biemans, 2016)

- Sales, commercial success relative to its stated objective (Carbonell et al., 2009, Tseng and Chiang, 2016, Storey and Larbig, 2018, Cui and Wu, 2016, Zhang and Xiao, 2020a, Melton and Hartline, 2015, Morgan et al., 2019, Gustafsson et al., 2012, Keszey and Biemans, 2016)

- Market share relative to its stated objective (Yang and Zhang, 2018, Carbonell et al., 2009, Storey and Larbig, 2018, Cui and Wu, 2016, Zhang and Xiao, 2020a, Melton and Hartline, 2015, Morgan et al., 2019)

- Overall profitability, profitability compared to goal (Yang and Zhang, 2018, Gustafsson et al., 2012, Tseng and Chiang, 2016, Zhang and Xiao, 2020a, Melton and Hartline, 2015, Morgan et al., 2019, Keszey and Biemans, 2016)

- Costs (within planned budget) (Feng and Wang, 2013, Li et al., 2019)

- Revenue goals (Yang and Zhang, 2018)

- Number of sold products (Pee, 2016)

Projection base: Competitors

- Return on investment relative to competitors (Menguc et al., 2014, Zhang and Yang, 2016)

- Sales, sales growth relative to competitors (Feng and Wang, 2013, Menguc et al., 2014)
- Market share, market share growth relative to (main) competitors (Feng and Wang, 2013, Menguc et al., 2014, Zhang and Yang, 2016)
- The profitability, profit growth of the new product is high relative to main competitors (Feng and Wang, 2013, Zhang and Yang, 2016)
- Overall commercial success compared to competitor (Zhang and Yang, 2016)
- NP performance relative to main competitors ((Hsieh and Hsieh, 2015, Menguc et al., 2014))

Perception of new product

Projection base: Customers

- Number of similar products identified by customers (reverse coded) (Pee, 2016)
-
- The new product meets or exceeds customer expectations (Tseng and Chiang, 2016)
- The new product meets or exceeds customers' expectations of satisfaction (Tseng and Chiang, 2016)
- The new product meets or exceeds the customers' expected value (Tseng and Chiang, 2016)

• The new service provides substantially higher customer benefits relative to the previous services in the category (Melton and Hartline, 2015)
Projection base: Competitors
• The percentage of service innovation that met customer needs relative to competitors (Hsieh and Hsieh, 2015) • The market response to my NPD projects was more positive than my competitors' (Keszey and Biemans, 2016) • Our NPD projects were more successful than my competitors' (Keszey and Biemans, 2016) • Our NPD projects were more novel and innovative compared with my competitors (Keszey and Biemans, 2016) • Service experience was superior to competitors (Carbonell et al., 2009) • Customer solution was superior to competitors (Carbonell et al., 2009) • The new service is a highly innovative service, which replaces a vastly inferior alternative (Melton and Hartline, 2015)

Source: own compilation

2.3.2 What is the effect of CI on innovation? Overview of key empirical findings

The key findings of prior empirical research are presented below. Some of the studies include mediator and moderator variables to further specify how CI effects innovation. Moderator variables are the ones that strengthen — positively moderate — or weaken — negatively moderate — the relationship between a dependent and an independent variable, hence shed light on the boundary conditions under what the relationship holds. Mediator variables transmit the effects of the indepent variable on the dependent ones, hence further specify how and why there is a relationship between the independent and dependent variables. In case of full mediation, the effect of the independent variable on the dependent is only significant in the presence of the mediator, whereas in case of partial mediation, the effect exists without the mediating variable as well.

Most studies confirm a positive or non-significant relationship between CI and innovation. An early study is one of the exceptions, that explain the negative effect by the wood industry's unaccustomedness to CI (Stendahl, 2009). Lin et al. (2010) show that CI has a positive effect on product innovation, and a decade later Kang et al. (2020) conclude the same results, and also reveal that CI mediates the positive effect of cross-functional integration on NPD outcomes.

Innovation outcomes of CI, may be differential depending on innovation outcome indicators. Keszey and Biemans (2016) posit that customer co-creation has a stronger positive effect on perception of product innovativeness then on financial related aspects of new product success. CI enhance financial innovation performance indirectly, through NPD cost and speed, on which involvement has a direct positive effect (Feng and Wang, 2013, Zhang and Yang, 2016). (Morgan et al., 2019) conclude that NPD speed partially mediates the effect of customer participation on financial NPD performance. (Anning-Dorson, 2018) find that customer involvement has a positive effect on product innovation and product innovativeness mediates the relationship between customer involvement and firm performance.

The effect of CI on innovation is highly context dependent, moderated by firm-internal factors. The positive effect of co-creation is strengthened by organizational culture, however, communication quality — the culture of sharing knowledge across partners — is found to negatively moderate this effect (Tseng and Chiang, 2016). Top managent support strengthen the positive effect of CI on both financial and non-financial performance of NPD (Yang and Zhang, 2018). Larger firms, presumably because are more likely to have the skills to incorporate external knowledge gained from customers to the innovation process, co-creation exerts a stronger effect on innovation (Mitrega et al., 2020). Incremental innovation capability strengthens, and radical innovation capability weakens the effect CI in product design has on financial performance (Menguc et al., 2014). (Storey and Larbig, 2018) find that the effect of CI on new product financial success is fully mediated by the processes of customer knowledge assimilation — the deep understanding of customers' latent needs — and concept transformation — the modification of the service concept due to customer insights — and this latter effect is also moderated by resource slack.

Among the factors influencing the effect of CI, those related to knowledge management and customer relationship capabilities are of paramount importance. IT implementation reduces time to-market outcomes of customer co-creation, as increases the likelihood that customer knowledge will be better integrated into NPD (Feng et al., 2012, Zhang and Yang, 2016). (Hsieh and Hsieh, 2015) uncover important underlying mechanism by demonstrating that dialogic co-creation with the customers during innovation has a positive effect on company-customer relationship, knowledge valuation and customizing capability, which in turn positively influence innovation outcomes. (Li et al., 2019) focus on product innovation novelty as a moderator from the perspectives of suppliers and customers. The two types of product innovation novelties exert a differential effect. Specifically, product innovation novelty for customers strengthens, for suppliers weakens the positive effects of customer involvement on the NPD cost performance.

Prior studies have addressed at what stage of innovation and what customers should be involved. (Carbonell et al., 2009) do not confirm any moderating effects of the stage of the development process, and find that CI at any stage positively

influence the technical quality of the product and innovation speed, whereas it has no effect on overall competitive superiority and sales performance of innovation. Other studies emphasize the benefits of CI in the design phase. (Melton and Hartline, 2015) highlight that the effect of CI in the design stage on the innovativeness of a radically new product is fully mediated by process complexity — the number and variety of activities that allow participants to interact creatively.

This is somewhat contradicted by the result that that co-creating design ideas and design decisions at the early stages of the innovation increase new product performance in terms of the level of perceived innovativeness and financial results (Pee, 2016). However, involving customers in the later stage of commercialization idea has a negative effect, whereas involving them in the commercialization decision has no effect on innovation outcomes (Pee, 2016). Involving close customers—with whom the firm frequently interacts — accelerates innovation speed and service advantage, while lead users — customers for whom the product is of great importance — has a positive effect on service newness and service advantage (Carbonell et al., 2012).

Prior studies also investigate how the intensity of customer involvement influence innovation results. These studies conclude that forms of CI in terms of collaboration intensity has their unique advantages and are suitable for different conditions. Frequency of interaction with customers during their new product development has a positive effect on both incremental and radical innovation outcomes (Gustafsson et al., 2012). However, customers should not be too highly involved in developing the content of radical innovations, as the chances to achieve financial success with radical innovations will diminish (Cui and Wu, 2016). Involving customers as innovators does not have an impact on innovation outcomes, whereas less intensive forms have a positive effect. The impact of customer involvement on product performance is moderated by the firm's technological capability (Cui and Wu, 2016). (Cui and Wu, 2017) compares the effects of involving customers as sources of information versus as co-creators. Both forms of involvement have a positive direct effect on NPD novelty. Yet, relying on customers as sources of information is more beneficial for novel product outcomes when firms take a more experimental NPD approach, whereas the effect of co-

developing is stronger when the NPD process is characterized with lower experimentation.

(Saldanha et al., 2017) also conclude that each intensity of CI positively influence NPD outcomes, however, the effect of relying on customers as sources information is amplified by analytical information processing capability — usage of business analytics technologies or applications that analyze critical business data — whereas the effect of co-creation is positively moderated by relational information processing capability — the usage of customer-relationship management related IT applications to support work processes. (Zhang and Xiao, 2020a) investigate the intensity of CI in a big data environment, reaching a conclusion as prior papers, that both customer involvement — as data providers versus data analysts—types of involvement facilitate B2B product innovation. However, customer need tacitness negatively, while diversity positively moderates the relationship between involving customers as providers of data and new product performance. Customer need tacitness is also found to positively moderate the relationship between involving customers as data analysts and new product performance, while diversity has no significant moderating role.

External contingencies, although receiving less empirical attention, compared to firm-internal ones, also moderate the effect studied. (Zhao et al., 2018) reveal that technological uncertainity strenghten and demand uncertainty has no significant moderating effect on the link between CI and green product innovation. (Morgan et al., 2019) show that link between customer participation and NPD speed is positively moderated by turbulence, hence customer participation in NPD allows firms to better manage turbulent environments by enhancing the speed to market of new products.

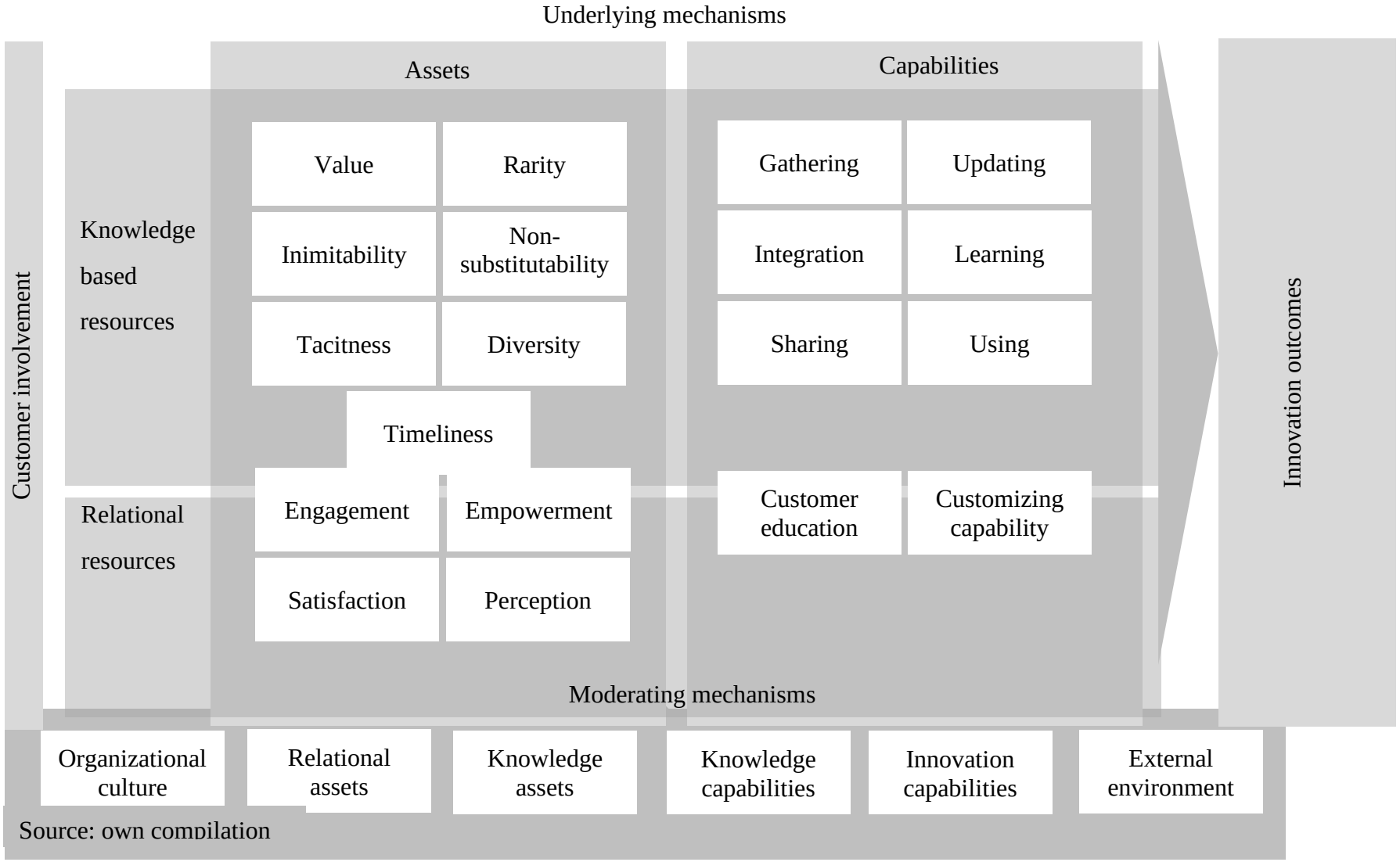
2.3.3 How does CI exert its effect on innovation? Theorizing underlying effects

Figure 3 summarizes the main results and Table 7 details the underlying mechanisms suggested in the theoretical reasoning of prior papers, as well as the mediating and moderating effects empirically validated in studies.

As Figure 3 highlights, I rely on the Knowledge Based View (KBV) and the concept of Market Based Resources (MBR) as theoretical frameworks for systemizing the underlying mechanisms. KBV posits that the primary role of the firm, and the essence of organizational capability, is the integration of knowledge (Grant, 1996), therefore it serves as prime framework for theorizing the impacts of external knowledge. This paper examines CI, a narrow subset of external knowledge, that derive from the firm's relationship and interaction with external stakeholders (customers) in the marketplace. Consequently, CI affects innovation outcomes not only through knowledge but also through relational resources (firm's interaction with the customers). While the domain of knowledge resources is embedded in KBV, the relational aspects are beyond its boundaries. These relational resources are presented by the concept of Market Based Resources (MBR), which posits, that these resources arise from the commingling of the firm with entities in its external environment (Srivastava et al., 1998).

Both KBV and MBR are theoretically underpinned by the Resource Based View (RBV). The core proposition of RBV is that firms possessing valuable, rare, inimitable and non-substitutable (VRIN) resources can obtain sustained competitive advantage by focusing on value-creating strategies that cannot be duplicated by competitors. Resources are "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm (Barney, 1991), out of which I focus on its two subsets, assets and capabilities. Assets are something a firm stocks within its boundaries, and that are rare, valuable, imperfectly imitable and non-substitutable, hence may be a source of competitive advantage (Barney, 1991). Capabilities are patterns of processes, activities, actions, that are organizationally embedded, non-transferable and aim to transforms assets into outputs of greater value (Makadok, 2001). As Figure 3 posits, knowledge-based capabilities include firms' gathering, updating, integrating etc. of knowledge, whereas customer education and customizing capabilities are examples of market-based capabilities.

3. Figure Meta framework for understanding the effect of customer involvement on innovation outcomes



Source: own compilation

7. Table Underlying mechanisms of how CI influences innovation outcomes

Knowledge-based resources related mechanisms	
Knowledge-based assets	
Value	***Inimitability***
• Co-creation with customers during innovation is an *important* source of organizational knowledge (Hsieh and Hsieh, 2015)	• A better understanding of end-user needs provides firms with *distinctive resources* that can lead to a competitive advantage (Menguc et al., 2014)
• Customers hare *innovative and constructive* ideas with the manufacturers when they specify their requirements (Yang and Zhang, 2018)	• Important source of *complementary* resources and knowledge (Kang et al., 2020)* (mix)
	Non substitutability
• Customers could provide first-hand feedback about product experience and point out potential problems, which *can help firms* make adjustments and corrections in time (Zhang and Yang, 2016)	• Customer information is considered a key source of NPD creativity because customer inputs bring in *new perspectives* that are likely to be *different* from those of NPD employees (Cui and Wu, 2017)

- Customers have knowledge of the functions and designs of existing products based on their usage experience. This serves as a basis for them to identify *ideas that are novel and not yet available* in existing products. (Pee, 2016)

- Customers with lead-user characteristics provide organizations with *profound and accurate* understanding of customers' needs (Carbonell et al., 2012)

- CI increases the *quality* of ideas (Morgan et al., 2019)

Rarity

- Unique type of managerial resource (Zhao et al., 2018)

Diversity

- Less embedded customers are sources of *new and diverse* information that would facilitate the development of highly innovative products (Carbonell et al., 2012)

- Provide firms information about the problems exist in the new products which would have been *overlooked* thus eliminating product design glitches (Yang and Zhang, 2018)*

Tacitness

- When customers are actively involved, they are likely to provide the contextual knowledge that is important for understanding their *tacit needs* and how the customer will ultimately regard and use the service (Storey and Larbig, 2018, Morgan et al., 2019, Keszey and Biemans, 2016a)

- It is assumed that *latent needs* are more easily detected if a search is conducted at the same time as the user experiences them (Gustafsson et al., 2012)

Sharedness

- Builds up a shared understanding between the firm

Broadens external innovation search *scope* (Feng and Wang, 2013)

and the customer (Zhao et al., 2018)

Timeliness

Provides first-hand knowledge, such as feedback of new products (Yang and Zhang, 2018, Morgan et al., 2019)

Knowledge-based capabilities

Knowledge gathering

- Increases the *efficiency and reduces the amount of time of gathering* information related to customer demand and preferences (Zhao et al., 2018)
- Reduces innovation *search cost* (Feng and Wang, 2013)
- Helps *generate insights* regarding customer needs, their preferences, and their requirements, which in turn impacts product offerings of

Knowledge updating

- Keeps the design team members *updated* on changing customer tastes and reduces demand uncertainty (Feng and Wang, 2013)

Knowledge integration

- NPD employees are responsible for *interpreting and combining* information with internal knowledge during the innovation. Firm's ability to execute these key development activities are enhanced by the

the firm (Storey and Larbig, 2018, Zhang and Yang, 2016), *(Storey and Larbig, 2018) empirically tested

- *Seeking of* continual customer feedback during development validates and confirms the product design, thereby *minimizing* last-minute changes, make adjustments and corrections *in time* (Carbonell et al., 2009, Zhang and Yang, 2016)

- *Minimize uncertainty* regarding what products to develop by simultaneously increasing the *firm's access to information* about customer preferences and integrating that information and customer resources directly within the NPD process (Morgan et al., 2019)

- *Knowledge gained* from customers allows the manufacturer to capture market information *more effectively*, as a result, customer involvement can enhance product development

insight and information gained through customer involvement (Feng et al., 2012)

- CI *increases the opportunity* for customer *knowledge assimilation*. Assimilation is a learning process that occurs when new information is taken-in organized, structured, and endowed with relevant meaning (Storey and Larbig, 2018)

- Inconsistencies among *inputs from diverse customers*, driven by the frequency of customer contact, result in *overload* and the need to compromise between *conflicting information* (Storey and Larbig, 2018)

- CI's relationship with customer *knowledge assimilation* may suffer from *diminishing returns*. At high levels, CI has been found to be detrimental to new service success (Storey and Larbig, 2018)

Learning

- Frequent meetings enable *learning process* about

efficiency and reduce time-to-market of new products (Feng et al., 2012)

- Enables firms to *acquire core information* about customer preferences and market needs, minimize *time of market* research (Zhang and Yang, 2016)

Knowledge sharing within the firm

- Stimulate *interfunctional communication* because they bring fresh ideas and point opinions to the process (Carbonell et al., 2012)

- Increases the number and variety of activities during the NPD process (i.e., process complexity) that allow participants to *interact creatively*, which in turn has a positive innovation outcome (Melton and Hartline, 2015)* empirically tested

customers' needs occurs and leads to the generation of new ideas in a development project (Gustafsson et al., 2012)

Utilization

- Large amount of detailed customer information generated through co-development in combination with the active role of customers may dominate the NPD process and *reduce* the chance of CIS information *being utilized* (Cui and Wu, 2017)

- Extensive collaboration with end users allows customers' voices to be captured and *facilitates* the *creation* of effective user-oriented designs that enhance product performance (Menguc et al., 2014)

Relational market-based resources related mechanisms	
Relational market-based assets	
Engagement • Enhances *customers's bond and identification with companies* (Hsieh and Hsieh, 2015) • Facilitates *collaboration with customers* and creates a climate of integration (Zhang and Xiao, 2020b) • Contribute to *customers'* sense of the company's mission, has a *positive effect on firm-customer relationship* (Hsieh and Hsieh, 2015) ***Empowerment*** • *Empowering customers* during CI to act on data will lead to opportunities to solve the firm's product problems (Zhang and Xiao, 2020b)	***Satisfaction*** • Increase *customer satisfaction* with the new product and boost its commercial success (Zhang and Xiao, 2020b) ***Product perception*** • Signal the novelty or differentiating feature of a new product and thereby influence customers' *perception of its innovativeness* (Pee, 2016) • Enhances *customers' understanding* of new services (Hsieh and Hsieh, 2015, Stendahl, 2009)

Relational market-based capabilities	
Customer education	***Customizing capability***
• Has a positive effect on *customer education* about new service concepts (Hsieh and Hsieh, 2015, Stendahl, 2009)	• Interaction with customers facilitates the company's *capability to customize* products (Hsieh and Hsieh, 2015) • Enables firms to modify and transform the concepts of the new product offerings to meet customer needs (Storey and Larbig, 2018)* empirically tested
Moderating mechanisms	
Firm internal	
Culture	***Knowledge-based capabilities***
• Organizational culture (Tseng and Chiang, 2016) • Top management support (Yang and Zhang, 2018)	• Relational information processing capability (Saldanha et al., 2017) • Analytical information processing capability (Saldanha et al., 2017)

Knowledge-based assets • Resource slack (Storey and Larbig, 2018) ***Relational asset*** • Perceived value of the product in the eye of customer (Tseng and Chiang, 2016) • Product innovation novelty for customers (Li et al., 2019) ***Other*** • Company size (Mitrega et al., 2020)	• IT implementation (Zhang and Yang, 2016, Feng et al., 2012) • Communication quality (Tseng and Chiang, 2016) ***Innovation-related capabilities*** • Radical product innovation capacity (Menguc et al., 2014) • Product innovation novelty for the firm (Li et al., 2019) ns (Stendahl, 2009) • Incremental product innovation capacity (Menguc et al., 2014) • Technological capability (Cui and Wu, 2016) • Stage of the process development (Carbonell et al., 2009)
Firm external	
External environment • Environmental turbulence (Morgan et al., 2019)	• Demand uncertainty (Zhao et al., 2018)

• Technological uncertainty (Zhao et al., 2018)	• Customer need tacitness (Zhang and Xiao, 2020b) • Customer need diversity (Zhang and Xiao, 2020b)

Source: own compilation

As Table 7 highlights, CI has a direct influence on a company's knowledge assets. CI increases the value of the firm's knowledge assets by increasing the quality of ideas, providing constructive insights, and improving the accuracy of customer needs' understanding (e.g., Morgan et al., 2019). CI also improves rarity of the firms' knowledge resources, as it can be seen as a unique type of managerial resource (Zhao et al., 2018). Further, inimitability is enhanced by CI being seen as a distinctive resource that can lead to competitive advantage (Menguc et al., 2014). CI is non-substitutable, as it brings in new perspectives, that are different from those of NPD employees, and draws attention to the problems exist in the new products which would have been overlooked (Yang and Zhang, 2018).

In addition to the well-known VRIN criteria, CI contributes to reducing the tacitness of knowledge by revealing the latent customer needs (Gustafsson et al., 2012). CI increases diversity of the firm's knowledge, as it is assumed to be the source of new and diverse information that would facilitate the development of highly innovative products (Carbonell et al., 2012). CI directly supposed to enhance the timeliness of the firm's knowledge assets by providing quick, first-hand feedbacks (Yang and Zhang, 2018, Morgan et al., 2019), and the sharedness of knowledge between the firm and the customer, which contributes to a shared understanding (Zhao et al., 2018).

CI has strong impact on knowledge capabilities. As Table 7 shows, CI increases the efficiency while reduces time, uncertainty and cost of data gathering (e.g., Morgan et al., 2019). CI facilitates knowledge updating and sharing within the firm (e.g., Melton and Hartline, 2015). Studies highlight the role knowledge integration, but also draw attention to two conflicting mechanisms. On the bright

side, insights gained through CI enhance the structuring of extant knowledge by endowing sporadic prior knowledge with relevant meaning (Storey and Larbig, 2018). On the dark side, however, integration of CI with the knowledge base of the firm may result into overload and the need to compromise between conflicting knowledge (e.g., Storey and Larbig, 2018). Frequent meetings enable learning process about customers, and usage of resulting knowledge facilitates the creation of new products that meet customer expectations (Menguc et al., 2014). Too frequent meetings with the customers, however may reduce the chance of knowledge gained from CI being utilized (Cui and Wu, 2017).

As Table 7 shows, the effects of CI on innovation performance through mechanisms embedded in relational resources have received less attention. Previous research suggests that CI increases market-based relational assets, specifically, how customers relate to the company in terms of engagement, satisfaction, product perception, and empowerment during CI. Relational market-based capabilities are also influenced by CI, specifically, interaction with customers facilitate firms capability to customize their products and educate their customers (Hsieh and Hsieh, 2015, Stendahl, 2009).

2.3.4 State-of-the art description of the Hungarian literature

In the analysis, I was able to create three categories of the researches as described earlier. These are summarised in detail below. The first group comprises materials dealing generally with the nature and concept of innovation and its organisational and managerial aspects. The second group focuses on knowledge management and the effective use of knowledge for innovation. The third group explores the nature and relationship between product development and innovation in different approaches.

Understanding the concept of innovation and related areas

The term innovation covers a wide range of concepts, from the skin-friendly angle of a razor blade to the discovery of the internet or the mapping of the human genome. There are therefore a myriad of approaches to defining innovation in the business and academic literature (Fejes, 2015). The chronological classification of innovation concepts used by Fejes (2015) provides us with an excellent overview and has therefore been included in the review of domestic research.

8. Table Innovation concepts

Author	**Year**	**Definition**
Schumpeter, J. A:	1934	Innovation is a new combination of production factors.
Mintzberg, H.	1983	Innovation means breaking away from the patterns that have been established so far.
OECD	2000	Innovation is the set of scientific, technical, commercial and financial activities necessary for the development and marketing of new products, the exploitation of new production processes or equipment, or the introduction of a new approach to a social service.
Drucker, P.	2003	Innovation is a purposeful, concentrated effort to change the economic or social potential of an enterprise.

Csath, M.	2004	Innovation is creativity in action.
Chikán, A.	2008	Innovation is satisfying consumers' needs at a new, higher level of quality.
Weiss, D. – Legrand, C.	2011	Innovation is applied creativity that creates business value.
More, R.	2011	Innovation is a process of change that creates and increases wealth.
Kornai, J.	2011	Innovation and dynamism are not random phenomena; on the contrary, they are deeply rooted systemic features of capitalism.
Boda, Gy.	2012	Innovation is the change/alteration that increases the efficiency of the available production.factors.
Hámori, B. – Szabó, K.	2012	Innovation is defined as a new combination of production factors, embodied in the production of new products, new technological processes, new marketing methods and organisational arrangements.

Source: Fejes 2018

For companies, having a competitive advantage is essential for market performance. Creating and realising competitive advantages in innovation is the

basis for achieving and maintaining a successful market position. In this respect, innovation is not an ad hoc, one-time extra for businesses, but a complex, ongoing and integrative task to ensure competitiveness at all times (Piskóti, 2016). The relationship between innovation and corporate performance can be attributed to several factors. On the one hand, the number of innovations observed is related to corporate capabilities, on the basis of which financial performance can be a good forecast for service companies (Berezvai et al., 2019). In addition, a number of tools are available to quantify innovation performance, such as market-based (market share, customer satisfaction), financial success (profit, profit rate) and technical performance indicators (technical specifications, competitive advantage rate) metrics (Keszey 2008).

Defining the role of marketing in innovation is one of the pillars of my research. Nowadays, more than ever, marketing can only fulfil its fundamental task of supporting the business success of enterprises and the achievement of their goals if it also focuses on innovation activity, if it acts as "innovation marketing", i.e. it helps to develop the competitive advantages of the enterprise in terms of innovation and to implement them on the market. The task of marketing is to ensure the competitiveness and market success of enterprises, which is increasingly based on innovation. The current 3rd generation theoretical approach, which represents an integral link between innovation and marketing, and the practice aimed at ensuring the competitiveness and market success of innovation performance can be considered an era of marketing-driven innovation, where marketing itself becomes innovative and innovation-driven (Piskóti, 2016). In addition, in companies, marketing is typically responsible for collecting and processing the needs of customers (Keszey 2008). Marketing innovation capabilities can also increase the general competitiveness of companies (Berezvai et al., 2019).

The widespread recognition of the importance of innovation and its positive economic impact has generated a growing demand for information. The experience of analysing innovation data surveys has highlighted the wider context of the field. The need to understand these correlations has emerged primarily from policy makers, but also from those directly involved in innovation activities (Szunyogh, 2010).

Fejes (2015) brings the reader closer to the issues of innovation and innovation management. The paper begins by discussing the topic of innovation from business theory basics, and then moves on to specific strategic considerations. It draws on a wide range of national and international literature to explore the roots of innovation in business theory. The article examines innovation from the perspective of corporate value creation. It concludes that innovation integrates the tenets of numerous business theories, resulting in a wide spectrum of strategic implications. As innovation induces change in the organisation, complex optimisation dilemmas emerge, which are increasingly challenging for managers, given the turbulent economic environment and shortening response times. He stresses that innovation is closely linked to marketing, as it cross-functionally adopts the spirit of consumer orientation. For this reason, innovation is an integrative, cross-functional business activity that combines knowledge, change and project orientation in order to increase the competitiveness of the company. A holistic and systemic approach to innovation is an essential managerial approach (Fejes, 2015). Among other things, this article presents these assumptions and dilemmas with a discussion-oriented attitude and a synthesis of theory and practice.

In their research, Gelei and Kenesei (2017) explain that there is a long tradition of research on the innovation performance of Hungarian companies, but the results of their research suggest that we are still significantly lagging behind the performance of developed countries. The article is related to company-level innovation research, examining the extent to which the supply chain relationship commitment of domestic companies influences their innovation performance. Their work explores the committed relationships at the supply chain level, focusing on the relationship with the key customer and the key supplier of the core company, rather than using the dyadic approach, as the literature emphasises the role of both partners in innovation. Their work also differs from previous domestic - but also international - research in that they examine innovation performance of companies differentiated along two dimensions and four specific performance elements. They modelled how the previous relationship (committed supply chain level linkages → innovation performance) is moderated by the internationalisation of the core firm. They pointed out that both the strengthening of dedicated supply chain links and internationalisation can be an important source of innovation performance gains for

the domestic business community. According to their empirical studies, different innovation performance elements behave differently. It is not sufficient to look at innovation as a single phenomenon; a deeper understanding can only be obtained by capturing and analysing innovation performance in a complex way.

Szunyogh (2010) describes the methodology used to measure innovation in the EU Member States and how it has changed over the past 20 years. She describes the characteristics of the CIS (Community Innovation Survey), the set of questions used to compare the innovation performance of countries, which are compulsory for all EU Member States under an EC Regulation in force since 2004. The article also provides a brief overview of the innovation surveys carried out in Hungary. It also highlights the achievements of innovation statistics so far and goes into more detail on the shortcomings identified as the most important ones, as well as outlining areas for improvement.

Piskóti (2016) explores the supportive environment for competitive advantage in innovation. Business marketing, as a typical field of applied marketing science, has undergone remarkable professional and theoretical development in recent decades. The paper, in search of a scientific identity, outlines the main stages in the history of industrial, business marketing, its disciplinary foundations, the dominant theoretical approaches and current research issues and trends. The second part of the paper examines one of the key research questions - innovation orientation. According to Piskóti, the current 3rd generation theoretical approach that is increasingly appreciated and represents an integral link between innovation and marketing, and the practice aimed at ensuring the competitiveness and market success of innovation performance can be considered an era of marketing-driven innovation, where marketing itself becomes innovative and innovation-driven. Five of the results of his researches, supported by several years of empirical studies, highlighted five findings and items explaining the functioning of the evolving management model: 1. Domestic corporate practice of a desirable, effective innovation portfolio is typically one-sided, with a lack of conscious integration of organisational and marketing innovations. 2. Corporate strategic innovation market research and innovation controlling analyses that provide a basis for innovation activities and consciously assess their impact are indispensable success factors.

However, both in terms of their intensity and methodology, they represent a weak point in the marketing of domestic enterprises. 3. The effectiveness and success of enterprises' innovations are determined by the strategic competences, resources, process and product advantages, their coherence and integration. In the sample of Hungarian enterprises examined, the product factors and advantages show the strongest correlation with success, while the direct correlation of the two previous sets of factors is weaker and is realised mainly through product characteristics. 4. There is a growing trend towards more open innovations based on cooperative, network, cluster cooperation and relationship management (Piskóti, 2016). The theoretical models outlined in the research and the results of the author's own multi-year research programme confirm that the success of businesses in business markets is also determined by 'competitive advantages in innovation', based on a coordinated innovation portfolio, which must be supported by effective marketing capabilities and activities.

The study by Agárdi and Berezvai (2017) examines the impact of digital innovations on the performance of food retailers. The retail sector has been significantly transformed by digitalisation over the past decade, far beyond the emergence of online commerce. Despite this, the number of studies related to digital innovations in retail is low and there are hardly any studies in the literature that empirically analyse the impact of digital innovations on company performance (Agárdi and Berezvai 2017). The authors aim to fill this gap with their work. They have compiled a panel database of digital innovation, business performance and other data from 36 retailers in Europe and North America sampled between 2007 and 2017. The results of their dynamic panel model show that the number of digital innovations implemented by food retailers significantly increases company performance one year after adoption. Digital innovation activity has a linear, positive impact on the financial performance of enterprises, at least in cases where they undertake relatively little digital innovation. However, this effect is only short- and mid-term, and is negligible roughly four years after the innovation is introduced. The research focused exclusively on food retailers, and it was therefore highlighted that future research should also include companies selling other product groups. Due to their different characteristics and related different consumption

patterns, different types of digital innovations may characterise different product groups, with different financial returns.

Knowledge management and efficient use of knowledge for innovation

Knowledge is often seen as a strategic factor by organisations and their managers (Keszey and Katona, 2015). The driving force behind the successful market performance of companies is their ability to innovate, and knowledge management has a significant impact on this innovation capability, with knowledge sharing playing a key catalytic role (Keszey, 2018). Global competition has put the innovative capacity of companies at the centre of attention of both managers and academics. Companied working in the knowledge-based economy need to place a particular emphasis on developing their ability to renew and adapt (Baksa and Báder, 2020).

Today, the conditions for innovation have also changed significantly: new intellectual content is created through joint thinking and cooperation between people with different knowledge (Baksa and Báder, 2020). Knowledge sharing is at the heart of knowledge management processes, as it links the acquisition of knowledge with its exploitation at the organisational level. It also plays a particularly important role in making tacit knowledge actionable. Tacit knowledge can be made available to the organisation primarily through personal interactions and through knowledge sharing (Baksa and Báder, 2020). Market knowledge at the company level thus facilitates the success of innovation, as knowledge of customers' preferences enables businesses to better understand their customers' needs and offer them novel and innovative products, and innovations are more likely to meet customers' expectations (Keszey, 2018).

The research of Baksa and Báder (2020) is based on a network approach to knowledge management, which is particularly useful for the organisational application of consumer knowledge. In their study, they investigated the conditions for knowledge demand and knowledge sharing. In almost all cases, the innovation necessary for effective organisational functioning is generated through joint

thinking and cooperation among organisational members. It is therefore increasingly worth analysing networks of individuals with different skills, knowledge and abilities rather than particularly talented individuals. A knowledge network is defined as a system of interconnections between network actors whose primary purpose is to share the knowledge held by the actors and thereby create new knowledge (Baksa and Báder, 2020). By reviewing the literature on the subject, the authors present the benefits of a network approach to knowledge demand and knowledge sharing, and then describe the organisational factors that influence knowledge demand and knowledge sharing. In their empirical research, they draw on the tools of network analysis to identify the factors that determine to whom members of a knowledge-based organisation turn when they need knowledge. As a result of the research, it was found that in the organisation under study, the trust relationships between colleagues and the perceived professionalism of knowledge holders were the main factors determining from whom a person seeks professional job-related assistance. A limitation of their research is that they examined a single organisation and knowledge within organisations, but their main aim was to focus researchers' attention on the professional issues involved in examining knowledge networks. An important starting point in this respect is that knowledge from outside the organisation - consumer knowledge - is a promising research direction.

According to Keszey's (2018) empirically tested theoretical model, constructed by linking knowledge management and innovation literature, intra-firm marketing knowledge sharing has a direct effect on innovation performance, while there is also an indirect effect through innovation novelty. The author examines market turbulence as one of the environmental contingency variables. The results show that knowledge sharing among marketing managers has a double effect on innovation performance. On the one hand, it showed a direct positive effect and on the other hand, it demonstrated an indirect effect through the novelty of innovation as a mediating variable. The author highlights that changes in the level of market turbulence do not moderate the effects between knowledge sharing and innovation performance. The research approach is presented in detail, including the development and validation of the measurement instrument and the preparation of the data analysis of the sample of 296 Hungarian companies based on a questionnaire survey (to evaluate non-response errors and to analyse bias due to the

use of a common methodology). The data are analysed using covariance-based structural equations modelling using AMOS software. The mediating effect is tested using a bootstrap procedure, while the moderating effect is examined with an interaction approach. According to the author, an important managerial conclusion of the study is that there is a strong positive relationship between marketing managers' knowledge sharing and innovation performance. In his work, he points out that in companies where the marketing manager has a deep understanding of the market, it is worthwhile to promote individual knowledge sharing. According to Keszey, knowledge sharing among marketing managers is an essential ingredient for high innovation performance, regardless of the degree of market turbulence.

Exploring the link between product development and innovation

Product is a broad concept in management literature, encompassing not only physical, tangible products but also services (Keszey, 2018). In addition, there is a rich literature on innovation, including the process of developing a new product from a procurement perspective (Gelei and Jámbor, 2018). Surveys were launched in the 1960s to find out what makes an innovation successful and what are the characteristics of firms that are at the forefront of innovation. Initially, product-level and later firm-level studies dominated (Kiss 2014). Innovation and, in particular the development of new products, is a key driver for firms, as it can lead to increased performance and competitiveness in many ways, and can be a key source of survival and renewal (Bokor, 2003).

Both development engineers and marketing specialists play, or at least may play, a key role in the development of new products (Pataki, 1996). The specific processes of product development can always be mapped as the result of different market imperatives and technological opportunities in the practical work of firms. The notion of novelty, according to the degree and source of novelty of the product/service, can also be approached by taking stock of the basic development orientation. Orientations can be derived from an assessment of two factors: product maturity, i.e. from new product to known product, and the alignment of the product

and the customer, i.e. from the user's directly expressed needs to the transfer of new opportunities offered by the technology (Szakály et al., 2006). In so-called 'market-driven' companies, the main driver for the development of new products is the 'market push'. New product ideas and initiatives are mainly driven by marketers (Pataki, 1996).

The research of Gelei and Jámbor (2018) focuses on innovation, including a specific type of innovation process, the New Product Development (NPD) process, and the organisational solutions of a real process of particular importance for domestic subsidiaries, the activities at the border of procurement. Globalisation is one of the major phenomena of the last decades that have a fundamental impact on corporate competitiveness. In the global economy, complex business networks are forming, and understanding the structure of these networks and the reasons for their emergence is a fundamental task. This issue is also highly important for the Hungarian economy, since it is not indifferent what specific activities are carried out by the subsidiaries of these multinational companies that are relocating to Hungary, and whether the companies relocating here expand their activity range, and if so, how (Gelei and Jámbor, 2018). Along this question, the authors analyse the global structures that these companies are setting up to support the sourcing functions that result from this product development process. In this article they examined a specific stage of procurement process from an organisational aspect, which has to be carried out when developing new producs. By examining two case studies, the main stages of the process were explored and their organisational location in the internal business network of global companies was presented. They then identified the considerations behind specific structural solutions. The emergence of this configuration cannot be directly explained by the theory of comparative advantage, but rather by internal competitiveness considerations, namely efficiency considerations. They are based on the phenomenon of the stickiness of the information sharing process as well as on the need for a given company's organisational unit being close to the key external/internal stakeholders of the process elements it manages.

In his academic work, Kiss (2008) uses an empirical study to investigate the impact of product development practices on the success of new products and firms'

the business performance of companies. The results from a large number of research and publications over many decades provide the basis for knowledge on the factors of successful product development and the measurement of success. In this article, the author uses a sample of domestic firms to examine the impact of product development practices on the success rate of product development and on firms' business performance. First he highlights relevant literature on the subject from abroad used in this study to construct the variables for measuring the quality of product development practices. The results show that mostly the product development activities of large firms, majority foreign-owned firms and chemical firms are that approximate the best practices. The author emphasises that firms that place a priority on proper product development management and introduce new products in their competitive markets are commercially successful. However, when product development performance was measured by the contribution of new products to sales, he no longer found a significant correlation with either product development practices or business performance. Nevertheless, he argues that overall the results point in the direction that it makes sense for companies to prioritise product innovation as it contributes significantly to their competitiveness. According to Kiss, the article can provide managers with guidance on what they should pay more attention to when developing new products.

Bokor (2003) investigates the role of cultural factors in the product development process. In his view, the relevance of the research is that the product development process, although having a major impact on the corporate competitiveness, is also a high-risk process that is difficult to manage using traditional management and control tools. The author believes that the knowledge-intensive nature of the process increases the role of cultural integration. From new product development aspects, corporate culture is both a potentially effective integration mechanism and a barrier that is difficult to break down. He stresses that firms that are able to overcome the structural and cultural conflicts arising from organisational segmentation through cultural integration can gain a sustainable competitive advantage. Obviously, it is not possible to solve the problem by eliminating subcultures, as this would remove the basis of a firm's competitiveness. By the way, eliminating subcultures itself might be a "mission impossible" for a company because of strong cultural conflicts involved in such a change. A common

framework is needed that can integrate different corporate subcultures in such a way that their members can participate in product development projects as collaborative, open partners. Bokor believes it is worth looking at how and through what processes it is done in a domestic company. Bokor sought to find out what factors influence this integration mechanism in a positive or negative direction and what factors determine the ability of a company's employees to escape a potentially threatening cultural trap. The main findings of the research are set out below: to identify the subcultures involved in product development and their characteristics; to grasp the dimensions that distinguish subcultures and significantly influence their functioning, and to understand their impact; to describe and compare conflicts in the product development process and develop a novel conflict typology; to identify the characteristics of the development process that most influence the emergence and resolution of conflicts; to explore how organisational culture influences the emergence and management of conflict and, as a result, the success of product development that is of strategic importance to the organisation(Bokor, 2003).

In their research, Keszey and Katona (2018) investigated the impact of two organisational units working together on the success of product development. They state that there is a large body of literature that had previously addressed the impact of sales and marketing department collaboration on product development success. In addition, recent research has pointed to the increasing strategic role of sales in the practices of organizations, which implies a diminishing power of marketing organizations. This change in strategic role in practice means that sales as an organisation unit has traditionally had marketing functions. In this research, they also examine whether there is a positive relationship between the success of product development and the power of marketing within the organization, and how the power of marketing influences the role of sales in marketing functions. Powerful functional organisations have greater authority and can control and influence the work of employees even in other departments. The authors' assumption is that this power can also have an impact on performance in relation to the organisations. They conducted empirical research on a 296-person-sample selected from domestic firms, concluding that for a strong marketing organisation, only internal success is likely, because external, i.e. market success requires the involvement of other factors or knowledge and is less determined by the role of whether salespeople are

involved in marketing tasks. Therefore, with a strong marketing department, sales contribute very little to the innovation success of companies. Consequently, if the power of the marketing organisation is weaker, then sales is an excellent complement, filling in and making up for the missing tasks and contributing to the innovative success of the product, both internally and externally (Keszey and Katona, 2015).

Pataki's (1996) study deals with the development of new products, an important area of cooperation between business and technical experts. It shows the clearly unfavourable experience of companies in developed market economies with product development where either the development engineers or the marketers unilaterally impose their own ideas on the other party. He outlines the successful practice of 'dual-drive' product development, which is equally open to the initiatives of both marketers and development engineers, and which the author argues is particularly appropriate for use in our country. According to Pataki, this type of product development is an attractive option, but its successful introduction requires great care. He draws attention to two of the many contexts that need to be borne in mind. The first is the composition of the team. Conflicts can arise between the groups in the same way as between the technical and marketing departments. If representatives of the different technical areas are not working as equal partners and are not present in the product development team from the start, it is easy to end up with unmanufacturable, irreparable designs. The second important factor is the professional application of teamwork and project management rules and methods. According to the researcher, where these working methods are not yet known or are poorly and incorrectly used, thorough practical training should precede any attempt to introduce dual drive. Without this, dual drive cannot be implemented.

Kovács (2020) takes a more distant view of the relationship between customer value and corporate pricing. In his view, the experimental approach represented by behavioural economics has become increasingly prominent in the field of price research over the past decade, one manifestation of which is the use of experimental auction methods to identify and measure consumer value and willingness to pay. This approach allows a more accurate and complete representation of consumer preferences than methods based on willingness to pay.

However, it believes that the discussion of auction methodology in this area in the domestic literature is still very limited, particularly with regard to the assessment of its practical applications. The author attempts to illustrate the relationship between customer value and corporate pricing by presenting the different models of corporate value, their interrelationships and starting from the concept of customer value. It situates and explains in detail the methodological advantages and limitations of experimental auctioning methods within price discovery methods, describing the most important auctioning mechanisms.

Using primary data, Kovács (2020) employs the Vickrey auction mechanism to illustrate and analyse how the experimental auction methodology can be used to measure willingness to pay and to identify and quantify the consumer surplus value generated by the development of a particular product. Furthermore, the study demonstrates how, using the observations used as a sample, a statistical and analytical toolkit can be applied to interpret the results and draw conclusions that can be implied in practice for the entire study population. The possibilities and limitations of estimating potential revenue gains from product development are specifically discussed. In line with the aim of the study, the value change resulting from product development is examined from the consumer side, therefore it deals with the theoretical models and measurement possibilities of consumer value. The author concludes that the measurement and estimation of the magnitude of the value change resulting from product development can be a key element in the pricing policy and price setting of businesses. Despite the differences in approach, there are a number of links and co-movements between the most commonly used concepts of corporate value, namely owner value, stakeholder value and consumer value. It is considered that one potential way of approaching the value added by product development is to measure consumer value and its change, for which the the pilot auction methodology is an effective tool.

In their research, Szakály et al. (2006) elaborate that the increasingly rapid change and differentiation of consumption patterns requires companies to adopt a renewed approach to production and product development. Nowadays, in addition to new, original (OEM) products, more and more people are looking for cheaper, more easily available refurbished products and parts, as well as those manufactured

on the secondary market (AM - After Market). This trend is particularly evident in the domestic appliance, heavy machinery and automotive sectors. Based on the experience of a PILOT project, the authors present the specific requirements that need to be addressed for the success of an AM development and suggest ways to develop a supporting toolbox. Table 9 shows an overview of the Hungarian literature.

9. Table Overview of Hungarian literature review

Understanding the concept of innovation and related areas
• The term innovation covers a wide range of concepts, from the skin-friendly angle of a razor blade to the discovery of the internet or the mapping of the human genome. There are therefore a myriad of approaches to defining innovation in the business and academic literature (Fejes, 2015). • For companies, having a competitive advantage is essential for market performance. Creating and realising competitive advantages in innovation is the basis for achieving and maintaining a successful market position. In this respect, innovation is not an ad hoc, one-time extra for businesses, but a complex, ongoing and integrative task to ensure competitiveness at all times (Piskóti, 2016). • The relationship between innovation and corporate performance can be attributed to several factors. On the one hand, the number of innovations observed is related to corporate capabilities, on the basis of which financial performance can be a good forecast for service companies (Berezvai et al., 2019).

- In addition, a number of tools are available to quantify innovation performance, such as market-based (market share, customer satisfaction), financial success (profit, profit rate) and technical performance indicators (technical specifications, competitive advantage rate) metrics (Keszey, 2018).

Knowledge management and efficient use of knowledge for innovation

- Knowledge is often seen as a strategic factor by organisations and their managers (Keszey and Katona, 2015).

- The driving force behind the successful market performance of companies is their ability to innovate, and knowledge management has a significant impact on this innovation capability, with knowledge sharing playing a key catalytic role (Keszey, 2018).

- Global competition has put the innovative capacity of companies at the centre of attention of both managers and academics. Companied working in the knowledge-based economy need to place a particular emphasis on developing their ability to renew and adapt (Baksa and Báder, 2020).

Exploring the link between product development and innovation

- Product is a broad concept in management literature, encompassing not only physical, tangible products but also services (Keszey, 2018).

- In addition, there is a rich literature on innovation, including the process of developing a new product from a procurement perspective (Gelei and Jámbor, 2018).

- Surveys were launched in the 1960s to find out what makes an innovation successful and what are the characteristics of firms that are at the forefront of innovation. Initially, product-level and later firm-level studies dominated (Kiss 2014).

- Innovation and, in particular the development of new products, is a key driver for firms, as it can lead to increased performance and competitiveness in many ways, and can be a key source of survival and renewal (Bokor, 2003).

Source: own compilation

2.4 DIRECTIONS FOR FUTURE RESEARCH BASED ON THE SYSTEMATIC LITERATURE REVIEW

As one of its main contributions, this study set out to scrutinize prior studies to understand future research needs. Thus, here I propose a research agenda to guide future research efforts.

2.4.1 Future research regarding methodological considerations

To better understand the relationship between CI and its subsequent innovation outcomes, rigorous empirical research efforts are needed. Based on my literature review, I suggest an updated amended definition for CI. There is a large variance in the extent, to which items used in the articles cover these aspects, and I can conclude that there is no widely accepted scale for measuring the phenomenon. This is surprising, regarding the efforts that have been made to standardize measurement scales of CI-related concepts and a limitation that should be addressed by future research to promote the comparability of empirical findings.

As a result of my systematic literature search, three distinct innovation outcomes (NPD process, financial results, NP perception) emerge. Nevertheless, numerous studies combine these, for example, the measurement for detecting innovation outcomes contain items that refer to financial performance and NP perception within the same scale. Future research should be more rigorous in this respect, as it reduces the accuracy and comparability of the measurements. Studies suggest that CI affect various innovation outcomes differently (Keszey and Biemans, 2016) and has an impact on financial innovation performance through innovation process and innovation perception (Feng and Wang, 2013, Zhang and Yang, 2016). If the measurement does not allow the separation of the distinct aspects of innovation outcomes it is difficult to pinpoint the mechanisms of how CI influences innovation outcomes.

Relevant studies are typically based on data from one respondent per firm. In order to increase the validity of the results, two important methodological

approaches are outlined. One is multiple within-firm respondent, or dyadic (firm and customer side) survey approach. The other is that perception-based measurements should be combined with objective metrics; which I also see some examples in the literature; for example, the number of patents as a proxy for the intensity of innovation, or the number of sold products (Pee, 2016, Saldanha et al., 2017).

2.4.2 Future research regarding the effect of CI on innovation outcomes

The systematic review of prior research has revealed contradictory findings, which should be addressed by future research. One controversial area is CI's role in developing radically new products. While much research sheds light on the beneficial innovation effects of CI, the picture is much darker for radical innovations. Number of research warn against CI because as it diminishes the chances to innovation success with radical innovations (Menguc et al., 2014, Gustafsson et al., 2012), and point out that involving customers as innovators does not have an impact on innovation outcomes (Cui and Wu, 2016). Assuming that companies seek for external information in order to obtain insights that are not available within the firm, it is surprising that the impact of customer involvement on radical innovations is at least controversial, hence more evidence is needed to understand impact of CI on radical innovation outcomes. For instance, future studies could examine to what extent is participation in radical innovation different from the point of view of customers. Research shows that participating in radical innovations makes consumers curious and thus motivated (Li et al., 2019); but the question is whether they understand the, but the question is whether they will be able to think out of the box as a result of motivation. What specific resources does customer involvement in radical innovations require from companies? To what extent do these resources extinguish each other? For example, it is possible that by educating customers about the product features of the radically new innovations, the two parties will understand each other better, but their thinking will also converge, hence the insights from customers will become less diverse what is already known by the firm.

As my systematic literature review reveal, variety of underlying mechanisms come to the surface in theoretical reasoning, however, very few studies actually measure these effects. The impact CI has on innovation through knowledge-based assets is particularly poorly understood, that future research should address. For example, to what extent the VRIN criterion (Barney, 1991) influences CI's innovation outcome. The underlying mechanisms related to knowledge-based capabilities also requires further investigation. Of these capabilities, integration has received the most academic attention, yet, even in this domain, more empirical evidence is needed. For instance, future studies could further explore the interplay between CI and knowledge integration. Research shows that CI has a U-shaped effect on knowledge assimilation (Storey and Larbig, 2018), therefore, it is important to shed more light on the boundary conditions under which knowledge from CI can actually be incorporated by companies and understand the underlying mechanism that prevents companies to expect that the more customer knowledge they gain, the more insights they can incorporate.

Prior research has examined CI and innovation outcomes at the level of companies and innovation projects, while very little is known about the behaviors and interactions of the individual, managerial-level actors that underpin and serve as the micro foundations of the phenomena. Future research for example, could uncover the role of managers' heuristics - as one micro-foundational level driver - in how external knowledge from CI is being elaborated. Managerial heuristics is surprisingly widespread, and, counter-intuitively, rule of thumb heuristic-based decision making frequently outweighs decisions based on data and insights (Persson and Ryals, 2014). In the relationship of CI and innovation, to best of my knowledge, phenomenon of heuristics has not been previously studied, although an important consideration is how the effectiveness and role of CI are influenced by individual-level factors.

The literature review highlights that the use of CI is environmental contingency dependent. Yet, relatively little is known about the roles of environmental contingencies and other moderating variables. Knowledge based heterogeneity and tacitness influence the mode and extent to which firms involve customers to contribute to NPD (Cui and Wu, 2016), but the understanding of how

competitive pressure or turbulence in the marketplace, even in connection with the covid-19 situation alters the degree to which firms can benfit from CI.

2.4.3 Future research regarding the digitally enabled environment

Digitalization significantly transforms CI. Virtual reality — a simulated environment that allows the customer to interact with the (physical) new product — will be on of the high impact technologies (Harz et al., 2021). Introducing a new product to the market is an important but risky endeavor. Involving customers can help mitigate risks, but the effectiveness of CI may depend on customers' prior experiences. Evidence shows that that extensive experiences can be created and assessed in virtual reality (Hershfield et al., 2011), hence firms may get customer insights by means of CI earlier and of higher consistency in the innovation process relying on virtual reality.

The study of the role of virtual reality in NPD is still in its infancy, so a number of promising further research directions in this field are outlined. For example, to what extent does the involvement of virtual reality change the knowledge generated by customers? Do they always provide more accurate, better quality, more usable knowledge? Is it possible that the physical presentation of the product by means of virtual reality may have a limiting effect on the value of external knowledge from CI in the early stages of product development? What specialized knowledge skills do companies need to be able to absorb external knowledge gained through a virtual reality-mediated platform?

Big data also opens up a number of research directions in relation to CI and innovation. Customers participate in a co-creation process where they acquire, analyze and act on big data (Zhang and Xiao, 2020a). Data-rich environment provides unique and unprecedent opportunities for innovation, yet, the concept of customer involvement in big data analytics is new and underexplored. It is a question, for example, at which stage of product development to involve customers in the analysis and interpretation of big data, what customers should companies involve, and how much autonomy should be given to customers in data analysis.

Besides the scope of collaboration, big data can also have an impact on how companies use external knowledge gained from CI to innovate. Regarding knowledge capability-related underlying mechanism, future research should for example explore what processes and firm capabilities are needed for firms being able to integrate big data with external knowledge from CI, how the use of external knowledge in innovation is influenced by big data. Big data is often characterized as high-volume, high-velocity and high-variety (Solazzo et al., 2021). As my findins reveal, some of the characteristics of external knowledge acquired through CI are related to those of big data, such as CI providing timely (high-velocity) and diverse (high-variety) insights. A very important question is how these characteristics of big data interfere with similar properties of CI.

2.5 CONCLUSIONS DRAWN FROM THE SYSTEMATIC LITERATURE REVIEW

2.5.1 Conclusions

This study set out to review the current state of the art in the literature examining the impact of CI on innovation. The study contributes to the extant literature by:

1) defining and conceptually distincting CI from other related concepts,

2) providing an overview of measurement of innovation outcomes,

3) identifying and theorizing the underlying mechanisms how CI exerts its effect on innovation,

4) proposing a research agenda to direct future research efforts.

To address the call for clarity and consistency in the usage, definition and measurement of concepts in CI literature, I resolve definitional ambiguities and suggest an improved definition to be utilized in further research. my updated definition has four main definitional elements, bidirectional collaboration, with customers, to cultivate customer knowledge for improved innovation outcomes. With the help of the four definitional elements, CI can be well distinguished from the related concepts, such as value co-creation or crowdsourcing. As my review reveals, there is no uniform scale available to capture CI. It is beyond the scope of my research to develop a unified measurement tool, but my study may serve as a basis for such developments. In my research, I also reviewed the measurement of innovation outcomes and found that three innovation related outcomes – innovation process, financial results and new product perception - are outlined, which are affected by CI.

Despite academic interest in the broader topic of CI, research on these mechanisms has so far been largely sporadic, and there has been a lack of a theoretical unification that integrates these mechanisms into a system. my research injects a theoretical perspective into this growing body of literature. In particular,

theoretically anchored in the Knowledge Based View (Grant, 1996) and Relational View (Srivastava et al., 1998), I delineate and present the main routes of underlying mechanisms organized around knowledge-based and relational assets and capabilities. This synthesis culminating into a meta-framework of underlying mechanism reconciles prior research and moves the field forward by contributing to the answer for the question that has remained open so far: how CI affects innovation.

As a managerial implication of the research, in my view, literature research prior to my empirical research can help managers to think about the outcome of product development in a more strategic way. Specifically, as my results have highlighted, in addition to financial success (which is measured using different hard metrics straightforward), other metrics are worth considering. However, customer involvement, as both the domestic and international literature on the subject points out, does not clearly lead to successful product development results. Such a measure is the novelty content of product development and the fact that with the help of co-creation the process of product development can also change in a positive direction. These aspects should be considered by managers alike when involving customers.

I identify gaps and propose a research agenda to direct future research efforts. I provide multiple suggestions for future research, encouraging studies to utilize multi-measurement research settings, to devote more attention to mediators and moderators and to focus on micro-processes of CI. Moreover, I set out a research agenda for CI in a digitally enabled business environment.

2.5.2 Limitations

This systematic literature review, like every study, has limitations that should be noted. My study was limited by its primary focus on the new product and service development aspect of innovation; thus, I did not cover studies that investigate the effect of CI on process innovation (e.g., the adoption of a new production procedure or information technology system). Neither did I cover the

antecedents of CI. In addition, I concentrated on studies, that quantifies the impact of CI on innovation, thus excluding exploratory research.

Nevertheless, the narrow scope of this study enabled me to provide a detailed discussion of the concept of customer involvement, an in-depth analysis of underlying processes and innovation related outcomes, and a broad set of recommendations for future research.

3 EMPIRICAL RESEARCH

In this section, I present my plan for the empirical research. First, I present the conceptual framework, research questions and research hypotheses. This is followed by the methodology section that outlines the data gathering, presents the sample and provides an overview of the measures used for capturing the concepts. Then the results are presented, which is followed by the discussion and contributions, and directions for future research.

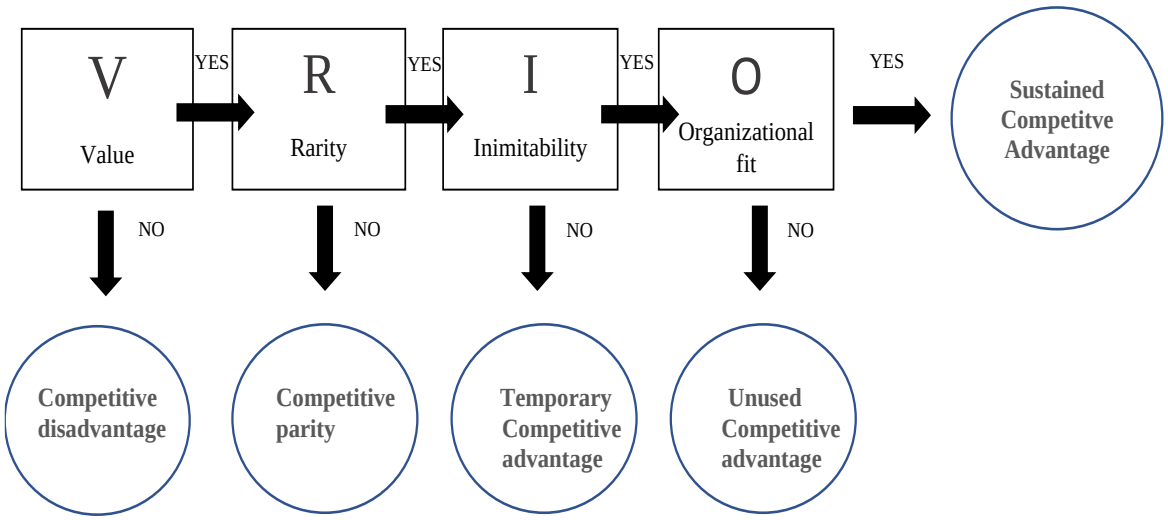
3.1 CONCEPTUAL FRAMEWORK, RESEARCH QUESTIONS AND HYPOTHESES

The aim of this research is to better understand how and when CI leads to innovation outcomes. As the systematic literature review reveals, although the link between CI and innovation is well established, less is known about the boundary conditions of this link.

Moreover, as I demonstrated in the systematic review of the prior literature, the previously investigated moderator variables are to large extant sporadic in the prior papers and are not organized around a well-established theoretical ground.

Against these backdrops, I aim to investigate the boundary conditions that may alter the effect of CI on innovation. The theoretical lens I am opting for choosing the moderator variables is the Resource Based View of the firm, specifically the VRIO framework, which includes four conditions, Value, Rarity, Inimitability, Organizational fit for assessing whether a resource, in my case the knowledge from CI, has the potential to generate sustainable competitive advantage, in my study, innovation outcomes (Kozlenkova et al., 2014, Barney, 1991). I amend this framework with another characteristics of strategic importance, Sharedness – a concept that I highlight while presenting the hypotheses.

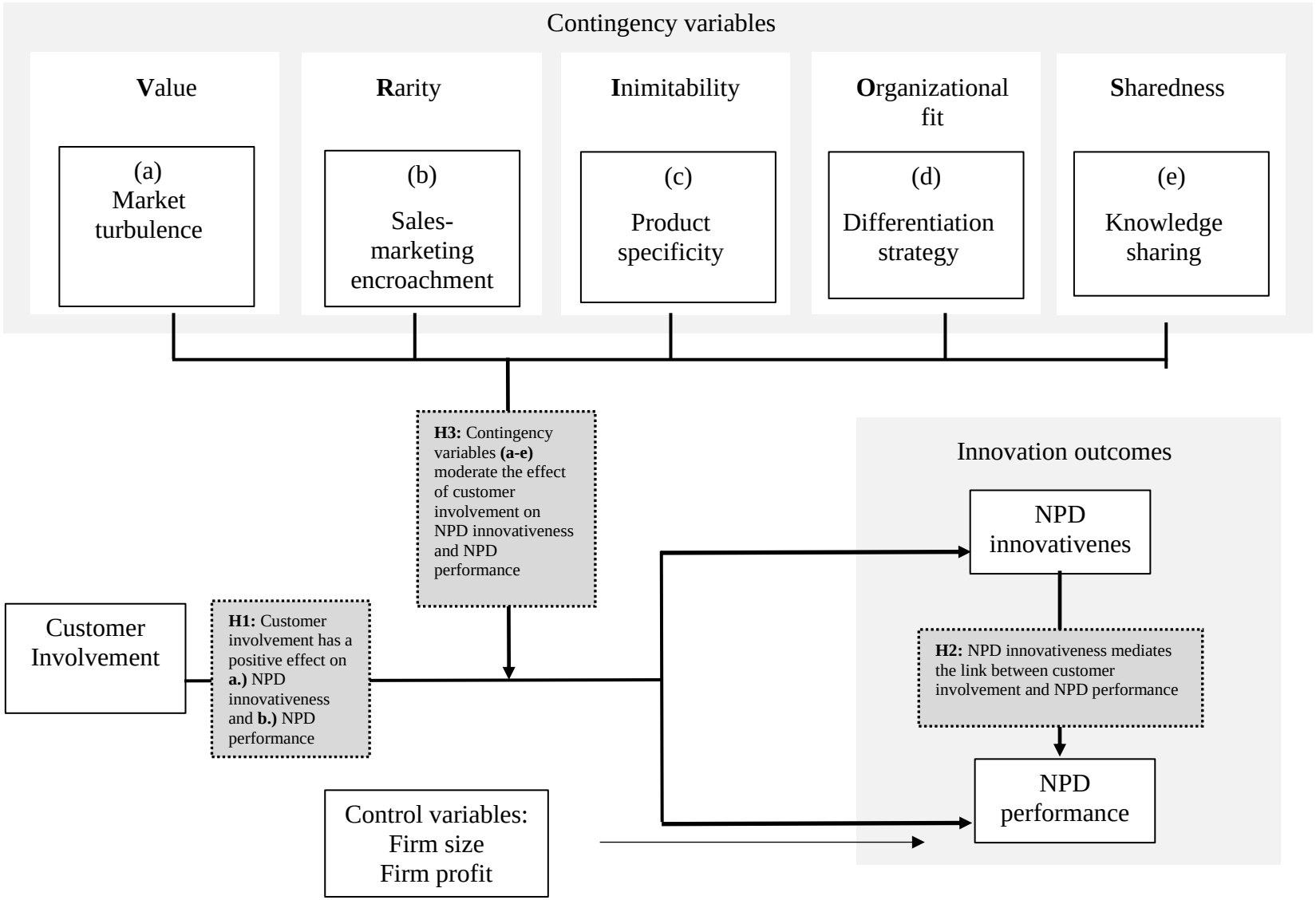
4. Figure VRIO framework



Source: Based on Barney, 1991, Barney, 1995, Kozlenkova et al., 2014 own compilation

This proposition, and my conceptual framework (Figure 5) rely on the preliminary assumption that CI contributes unique resource to the firm, external customer knowledge from the customers directly (Gustafsson et al., 2012, Prahalad and Ramaswamy, 2004). Based on the RBV, as a theoretical lens, I posit, that the extent to which external knowledge gained by CI contributes to innovation outcomes depends on its value, rarity, inimitability and organizational fit (see the VRIO framework (Barney, 1995, Barney, 1991)). Following the approach of Bommaraju et al. (2019), I do not measure the elements of the VRIO framework directly, instead use proxy variables to capture the four aspects of the VRIO. These variables, and their relationship and representation of the VRIO framework is explained in a detailed manner in the following sections about the hypotheses. Figure 5 posits my conceptual framework of the study.

5. Figure Conceptual framework of the study



3.1.1 Direct and mediating hypotheses

As my systematic literature review reveal, an overwhelming body of evidence suggests that CI has an impact on the novelty of innovation. For example, Carbonell et al. (2012) empirically confirms that involving lead users increase the novelty of the new product. In a similar vein, Pee (2016) finds that co-creating design ideas and design decisions with the customers increase new product performance in terms of the level of perceived innovativeness. Tseng and Chiang (2016) highlight that the relationship between customer co-creation and novelty of product performance is positive. The underlying logics behind this empirically well tested hypotheses is organized around the logics that incorporating the voice of the customer is of core importance to NPD success (Mahr et al., 2014). CI is one prominent way to incorporate the voice of the customers, that helps firms explore latent customer needs (Blocker et al., 2011). Studies of CI in innovation posit that it produces new products that are more creative, valued by customers, because the product incorporates external knowledge that is not available within the boundaries of the firm (Gustafsson et al., 2012).

H1a: CI has a positive effect on NPD innovativeness

According to my second hypotheses, NPD innovativeness contributes to NPD financial performance. This again is a well-established link in the literature, as a number of prior papers have confirmed that novelty of NPD is a driver of NPD financial outcome. The underlying logics is that customers are more willing to pay price premium for novel products compared to me-too products, or for offerings that bring incremental innovations (Gustafsson et al., 2012). Moreover, overwhelming evidence suggest, that the effect of CI on innovation outcomes may be mediated by the novelty of innovation. For instance, Anning-Dorson (2018) investigates the effect that customer involvement has on service firm performance in two economic contexts, Ghana and the United Kingdom. He finds that customer involvement has a positive effect on product innovation in both economies and

finds that product innovativeness mediates the relationship between customer involvement and firm performance. Another study by Feng and Wang (2013) points out that CI enhance financial performance of the new product indirectly, through NPD cost and speed, on which involvement has a direct positive effect. The underlying logic is that customers can contribute to product development primarily through the sharing of their own needs and desires, which more directly affects the novelty of the product than financial success, which also depends on many factors, such as the company's resources (Mitrega et al., 2020). Consequently, I also assume that the effect of CI on financial performance is mediated by the novelty of innovation.

H1b: CI has a positive effect on NPD performance

H2b: NPD innovativeness mediates the link between customer involvement and NPD performance

3.1.2 Moderating hypotheses

Hypotheses about the moderation mechanisms related to the VRIO (Value, Rarity, Inimitability and Organizational fit) framework are formulated in relation to the well-established link between CI and the novelty of innovation. I use proxy variables to capture the degree to which CI meets the VRIO criteria. Specifically, we, for example, do not measure the extent to which CI is perceived to be valuable by the firm, instead, I posit that market turbulence is a variable that serves as a proxy for capturing the value of a firm-level resource. The following section presents the moderating hypotheses according to the acronyms of the VRIO framework.

3.1.2.1 Value

As Barney (1991) puts forward, a firm capitalizes a resource (considers it to be valuable) if the specific resource helps the firm "exploit opportunities or neutralize threats in [its] environment." In line with this definition, I consider the CI resources available to the firm to be valuable in the degree to which the opportunities or threats inherent in the focus firm's environment that CI can help with. Given that insights can be gained by means of CI are mainly related to demand-side (i.e., customer) of the activities of the firm, I posit that the degree of market turbulence influence, and to large extant, determine the value of CI as a resource, thus it moderates the degree to which CI positively influences the novelty of innovation.

This study — following the seminal work of Jaworski and Kohli (1993) — conceptualizes market turbulence as the rate of change in the composition of customers and their preferences. Market turbulence induce that customers are unpredictable, their needs change quickly and hectically, and serving customers is like shooting at a constantly changing target. Due to these constantly changing needs, it is difficult to fully serve the needs of the customers and the understanding of the customers requires continuous adjustment by the firms. In order to offer the updated, adjusted value propositions to customers, firms need to be in touch with customers. CI ensures this keeping in touch, getting quick and timely first-hand customer insights directly from the customers. Moreover, CI does not only equip firms with timely insights, but also has the potential to inject this information directly to the process of innovation. Therefore, involving customers in the innovation processes of firms operating in highly turbulent markets may be highly beneficial, as markets are constitute of customers, and customers are aware of their own evolving needs. Hence, I posit that:

> H3a: Market turbulence positively moderates the positive effect of CI on the novelty of innovation.

3.1.2.2 Rarity

The RBV theory posits that any resource to contribute to competitive advantage should be rare (Barney, 1995). Although rarity is typically assessed in comparison with the competing firms, in my research, I evaluate rarity in relation to other, similar resources available within the boundaries of the firm (Bommaraju et al., 2019). Specifically, I look at the degree to which salespeople are involved into tasks that are strategic in nature and typically belong to the responsibility of the marketing personnel. These tasks include sales' contribution in market research tasks, such as the analysis of market research potential for the new products, or active participation in new product development related duties, such as design and introduction of new products. I hypothesize that if sales, the unit equipped with keeping touch with the customers of the firm on a daily basis (Malshe and Biemans, 2014, Homburg et al., 2017, Kuester et al., 2017), hence have a well-developed and first hand understanding of the customer needs formulates an integral part of the strategic tasks, including new product development related ones. they are able to contribute effectively to the innovation process. In this way the role of involving the customers in the new product development may be of lesser importance. CI is also used to bring in the demand-side customer perspectives, however, when sales personnel is already performing that task, the insights gained by means of CI might be less rare, hence its innovation outcomes may be diminished.

> H3b: Sales-marketing encroachment negatively moderates the positive effect of CI on the novelty of innovation.

3.1.2.3 Inimitability

To contribute to a sustained competitive advantage, besides being valuable and rare, it should also be difficult to imitate. This inimitability may derive from causal ambiguity, social complexity or from unique historical conditions (Barney, 1995, Barney, 1991).

In case the insights firms gain by means of CI can easily be imitated by the competitors, the benefit accrues from CI in terms of innovation outcomes will be

significantly lower. I posit, that inimitability of customer insight as a resource gained by CI is clearly signaled by the product specificity, defined as the degree to which the product is unique and tailored to the needs of the customer, and the firm develops long-lasting relationship with the customer. Specifically, when the focal firm offers standardized products, I argue that the insights, the customers are able to bring in are more generic, and not tailored to the specific characteristics of the focal firm. Yet, when firms offer customized products and develop long-term collaborations with the customers, the knowledge they are able to bring into the innovation process is targeted to the focal firm, and this knowledge cannot easily be mitigated by the competitor, or in other words it is imperfectly imitable, hence meets the criteria of inimitability. Therefore, I posit, that:

> H3c: Product specificity positively moderates the positive effect of CI on the novelty of innovation.

3.1.2.4 Organizational fit

Organizational fit posits that firms can capitalize on a specific resource they possess in case only, if the firm is oriented in a way to be able to effectively use it (Barney, 1995). This criteria suggests that number of firms own valuable resources, yet these resources cannot be effectively cultivated. Differentiation strategy of a firm is conceptualized as the firm' exploration of customer need that are often complex and the adaptation of products to fit and respond to these needs (Porter, 1980). Differentiation strategy emphasizes the achievement of higher levels of customer satisfaction and subsequently business performance (Olson et al., 2005).

I argue that the organizational fit of CI depends on the degree to which the firm can be characterized by differentiation strategy. Differentiation strategy requires an in-depth customer understanding, to be able to explore and meet customer needs in a superb level. Hence, differentiation strategy creates a firm-level orientation that enhances the degree to which the company is able to capitalize on CI as a resource. As CI is a fast and valuable way to bring in first-hand feedback from the planned innovation from customers (Keszey and Lilli, 2015, Moorman,

2016), I posit that firms characterized by high level of differentiation strategy will more be able to capitalize on this resource than their counterparts with dissimilar strategic focus.

> H3d: Differentiation strategy positively moderates the positive effect of CI on the novelty of innovation.

3.1.2.5 Sharedness

Saredness refers to the degree of CI-related market knowledge overlap between the innovating firm and its customers (Stanko and Bonner, 2013). Recent studies in innovavtion and new product development start to highlight that besides the VRIO framework, other characteristics also influence the degree to which a resource—in my case a knowledge resourece provided by the customer—contributes to firm performance. A recent study by Tang and Marinova (2019) show that the sharedness of knowledge has an inverted U-shaped effect on the performance of the new product. Stanko and Bonner (2013) conclude that knowledge redundancy (i.e., sharedness) between customer and supplier improves customer interactivity which positively influence the innovativeness of NPD, however, the direct effect of sharedness on innovativeness is negative.

Based on the findings of prior studies, I suggest that sharedness makes the collaboration between the customer and the firm more smooth, as both parties have a shared understanding, and they understand each-others's language. However, as their ideas tend to converge, the chance of out-of-box thinking diminish, and as a result the outcomes of such collaborations tend to be less novel.

> H3e: Knowledge sharing negatively moderates the positive effect of CI on the novelty of innovation.

3.2 DATA AND METHODS

3.2.1 Data gathering and sample

The data for my thesis were collected through a mail survey that was sent to firms operating in Hungary. The business information database of the Hungarian Central Statistical Office was used and selected firms that belong to the top ten percent of firms in terms of sales revenue, as reported in the quarterly (please note that data for this research was collected by an OTKA research of my Ph.D. supervisor, Prof. Tamara Keszey, project number PD77726).

Altogether, 2500 questionnaires were sent out by mail with an alternative option of filling out the questionnaire online. In order to improve the response rate, follow-up phone calls were made. These phone calls gave the opportunity to inquire whether the questionnaire had reached the competent key respondent and to gain further insights about the causes of potential non-response. Respondents were ensured of the confidentiality of their data.

The data collection resulted into 296 usable responses (response rate of 11.8%). Companies in the sample represent a great variety of industries. The key informants for the survey are marketing executives and marketing managers, who are typically top managers or one level below top management, supposedly with decision-making authority and with a mean company-specific experience of 12.1 years.

Table 10 summarizes the profiles of the sample firms and details of the company characteristics. As it shows, the division by sector is harmonious between firms producing physical products and services (31.8 and 31.7, respectively). 36.5 percent of responding companies also produce physical products and services. The respondent firm profile also shows that the vast majority of firms belong to the ones with 250-999 employees, followed by smaller enterpises with 50-249 employees (39.5 and 46.3 percent, respectively), while the proportion of large firms and small ones is smaller in the dataset (9.1 and 5.1 percent, respectively).

10. Table Respondent profile (N=296)

Company characteristic	**Percentage**	**Company characteristic**	**Percentage**
Type of product		Major field of operation	
Only physical products	31.8	Business-to-customer	46.6
Only services	31.7	Business-to-business	53.4
Both physical products and services	36.5		
Number of employees		Ownership	
≥1000	9.1	Private domestic	47.6
250-999	39.5	Private foreign	41.6
50-249	46.3	State-owned	10.8
0-49	5.1		

Source: own compilation

In terms of major field of operation, firms operationg in business-to-customer versus business-to-business markets is also evenly distributed (46.6 and 53.4 percent, respectively), while in terms of ownership the proportion of domestic firms is slightly higher than private foreign ones (47.6 and 41.6 percent, respectively), while rest of the enterprises are owned by the state (10.8 percent).

I tested the dataset for non-response bias. Following the approach of Armstrong and Overton (1977), the analysis of variance did not reveal significant differences between the means of the descriptive statistics (ownership structure, products/services provided and number of employees) of early and late respondents. As discovered during the follow-up phone calls, the most frequent reason for refusal to cooperate was a lack of time. Therefore, I concluded that non-response would

not cause a systematic error in the sample, and I pooled the data for subsequent analyses.

3.2.2 Measures

I used a survey to gather and analyze data. The constructs from my hypothetical model were measured by means of seven-point Likert-type scales. Each scale were multi-item, and consisted of at least three items.

Table 11 summarizes the measurement constructs of this study. As Table 11 shows, CI was measured by seven scale items put forward by Carbonell et al. (2009) and Hsieh and Hsieh (2015). Examplary items include “our customers are actively involved in NPD projects” or “customers were involved in every stage of the project”. To capture NPD innovativeness, five items were used, for example, “We have more product innovations than our competitors” or “we enter first-to-market with our product innovations”. NPD performance was captured by using scale items of De Luca and Atuahene-Gima (2007). Exemplary items are “NPD sales goals relative to stated objectives” or “NPD return on investment related to stated objectives” evaluated on a seven point Likert scale.

Market turbulence was measured by the well-known and widely used scale of Jaworski and Kohli (1993), including items such as “our customers tend to look for new products all the time”, or "in our kind of business, customers’ product preferences change quite a bit over time”.

Sales-marketing encroarchment was measured by the scale of (Homburg et al., 2008), which consists of five items, such as the extant to which sales is involved in carrying out the tasks, that include “active participation in market research” or “active participation in service tasks (e.g., definition of product-related services and training offers)” is high.

Product specificity consist of three items, such as “our products/services are very complex” or “specific knowledge is needed to fully understand the benefits our products bring”.

Differentiation strategy was taken over by (Homburg et al., 1999). This three-item scale includes items such as “our firm / business emphasizes competitive advantage through superior products”.

Knowledge sharing was measured by the three-item scale of (Holste and Fields, 2010), including items such as “I would allow my colleagues to spend significant time observing and collaborating with me for him/her to better understand and learn from my work.

Finally, I controlled for two variables, firm net income and firm size. The first was measured be the logarithy of the firm’s net income in thousands of forints, and the latter one with the number of employees the form has in Hungary.

Because all variables were collected at the same time, with the same instrument from the same respondents, the results were controlled and tested for common method bias (CMB) (Podsakoff et al., 2003). To control for CMB, criterion predictor and moderating variables were allocated to separate sections of the questionnaire. The existence of CMB was statistically assessed using different techniques: (1) Harman's single-factor method (Harman, 1976), (2) assessment of the correlation matrix (Bagozzi et al., 1991). Following Harman’s (1976) single factor approach, the results show that no single factor emerged from a factor analysis of all survey items and that no general constructs account for the majority of the covariance among all the constructs. The correlation matrix of the variables included in the conceptual model does not include highly correlated variables ($r>.90$) (Bagozzi et al., 1991). Given these results, it can be concluded that CMB did not significantly affect the findings from this study.

11. Table Measurement constructs, scale items and standardized factor loadings

Construct (based on / inspired by)	Question, scale	Item	Factor loading
Customer involvement (Carbonell et al., 2009, Hsieh and Hsieh, 2015)	"To what extent do you involve your customers to the process of new product development?"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	(CR = 0.90; AVE = 0.59; Cronbach's alpha = 0.90)	
		Our customers are actively involved in NPD projects	0.675
		Customers were involved at every stage of the project	0.611
		There is a wide variety of methods and channels we apply to involve our customers	0.513
		The frequency of the meetings with customers is high during new product development	0.793
		Customers are involved in identifying the directions of innovation	0.920
		Customers are involved in generating new product ideas	0.922
		Our customers are involved in testing and evaluating new products	0.861
NPD innovativeness (Keszey and Biemans, 2016)	"Please evaluate the firm's / business unit's new product development performance"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	(CR = 0.95; AVE = 0.79; Cronbach's alpha = 0.95)	
		We enter first-to-market with our product innovations	0.883
		We have more product innovations than our competitors	0.916
		Our NPDs were more successful than our competitors'	0.896
		Our NPDs were more novel and innovative compared to my competitors'	0.895
		The market response to my NPDs were more positive than to my competitors'	0.874
NPD performance (De Luca and	"Please evaluate the firm's / business unit's new product development	(CR = 0.91; AVE = 0.73; Cronbach's alpha = 0.94)	
		NPD sales goals relative to stated objectives	0.882
		NPD return on investment related to stated objectives	0.661

Construct (based on / inspired by)	Question, scale	Item	Factor loading
Atuahene-Gima, 2007)	performance"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	NPD return on assets related to stated objectives	0.948
		NPD profitability relative to stated objectives	0.904
Market turbulence; (Jaworski and Kohli, 1993)	"To what extent are the following statements specific to your firm / business unit?"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	(CR = 0.81; AVE = 0.52; Cronbach's alpha = 0.81)	
		In our kind of business, customers' product preferences change quite a bit over time	0.764
		Our customers tend to look for new products all the time	0.717
		We are witnessing demand for my products and services from customers who never bought them before	0.711
			0.709
		New customers tend to have product related needs that are different from those of my existing customers	
Sales-marketing encroachment (Homburg et al., 2008)	"Please evaluate the extent to which sales is involved in carrying out the following tasks!" (1 = "Not at all," and 7 = "To a large extent")	(CR = 0.83; AVE = 0.51; Cronbach's alpha = 0.83)	
		Active participation in market research tasks (e.g., analysis of market potential)	0.631
		Active participation in service tasks (e.g., definition of product-related services and training offers)	0.729
			0.771
		Active participation in various strategic tasks (e.g., definition of a market strategy)	0.764
		Active participation in product-development related tasks (e.g., design and introduction of new products)	0.636

Construct (based on / inspired by)	Question, scale	Item	Factor loading
		Active participation in pricing-related tasks (e.g., definition of price positioning, discounts, and price promotions)	
Product specificity (new scale)	"To what extent are the following statements specific to the products / services of your firm / business unit?"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	(CR = 0.87; AVE = 0.70; Cronbach's alpha = 0.86)	
		Our products/services are very complex	0.830
		The content of the product we produce is specific	0.951
		Specific knowledge is needed to fully understand the benefits our products bring	0.719
Differentiation strategy (Homburg et al., 1999)	"To what extent are the following statements describing the strategy of your firm / business unit?"; (1 = "Not at all," and 7 = "To a large extent")	(CR = 0.78; AVE = 0.55; Cronbach's alpha = 0.77)	
		Our firm / business unit emphasizes competitive advantage through superior products (0.80)	0.796
		Our firm / business unit emphasizes building up a premium product or brand image (0.76)	0.760
		Our firm / business unit emphasizes new product development (0.65)	0.664

Construct (based on / inspired by)	Question, scale	Item		Factor loading
Knowledge sharing	"To what extent	(CR = 0.93; AVE = 0.83; Cronbach's alpha = 0.93)		
(Holste and Fields, 2010)	colleagues in your firm / business unit would be willing to share their knowledge?"; (1 = "Not at all," and 7 = "To a large extent")	I would allow my colleague to spend significant time observing and collaborating with me for him/her to better understand and learn from my work		0.883
		I would willingly share with my colleague rules of thumb, tricks of the trade and other insights		0.984
		I would willingly share my new ideas with my colleague		0.874
Firm net income	"How much was your firm's / business unit's net income in thousands of forints last year?	Logarithm of the firm's / business unit's net income in thousands of forints*		NA
Firm size	"Approximately how many people the company employs in Hungary?"	1.) -20	5.) 500-999	NA
		2.) 20-99	6.) 1000-4999	
		3.) 100-299	7.) 5000-	
		4.) 300-499		

3.3 RESULTS

3.3.1 Testing of the measurement instrument

Statistical analyses were performed using ©IBM SPSS 27 (Statistical Package for Social Sciences), and ©IBM SPSS AMOS 27. As a first step, I conducted a confirmatory factor analysis (CFA) to test for the reliability and validity of measurement instruments. This is a compulsory step before the planned analyses of the direct, mediated and moderated hypotheses.

As Table 11 shows, all of the standardized factor loadings are statistically significant ($p<.05$) and greater than .50 (Anderson and Gerbing, 1988). Table 11 also presents the scales used for measurements, and the corresponding items.

As table 12 show some of the key indicators of the model fit summary, the results of this test indicate a good fit, as all key metrics are within the acceptable ranges compared to the traditional cut-off values. The Chi-square /df ($\chi 2/df$) is 1.774, hence less than 3.0, the comparative fit index (CFI) is 0.944, hence greater than .85, the root mean square error of approximation (RMSEA) is 0.078, hence not greater than .08, and the standardized root mean square residual (SRMR) is 0.063, hence less than .08 (Byrne, 2010).

12. Table Model Fit Summary

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	96	885,246	499	,000	1,774
Saturated model	595	,000	0		
Independence model	34	7443,078	561	,000	13,268

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	,150	,850	,821	,713
Saturated model	,000	1,000		
Independence model	,756	,259	,214	,244

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	,881	,866	,944	,937	,944
Saturated model	1,000		1,000		1,000
Independence model	,000	,000	,000	,000	,000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	,889	,784	,840
Saturated model	,000	,000	,000
Independence model	1,000	,000	,000

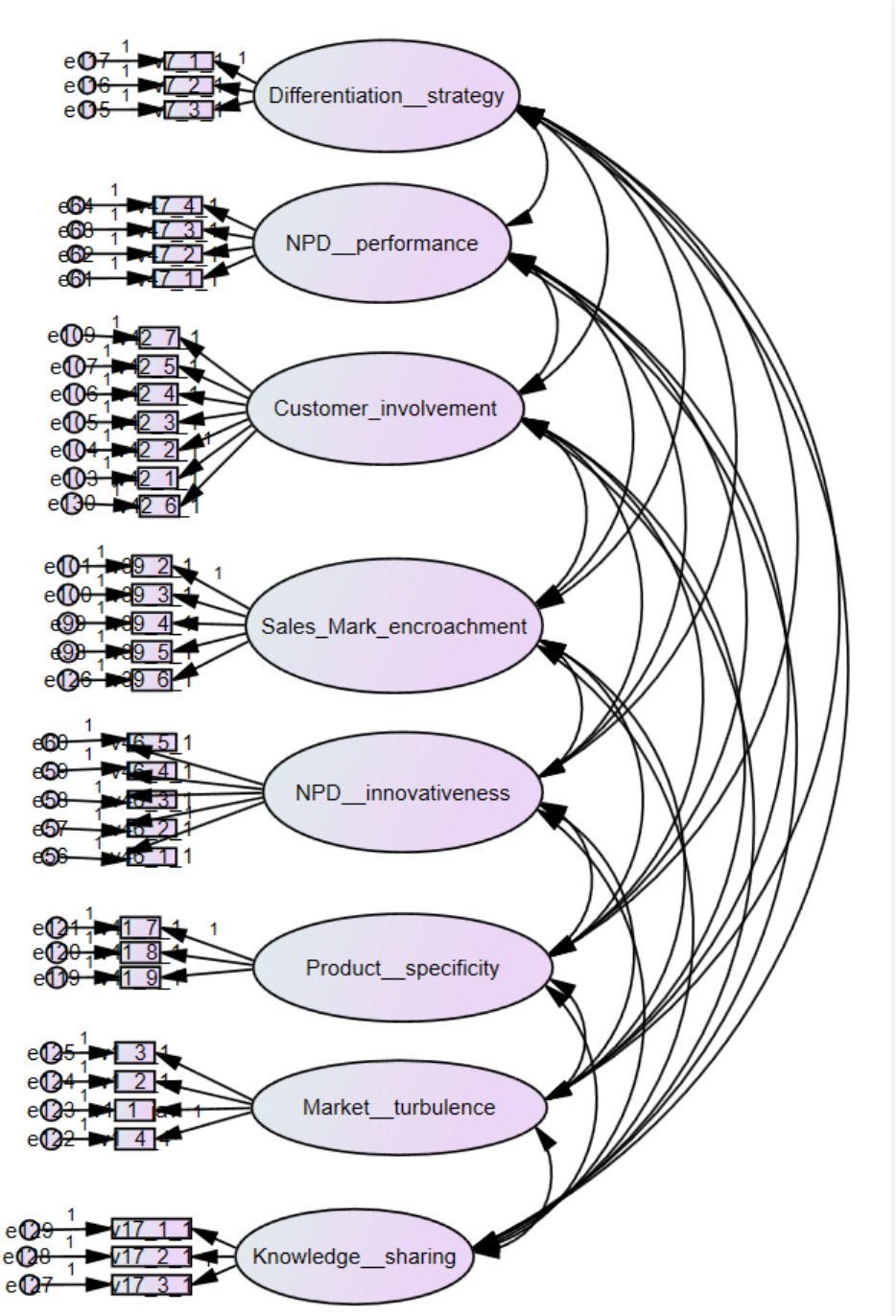
NCP

Model	NCP	LO 90	HI 90
Default model	386,246	307,188	473,145
Saturated model	,000	,000	,000
Independence model	6882,078	6606,897	7163,705

Source: own compilation

Figure 5 depicts the CFA model as it appears in the AMOS 27 system. As the figure show, all the multi-item constructs are entered for the measurement item tests.

6. Figure CFA model



Source: own compilation

Table 13 shows the correlations of the multi-item constructs of the model, as it can be seen, the correlations are not overly high (above 0.90) (Byrne, 2010).

13. Table The correlations of the multi-item constructs in the model

Correlations: (all - Default model)

			Estimate
NPD__performance	<-->	NPD__innovativeness	,548
Differentiation__strategy	<-->	NPD__innovativeness	,549
Sales_Mark_encroachment	<-->	NPD__innovativeness	,191
Customer_involvement	<-->	NPD__innovativeness	,427
Product__specificity	<-->	NPD__innovativeness	,301
Market__turbulence	<-->	NPD__innovativeness	,060
NPD__performance	<-->	Differentiation__strategy	,353
NPD__performance	<-->	Sales_Mark_encroachment	,339
NPD__performance	<-->	Customer_involvement	,318
NPD__performance	<-->	Product__specificity	,227
NPD__performance	<-->	Market__turbulence	,050
Sales_Mark_encroachment	<-->	Differentiation__strategy	,310
Customer_involvement	<-->	Differentiation__strategy	,373
Differentiation__strategy	<-->	Product__specificity	,234
Differentiation__strategy	<-->	Market__turbulence	,009
Sales_Mark_encroachment	<-->	Customer_involvement	,248
Sales_Mark_encroachment	<-->	Product__specificity	,164
Sales_Mark_encroachment	<-->	Market__turbulence	,018
Customer_involvement	<-->	Product__specificity	,385
Customer_involvement	<-->	Market__turbulence	-,027
Product__specificity	<-->	Market__turbulence	,051
Product__specificity	<-->	Knowledge__sharing	,194
Market__turbulence	<-->	Knowledge__sharing	,179
Differentiation__strategy	<-->	Knowledge__sharing	,233
NPD__performance	<-->	Knowledge__sharing	,275
Customer_involvement	<-->	Knowledge__sharing	,175
Sales_Mark_encroachment	<-->	Knowledge__sharing	,285
NPD__innovativeness	<-->	Knowledge__sharing	,232

Source: own compilation

I also calculated the correlations using the SPSS 27 software to be able to report the correlation between the multi-item scales and the two single item scales. The results are reported in Table 14.

14. Table Correlation test results – SPSS software

Correlations

		Firm_profit_log	Firm_size_log	Zscore (Knowledge_sharing)	Zscore (NPD_innovativeness_a)	Zscore (Market_turbulence_a)	Zscore (Product_specificity_a)	Zscore (Differentiation_strategy_a)	Zscore (Co_creation_NPD_a)	Zscore (Marketing_Sales_encroachment)	Zscore (NPD_performance_a)
Firm_profit_log	Pearson Correlation	1	,325**	,067	,140*	,066	,098	,157**	,097	,166**	,132*
	Sig. (2-tailed)		<,001	,249	,016	,255	,093	,007	,095	,004	,023
	N	296	296	296	296	296	296	296	296	296	296
Firm_size_log	Pearson Correlation	,325**	1	,062	,034	,068	,126*	,028	,071	,015	,066
	Sig. (2-tailed)	<,001		,291	,555	,243	,030	,632	,220	,792	,256
	N	296	296	296	296	296	296	296	296	296	296
Zscore (Knowledge_sharing)	Pearson Correlation	,067	,062	1	,241**	,199**	,204**	,261**	,182**	,317**	,286**
	Sig. (2-tailed)	,249	,291		<,001	<,001	<,001	<,001	,002	<,001	<,001
	N	296	296	296	296	296	296	296	296	296	296
Zscore (NPD_innovativeness_a)	Pearson Correlation	,140*	,034	,241**	1	,067	,319**	,615**	,444**	,218**	,574**
	Sig. (2-tailed)	,016	,555	<,001		,250	<,001	<,001	<,001	<,001	<,001
	N	296	296	296	296	296	296	296	296	296	296
Zscore (Market_turbulence_a)	Pearson Correlation	,066	,068	,199**	,067	1	,058	,013	-,031	,045	,057
	Sig. (2-tailed)	,255	,243	<,001	,250		,317	,825	,595	,442	,331
	N	296	296	296	296	296	296	296	296	296	296
Zscore (Product_specificity_a)	Pearson Correlation	,098	,126*	,204**	,319**	,058	1	,268**	,411**	,194**	,242**
	Sig. (2-tailed)	,093	,030	<,001	<,001	,317		<,001	<,001	<,001	<,001
	N	296	296	296	296	296	296	296	296	296	296
Zscore (Differentiation_strategy_a)	Pearson Correlation	,157**	,028	,261**	,615**	,013	,268**	1	,418**	,360**	,401**
	Sig. (2-tailed)	,007	,632	<,001	<,001	,825	<,001		<,001	<,001	<,001
	N	296	296	296	296	296	296	296	296	296	296
Zscore (Co_creation_NPD_a)	Pearson Correlation	,097	,071	,182**	,444**	-,031	,411**	,418**	1	,289**	,335**
	Sig. (2-tailed)	,095	,220	,002	<,001	,595	<,001	<,001		<,001	<,001
	N	296	296	296	296	296	296	296	296	296	296
Zscore (Marketing_Sales_encroachment)	Pearson Correlation	,166**	,015	,317**	,218**	,045	,194**	,360**	,289**	1	,385**
	Sig. (2-tailed)	,004	,792	<,001	<,001	,442	<,001	<,001	<,001		<,001
	N	296	296	296	296	296	296	296	296	296	296
Zscore (NPD_performance_a)	Pearson Correlation	,132*	,066	,286**	,574**	,057	,242**	,401**	,335**	,385**	1
	Sig. (2-tailed)	,023	,256	<,001	<,001	,331	<,001	<,001	<,001	<,001	
	N	296	296	296	296	296	296	296	296	296	296

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

*. Correlation is significant at the 0.05 level (2-tailed).

Source: own compilation

Hereby, I also present the standardized factor loads for each constructs and the corresponding items. As this table shows, all items load significantly and with a high (>0.6) value (Byrne, 2010).

15. Table Standardized factor loads

			Estimate
v47_1_1	<---	NPD__performance	,882
v47_2_1	<---	NPD__performance	,661
v47_3_1	<---	NPD__performance	,948
v47_4_1	<---	NPD__performance	,904
v39_5_1	<---	Sales_Mark_encroachment	,764
v39_4_1	<---	Sales_Mark_encroachment	,771
v39_3_1	<---	Sales_Mark_encroachment	,729
v39_2_1	<---	Sales_Mark_encroachment	,631
v42_1_1	<---	Customer_involvement	,675
v42_2_1	<---	Customer_involvement	,611
v42_3_1	<---	Customer_involvement	,920
v42_4_1	<---	Customer_involvement	,922
v42_5_1	<---	Customer_involvement	,861
v42_7_1	<---	Customer_involvement	,793
v7_3_1	<---	Differentiation__strategy	,664
v7_2_1	<---	Differentiation__strategy	,760
v7_1_1	<---	Differentiation__strategy	,796
v41_9_1	<---	Product__specificity	,719
v41_8_1	<---	Product__specificity	,951
v41_7_1	<---	Product__specificity	,830
v1_4_4	<---	Market__turbulence	,709
v_1__1	<---	Market__turbulence	,764
v1_2_1	<---	Market__turbulence	,717
v1_3_1	<---	Market__turbulence	,711
v39_6_1	<---	Sales_Mark_encroachment	,636
v46_5_1	<---	NPD__innovativeness	,883
v46_2_1	<---	NPD__innovativeness	,916
v46_3_1	<---	NPD__innovativeness	,896
v46_4_1	<---	NPD__innovativeness	,895
v46_1_1	<---	NPD__innovativeness	,874
v17_3_1	<---	Knowledge__sharing	,874
v17_2_1	<---	Knowledge__sharing	,984
v17_1_1	<---	Knowledge__sharing	,883
v42_6_1	<---	Customer_involvement	,513

Source: own compilation

As part of the reliability analysis I calculated the Cronbach alpha for each multi-item scales.

The reports are presented in the Tables under. Reliability analysis for the following scales ‘Differentiation strategy’, ‘NPD innovativeness’, ‘NPD performance’, ‘Product specificity’, ‘Customer involvement’, ‘Market turbulence’, ‘Sales-Marketing Encroachment’, ‘Knowledge sharing” are presented in Table 16.

16. Table Reliability analysis for scale

Reliability analysis for scale ‘Differentiation strategy’

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,769	3

Reliability analysis for scale ‘NPD innovativeness’

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,951	5

Reliability analysis for scale 'NPD performance'

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,912	4

Reliability analysis for scale 'Product specificity'

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,864	3

Reliability analysis for scale 'Customer involvement'

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,904	7

Reliability analysis for scale 'Market turbulence'

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,817	4

Reliability analysis for scale 'Sales-Marketing Encroachment'

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,831	5

Reliability analysis for scale 'Knowledge sharing"

Case Processing Summary

		N	%
Cases	Valid	296	100,0
	Excluded[a]	0	,0
	Total	296	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,936	3

Source: own compilation

As these analyses show, all Cronbach alpha measures are above the 0.7 threshold. The results of the measurement instrument testing are summarized in Table 17. It presents the means (ME) and standard deviations (SD) for the scales used for measurement related to the assessment of construct reliability. Composite reliability (CR) measures are higher than the .70 threshold (Nunnally, 1967), which indicate good reliability of the constructs, while the average variance extracted (AVE) is also greater than the cut-off value of .50 for each scales (Bagozzi and Yi, 1988). These tests confirm the convergent validity of the measures. As Table 17 shows, the correlation between two constructs is less than the square root of AVE, indicated on the diagonal, signalling discriminant validity (Fornell and Larker, 1981).

17. Table The results of the measurement instrument testing - summary

	Mean	Std. deviation	CR	AVE	1	2	3	4	5	6	7	8	9	10
1. Customer involvement	2.80	1.07	0.90	0.59	**0.77**									
2. NPD innovativeness	4.18	1.48	0.95	0.79	0.42**	**0.89**								
3. NPD performance	4.34	1.28	0.91	0.73	0.31**	0.54**	**0.85**							
4. Market turbulence	3.50	0.70	0.81	0.52	-0.02	0.06	0.05	**0.72**						
5. Sales-marketing encroachment	3.18	0.67	0.83	0.51	0.19**	0.01	0.34**	0.02	**0.70**					
6. Product specificity	4.32	1.49	0.87	0.70	0.38**	0.30**	0.22**	0.05	0.16**	**0.83**				
7. Differentiation strategy	4.34	0.99	0.78	0.55	0.37**	0.54**	0.35**	0.30**	0.31	0.23**	**0.74**			
8. Knowledge sharing	5.32	1.14	0.93	0.83	0.17	0.23**	0.27**	0.18**	0.23	0.19**	0.23**	**0.91**		
9. Firm profit log.	2.41	0.84	NA	NA	0.09	0.14*	0.13*	0.06	0.16**	0.09	0.15**	0.06	**NA**	
10. Firm size	3.17	1.39	NA	NA	0.05	0.03	0.06	0.06	0.01	0.12*	0.02	0.06	0.32**	**NA**

Note: Composite reliability (CR), the square root of the average variance extracted (AVE) (in bold) and correlations between constructs (off-diagonal) Source: own compilation

3.3.2 Model testing

Following the mainstream of the CI research trend (e.g., Zhang and Xiao, 2020b, Morgan et al., 2019), I examine the empirical part of my research by means of Structural Equation Modelling, as this is the mainstream in this body of literature as my systematic literature review has also shown.

18. Table Comparison of this study's research setting with CI papers from leading academic journals

	Central and Eastern Europe investigated?	Survey data?	Structural equation modelling
This study	Yes, Hungary	Yes	yes
Other studies [a]	1 study out of 26	24/26	13/26

[a] Identified as relevant in the systematic literature review

Source: own compilation

The further analyses include testing the proposed hypotheses, which are direct, mediated and moderated in my Thesis. Similar to testing the measurement tools, I use the ©IBM SPSS AMOS 27 software – as this tool is appropriate and frequently used for these types of analyses.

The fit indices suggest that the model fits the data very well ($\chi2(127)=324.48$; $\chi2/df=2.55$; $p<.001$; RMSEA=.073; SRMR=.05; NNFI=.94; and CFI=.95). The results, summarized in Table 19, show that CI has a direct effect on NPD innovativeness (β =.609, $p<.001$), but it has no direct effect on NPD performance (β =.135, ns), providing support for H1ab, but not for H1b. NPD innovativeness is positively related to NPD performance (β =.433, $p<.001$), this relationship however is not formulated in form of a direct relationship. I controlled for two variables, firm net income and firm size have no direct significant effect on

NPD innovativeness (β =.195, n.s.; -0,04, n.s., respectively) and on NPD performance (β =.06, n.s.; 0.02, n.s., respecitvely).

To test whether NPD innovativeness mediates the relationship between CI and NPD performance, the approach of Zhao et al.'s (2010) was used. They methodology suggests using bootstrapping to investigate the significance of indirect effects. I applied 5000 bootstrap resamples. According to Zhao et al.'s (2010) approach, an indirect effect is significant, therefore the mediation is established if the bootstrap confidence interval of an indirect effect does not include zero (Preacher and Hayes, 2008, Zhao et al., 2010). The result of the bootstrap mediation analysis shows that CI a significant total effect on NPD performance (β =.386, p<.001), however, the direct effect in insignificant (β =.135, n.s.), while the indirect effet through NPD innovativeness is significant (β =.251, p<.001), suggesting full mediation and providing support for H2.

To test my hypothesized moderating effects, I created interaction terms by the case-wide multiplication of the underlying standardized construct scores for the independent and moderator variables (Collier, 2020, Byrne, 2010). Both the moderating latent variable and the interaction terms were then included in AMOS 27.0. My results in Table 19 demonstrate that the moderating effect of market turbulence is insignificant on the link between CI and NPD innovativeness (β =.02, n.s.), leading me to reject H3a. Similarly, I found that sales-marketing encroachment does not moderate the effect of CI on NPD innovativeness (β =-.09, n.s.); thus, H3b is also rejected. The moderating effect of product specificity is also insignificant, leading me to reject H3c (β =.00, n.s.). Differentiation strategy positively moderate the effect of CI on NPD innovativeness (β =.10, p<.05), while knowledge sharing negatively moderate this investigated link (β =-.12, p<.01).

19. Table Results of SEM: Main Effect and Interaction Moderation Effects

Hypothesis	Relationship	Beta coefficient	t-value (bootsrap confidence)	Hypothesis supported
Main effects				
H1a (+)	Customer involvement → NPD innovativeness	0.609	6.791***	Yes
H1b (+)	Customer involvement → NPD performance	0.135	1.894ns	No
	NPD innovativeness → NPD performance	0.433	8.009***	n.a.
Mediated effects				
H2	Customer involvement → NPD innovativeness → NPD performance			
	Total effects	0.386***	(0.230, 0.556)	
	Direct effects	0.135ns	(-0.042, 0.308)	
	Indirect effects	0.251***	(0.150, 0.381)	Yes
Moderated effects				
H3a (+)	Customer involvement x Market turbulence → NPD innovativeness	-0.027	-0.650ns	No
H3b (+)	Customer involvement x Sales-marketing encroachment → NPD innovativeness	-0.090	1.771ns	No
H3c (+)	Customer involvement x Product specificity → NPD innovativeness	-0.001	-0.019ns	No
H3d (+)	Customer involvement x Differentiation strategy → NPD innovativeness	0.106	2.265*	Yes
H3e (+)	Customer involvement x Knowledge sharing → NPD innovativeness	-0.121	-2.399**	Yes
Control paths				
n.a.	Firm profit → NPD innovativeness	0.189	1.817ns	n.a.
n.a.	Firm size → NPD innovativeness	-0.044	-0.697ns	n.a.
n.a.	Firm profit → NPD performance	0.053	0.638ns	n.a.
n.a.	Firm size → NPD performance	0.039	0.777ns	n.a.

Note: *** p < 0.01 ** p < 0.05 * p < 0.10 ns=not significan n = 296

Source: own compilation

3.4 IMPLICATIONS

3.4.1 Theoretical implications

My research investigates the effect that CI has on innovation outcomes. Specifically, in my research, based on my own typology of innovation-related outcomes of CI, namely, (a) innnovation-process related outcomes, (b) financial outcomes and (c) customer perception of new products, this research looks at the latter two. This is a theoretically incremental novelty, as many previous studies examine only one type of innovation outcome as a result of CI, for an exception, see Yang and Zhang (2018) or Tseng and Chiang (2016). According to my findings, CI has a direct positive effect on NPD innovativeness. This result is not surprising, considering that prior studies reached the same conclusion. For example, Cui and Wu (2017) show that no matter how a firm involves their customers, for example, as pure source of information or as co-creators, the innovation outcomes will be more novel. In a similar vein, Kang et al. (2020) also reveal that CI has a positive effect on product innovativeness. My results show that the direct effect of CI on NPD performance is not directly positive. Although this result seems to be somewhat counter-intuitive, number of prior studies reveal that the effect of CI on NPD performance is not straightforward. For example, several studies conclude that CI does not directly lead to better innovation-related financial outcomes (Feng and Wang, 2013, Zhang and Yang, 2016).

My research aids the better understanding of how and along what value chain CI leads to better financial performance. (Feng and Wang, 2013, Zhang and Yang, 2016) empirically shows thata CI leads to innovation performance indirectly, through NPD cost and speed. Morgan et al. (2019) reach a similar result, however, according to their findings CI has a direct effect on NPD performance, and an indirect one through NPD speed.

Hence, these results theoretically imply that involving customers speed up the NPD process, and lead to cost reductions. My results propose an alternative

route, namely, I show that involving customers lead to better NPD performance by products that are being perceived as more novel by the customers. My findings suggest that the path between customer involvement and financial performance is not directly proportional. Customers can give insights on how, in what cases they find the product more attractive, how to shorten the innovation path, what unnecessary mistakes a company should avoid during product development that slows down innovation. An important result is that they are likely to be less able to provide useful information about what affects the financial success of an innovation, such as pricing or distribution channel decisions. Nevertheless, CI pays off financially, but the impact is not direct, this is important for decision makers to keep in mind.

Although previous research has shown that the CI innovation performance link may be exposed to contingencies, the selection of moderating variables in previous research was quite ad-hoc. Against this backdrop my study organized the investigated moderating variables according to the broader theoretical framework of the VRIO (Barney, 1991). My results imply that market turbulence, which induce that customers are unpredictable, their needs change quickly and hectically, and serving customers is like shooting at a constantly changing target (Jaworski and Kohli, 1993), does not erode the impact of CI on the novelty of inovation outcomes. Hence, my results show, that even in unpredictable times it pays off to include customers in the NPD process – this is an important theoretical implication especially in turbulent times, because it implies that customers and the information value they generate evolves along the changes caused by market turbulence occuring in the external environment.

Previous research has not examined the relationship between sales-marketing encroachment and, more broadly, alternative ways of acquiring customer knowledge. My preliminary assumption was that close collaboration between sales and marketing weakens the effects of customer engagement. However, my empirical results did not confirm this effect. This may also be due to the fact that customers are able to provide unique insights that cannot be replaced by customer information from sales colleagues, so there is no extinguishing effect. The optimal

organization of the internal flows of customer knowledge and the exploration of the necessary knowledge can be the subject of further research.

Product specificity has also not been investigated by prior research as an environmental contingency. I posit that when a product is customized, firms develop long-term collaborations with the customers, hence the knowledge they are able to bring into the innovation process is targeted to the focal firm. This knowledge cannot easily be mitigated by the competitor, hence it contributes to the novelty of the NPD more compared to when the product is generic. Here, too, my results confirm that customers are able to adapt very well not only to customer turbulence, but also to how specific a product a company produces, and that these external contingencies do not affect the positive value that CI adds to product development (Mitrega et al., 2020).

My results show that firm strategy can actually alter the effects of CI on innovation outcomes. Specifically, differentiation strategy requires an in-depth customer understanding, to be able to explore and meet customer needs in a superb level. When a high level of customer service is an important corporate priority, decision-makers add more value, more credit to the findings made by customers, which is why they are better integrated into the product development process. My results thus point to the role of senior management in the success of CI and that CI's impact is not in a vacuum but as an element of an organizational strategy. And this strategy affects how important and effective a particular tool is. This notion also appears indirectly in, for example, Cui and Wu (2016), who also demonstrate that the effect of CI is related to other strategies, specifically on technological one.

3.4.2 Managerial implications

My research seeks to reflect the challenge for managers that companies are increasingly developing collaborations with customers in search of new sources of inspiration for innovation. My research also helps managers better understand the processes through which customer engagement creates value through innovation. Two routes were outlined. On the one hand, customers bring knowledge into the

organization, on the other hand, involvement also gives the customer the opportunity to get to know the company better, and involvement can also be regarded an engagement development activity. The previous literature says little about how environmental contingencies affect the impact of involvement, and the moderator variables considered are also sporadic, and the option of selection often remain unclear. My empirical research at this point brings theoretical and practical novelty content according to my intentions. My research aims to show the environmental contingency effects that may amplify or, where appropriate, weaken the effect of CI.

The results of my research shed light on how managers can confidently rely on external knowledge from customers in product development. Involving customers in product development also results in more innovative products, so customers can bring in new insights that aren't available within the company. My research results. It is also an important achievement and encouragement for managers who have previously sought to learn and incorporate the views of their customers in the product development process in a different way, through a different channel. The result can be insightful, especially for managers working in the B2B field, as firms in the B2B sector often do not make sufficient use of these opportunities. My research also highlights that customer engagement does not directly affect a product's financial profitability, so when managers want to convince their superiors of the potential of customer engagement, it is important that the main argument is not to increase financial profitability. At the same time, the involvement of customers is also financially profitable, but this effect is felt indirectly through the novelty content of the new product.

My results show that customer involvement is a robust tool to increase the success and novelty of a new product. The lessons of my research show that market turbulence and the rapidly changing needs of customers do not erode its effects, just as the configuration of the relationship between marketing and sales functions does not change the mechanism of action. These results imply that even in rapidly changing conditions, companies should be able to rely directly on direct inquiries from customers, and that direct inquiries should not discourage companies from having direct contact with customers.

3.5 LIMITATIONS OF THE EMPIRICAL RESEARCH AND FUTURE RESEARCH DIRECTIONS

As a limitation of my research, I have to point out that in the present survey, the participants completed the questionnaire as "single respondents" within the companies. In this respect, I can say that there was limited measurability. In the course of my work, it became apparent that a dyadic survey could be useful for the present research, in which other relevant groups could have been studied in addition to marketing decision-makers. Furthermore, a customer survey would have been a useful contribution to the thesis. In this case, instead of the previously used proxy variables, customers would have been asked about the customer aspects of innovation related to new products.

In order to get a comprehensive picture of customer involvement throughout the process, it would have been interesting to investigate and measure the stage at which customer involvement occurs within the product development practices of organisations. When does the company exploit customer knowledge in this context? Perhaps in the planning phase of the market entry strategy, during the prototype test phase, or specifically at different stages of product launch, etc.?

Table 6 shows how previous studies were examined and organised within the theoretical research framework. As Table 6 outlines, the items can be further divided into three subsets according to which I capture aspects of CI innovation outcomes. The first subset addresses the results related to the innovation process (speed, novelty, sustainability, technical superiority), typically defined in respect to the standards set by the company. The second subset reviews the financial results of the innovation, such as return on investment, assets, market share, profitability, costs, and commercial success of the new product's revenues, against company targets or against a comparison of competitors. The third subset of articles is organised around the customers' perception of the new product, either in terms of satisfaction, benefits, similarity or novelty compared to competitors. In my own empirical research, I examined the results of the second and third subsets only. I did not measure aspects related to the innovation process. Therefore, in the future, I

will outline a particularly important and interesting line of research to investigate the innovation process in relation to this topic.

I should highlight that the study of the intensity of customer involvement, as a possible area for future research, raises interesting questions. There are different intensities of customer involvement, there can be sources of information, as described in chapter 2.3.2, but it is also possible to imagine the case of involving customers as innovators. Previous studies have also examined how the intensity of customer involvement affects innovation outcomes. These studies conclude that CI forms have their own specific advantages in terms of cooperation intensity and can be applied in different contexts. The frequency of interactions with customers during the development of their new products has a positive effect on both incremental and radical innovation outcomes (Gustafsson et al., 2012, Saldanha et al., 2017). The authors also conclude that all intensities of CI positively affect NPD outcomes. The effect of relying on customers as sources of information is amplified by analytical information processing capabilities, namely the use of business analytics technologies or applications for analysing critical business activities, or the use of IT applications to support workflow in customer relationship management.

While examining the model, it was noted that further empirical testing could be considered as a future research direction. In further analysis, it is worth looking for and testing a moderating variable that is not a proxy variable, but some kind of measure of actual values.

My work has also shown that digitalisation is significantly transforming customer involvement (CI). I already know that virtual reality - a simulated environment that allows customers to interact with a real-life new product - will be one of the high-impact technologies (Harz et al., 2021). In a complex and commercially risky process like innovation, customer engagement can help mitigate risks, but the effectiveness of CI may depend on customers' previous experiences. Evidence shows that extensive experiences can be created and evaluated in virtual reality (Hershfield et al., 2011), allowing firms to gain customer insights earlier and more consistently than before through CI during the innovation process that relies on virtual reality. To this end, a deeper understanding and

exploration of virtual reality in relation to innovation and customer involvement (CI) could be a basis for further investigation.

Finally, I would like to outline the possibility of a future research direction, based on a separate analysis of the role and outcomes of customer involvement in both radical and incremental innovation. Based on previous research, a deeper exploration of these two areas could be another research direction that is still less exploited.

4 REFERENCES

Anderson, J. C. and Gerbing, D. W. (1988), "Structural equation modeling in practice: A review and recommended two-step approach", Psychological Bulletin, Vol. 103 No. 3, pp. 411-23.

Anning-Dorson, T. (2018), "Customer involvement capability and service firm performance: The mediating role of innovation", Journal of Business Research, Vol. 86, pp. 269-280.

Armstrong, J. S. and Overton, T. S. (1977), "Estimating nonresponse bias in mail surveys", Journal of Marketing Research, Vol. 14 No. 3, pp. 396-402.

Bagozzi, R. P. and Yi, Y. (1988), "On the evaluation of structural equation models", Journal of the Academy of Marketing Science, Vol. 16 No. 1, pp. 74-94.

Bagozzi, R. P., Yi, Y. and Phillips, L. W. (1991), "Assessing construct validity in organizational research", Administrative Science Quarterly, Vol. 36 No. 3, pp. 421-458.

Baksa, M. and Báder, N. (2020), "A tudáskérés és tudásmegosztás feltételei–egy szervezeti tudáshálózat elemzése-----Prerequisites of advice-seeking and knowledge sharing. Analysis of an organizational knowledge network", Vezetéstudomány-Budapest Management Review, Vol. 51 No. 1, pp. 32-45.

Barney, J. B. (1991), "Firm resources and sustained competitive advantage", Journal of Management, Vol. 17 No. 1, pp. 99-120.

Barney, J. B. (1995), "Looking inside for competitive advantage", Academy of Management Perspectives, Vol. 9 No. 4, pp. 49-61.

Berezvai, Z., Agárdi, I. and Szabolcsné Orosz, J. (2019), "A digitális innovációk hatása az élelmiszer-kiskereskedelmi vállalatok teljesítményére= The impact of digital innovations on grocery retail performance", Statisztikai Szemle, Vol. 97 No. 10, pp. 915-932.

Blocker, C. P., Flint, D. J., Myers, M. B. and Slater, S. F. (2011), "Proactive customer orientation and its role for creating customer value in global markets", Journal of the Academy of Marketing Science, Vol. 39 No. 2, pp. 216-233.

Boda, G. (2012), "Maradunk a periférián, vagy felzárkózunk?".

Bokor, A. (2003), "A szervezeti kultúra hatása a termékfejlesztés folyamatára", Vezetéstudomány-Budapest Management Review, Vol. 34 No. 10, pp. 37-56.

Bommaraju, R., Ahearne, M., Krause, R. and Tirunillai, S. (2019), "Does a Customer on the Board of Directors Affect Business-to-Business Firm Performance?", Journal of Marketing.

Byrne, B. M. (2010), Structural equation modeling with AMOS: Basic concepts, applications and programming Routledge, Taylor & Francis Group, New York.

Carbonell, P., Rodriguez-Escudero, A. I. and Pujari, D. (2012), "Performance effects of involving lead users and close customers in new service development", Journal of Services Marketing, Vol. 26 No. 7, pp. 497-509.

Carbonell, P., Rodríguez-Escudero, A. I. and Pujari, D. (2009), "Customer involvement in new service development: An examination of antecedents and outcomes", Journal of product innovation management, Vol. 26 No. 5, pp. 536-550.

Chesbrough, H., Vanhaverbeke, W. and West, J. (2014), New frontiers in open innovation, Oup Oxford.

Chichkanov, N. (2021), "The role of client knowledge absorptive capacity for innovation in KIBS", Journal of Knowledge Management, Vol. ahead-of-print.

Chikán, A. (2008), "Vállalatgazdaságtan Budapest: Aula".

Collier, J. E. (2020), Applied structural equation modeling using AMOS: Basic to advanced techniques, Routledge.

Cui, A. S. and Wu, F. (2016), "Utilizing customer knowledge in innovation: antecedents and impact of customer involvement on new product performance", Journal of the Academy of Marketing Science, Vol. 44 No. 4, pp. 516-538.

Cui, A. S. and Wu, F. (2017), "The impact of customer involvement on new product development: Contingent and substitutive effects", Journal of Product Innovation Management, Vol. 34 No. 1, pp. 60-80.

Csath, M. (2004), "Stratégiai tervezés és vezetés a 21. században. Nemzeti Tankönyvkiadó, Budapest", ISBN 963-19-5251-7.

De Luca, L. M. and Atuahene-Gima, K. (2007), "Market knowledge dimensions and cross-functional collaboration: examining the different routes to product innovation performance", Journal of Marketing, Vol. 71 No. 1, pp. 95-112.

Deloitte (2021), "2021 Global Marketing Trends", Deloitte Insights, https://www2.deloitte.com/content/dam/insights/us/articles/6963_global-marketing-trends/DI_2021-Global-Marketing-Trends_US.pdf, retreived: 30.04.2021. .

Díaz-Díaz, N. L. and de Saá Pérez, P. (2014), "The interaction between external and internal knowledge sources: an open innovation view", Journal of Knowledge Management, Vol. 18 No. 2, pp. 430-446.

Dong, B., Evans, K. R. and Zou, S. (2008), "The effects of customer participation in co-created service recovery", Journal of the academy of marketing science, Vol. 36 No. 1, pp. 123-137.

Drucker, P. (2003), "Az innováció lehetőségei", Harvard Business Manager, Vol. 5 No. 3, pp. 28-35.

Estellés-Arolas, E. and González-Ladrón-de-Guevara, F. (2012), "Towards an integrated crowdsourcing definition", Journal of Information Science, Vol. 38 No. 2, pp. 189-200.

Fejes, J. (2015), "Innovációs kalandozások az elmélettől a stratégiáig= Innovation adventuring from theory to strategy", Vezetéstudomány-Budapest Management Review, Vol. 46 No. 6, pp. 58-69.

Feng, T., Sun, L., Zhu, C. and Sohal, A. S. (2012), "Customer orientation for decreasing time-to-market of new products: IT implementation as a complementary asset", Industrial Marketing Management, Vol. 41 No. 6, pp. 929-939.

Feng, T. and Wang, D. (2013), "Supply chain involvement for better product development performance", Industrial Management & Data Systems, Vol. 113 No. 2, pp. 190-206.

Fornell, C. and Larker, D. F. (1981), "Evaluating structural equation models with unobservable variables and measurement errors", Journal of Marketing Research, Vol. 18 No. 1, pp. 39-50.

Gelei, A. and Jámbor, Z. (2018), "Globális vállalatok belső struktúrájának alakítása a beszerzés és a termékfejlesztés kapcsolódó tevékenységeinek tükrében", Vezetéstudomány-Budapest Management Review, Vol. 49 No. 3, pp. 52-63.

Gelei, A. and Kenesei, Z. (2017), "Elkötelezett kapcsolatok és nemzetköziesedés–vállalataink innovációs teljesítményének két fontos forrása", Statisztikai Szemle, Vol. 95 No. 8-9, pp. 823-846.

Grant, R. M. (1996), "Toward a knowledge-based theory of the firm", Strategic Management Journal, Vol. 17 No. S2, pp. 109-122.

Grönroos, C. (2011), "Value co-creation in service logic: A critical analysis", Marketing theory, Vol. 11 No. 3, pp. 279-301.

Gustafsson, A., Kristensson, P. and Witell, L. (2012), "Customer co-creation in service innovation: a matter of communication?", Journal of Service Management, Vol. 23 No. 3, pp. 311-327.

Hámori, B., Szabó, K., Derecskei, A., Hlédik, E., Rosta, M. and Tóth, L. (2012), "Innovációs verseny–esélyek és korlátok", Aula Kiadó, Budapest.

Harman, H. H. (1976), Modern factor analysis, University of Chicago Press, Chicago, IL.

Harz, N., Hohenberg, S. and Homburg, C. (2021), "Virtual reality in new product development: Insights from pre-launch sales forecasting for durables", Journal of Marketing, Vol. article in press.

Hershfield, H. E., Goldstein, D. G., Sharpe, W. F., Fox, J., Yeykelis, L., Carstensen, L. L. and Bailenson, J. N. (2011), "Increasing saving behavior through age-progressed renderings of the future self", Journal of Marketing Research, Vol. 48 No. SPL, pp. S23-S37.

Holste, J. S. and Fields, D. (2010), "Trust and tacit knowledge sharing and use", Journal of Knowledge Management, Vol. 14 No. 1, pp. 128-140.

Homburg, C., Alavi, S., Rajab, T. and Wieseke, J. (2017), "The contingent roles of R&D–sales versus R&D–marketing cooperation in new-product

development of business-to-business firms", International Journal of Research in Marketing, Vol. 34 No. 1, pp. 212-230.

Homburg, C., Jensen, O. and Krohmer, H. (2008), "Configurations of marketing and sales: A taxonomy", Journal of Marketing, Vol. 72 No. 2, pp. 133-154.

Homburg, C., Workman, J. P. and Krohmer, H. (1999), "Marketing's influence within the firm", Journal of Marketing, Vol. 63 No. 2, pp. 1-17.

Hsieh, J.-K. and Hsieh, Y.-C. (2015), "Dialogic co-creation and service innovation performance in high-tech companies", Journal of Business Research, Vol. 68 No. 11, pp. 2266-2271.

Jaworski, B., J and Kohli, A. K. (1993), "Market orientation: Antecedents and consequences", Journal of Marketing, Vol. 57 No. 7, pp. 53-70.

Kang, M., Lee, G., Hwang, D. W., Wei, J. and Huo, B. (2020), "Effects of cross-functional integration on NPD success: mediating roles of customer and supplier involvement", Total Quality Management & Business Excellence, pp. 1-17.

Keszey, T. (2018), "Kontingenciaváltozók vizsgálata–A vállalati marketingtudás-megosztás innovációs teljesítményre gyakorolt hatása", STATISZTIKAI SZEMLE, Vol. 96 No. 11-12, pp. 1091-1108.

Keszey, T. and Biemans, W. (2016), "Sales–marketing encroachment effects on innovation", Journal of Business Research, Vol. 69 No. 9, pp. 3698-3706.

Keszey, T. and Katona, Á. (2015), "Piaci tudáscsere és tanulás a marketing és értékesítési részleg együttműködésével", in Buzás, N. and Prónay, S. (Eds.) Tudásteremtés és -alkalmazás a modern társadalomban, Szegedi Tudományegyetem, Interdiszciplináris Tudásmenedzsment Kutatóközpont, Szeged, pp. 72-82.

Keszey, T. and Lilli, N. (2015), "Developing customer insights through sales-marketing interface", in Luk, W. (Ed.) Collaboration in Research: EMAC 2015, Katholieke Universiteit Leuven, Leuven, pp. 59-66.

Kiss, J. (2008), "Termékfejlesztés és üzleti teljesítmény", Vezetéstudomány-Budapest Management Review, Vol. 39 No. 6, pp. 27-31.

Kornai, J. (2011), "„Liberté, Egalité, Fraternité. Gondolatok a szocialista rendszer összeomlását követő változásokról”", Kornai J.: Gondolatok a

kapitalizmusról. Négy tanulmány. Budapest: Akadémiai Kiadó, pp. 185-206.

Kovács, G. (2020), "A termékfejlesztésből eredő fogyasztói értéktöbblet mérése az aukciós ármeghatározás módszerével", Vezetéstudomány-Budapest Management Review, Vol. 51 No. 7-8, pp. 77-88.

Kozlenkova, I. V., Samaha, S. A. and Palmatier, R. W. (2014), "Resource-based theory in marketing", Journal of the Academy of Marketing Science, Vol. 42 No. 1, pp. 1-21.

Kuester, S., Homburg, C. and Hildesheim, A. (2017), "The catbird seat of the sales force: How sales force integration leads to new product success", International Journal of Research in Marketing, Vol. 34 No. 2, pp. 462-479.

Li, Y., Li, G., Feng, T. and Xu, J. (2019), "Customer involvement and NPD cost performance: the moderating role of product innovation novelty", Journal of Business & Industrial Marketing, Vol. 34 No. 4, pp. 711-722.

Lin, R. J., Chen, R. H. and Chiu, K. K. S. (2010), "Customer relationship management and innovation capability: an empirical study", Industrial Management & Data Systems, Vol. 110 No. 1, pp. 111-133.

Mahr, D., Lievens, A. and Blazevic, V. (2014), "The value of customer cocreated knowledge during the innovation process", Journal of Product Innovation Management, Vol. 31 No. 3, pp. 599-615.

Makadok, R. (2001), "Toward a synthesis of the resource-based and dynamic-capability views of rent creation", Strategic management journal, Vol. 22 No. 5, pp. 387-401.

Malshe, A. and Biemans, W. G. (2014), "The role of sales in NPD: An investigation of the US health-care industry", Journal of Product Innovation Management, Vol. 31 No. 4, pp. 664-679.

Melton, H. and Hartline, M. D. (2015), "Customer and employee co-creation of radical service innovations", Journal of Services Marketing, Vol. 29 No. 2, pp. 112-123.

Menguc, B., Auh, S. and Yannopoulos, P. (2014), "Customer and supplier involvement in design: The moderating role of incremental and radical

innovation capability", Journal of Product Innovation Management, Vol. 31 No. 2, pp. 313-328.

Mintzberg, H. (1983), Structures in Fives: Designing Effective Organisations, Prentice-Hall, London.

Mitrega, M., Spacil, V. and Pfajfar, G. (2020), "Co-creating value in post-communists contexts: capability perspective", Journal of Services Marketing, Vol. 35 No. 2, pp. 169-181.

Moeller, S. (2008), "Customer integration—a key to an implementation perspective of service provision", Journal of service research, Vol. 11 No. 2, pp. 197-210.

Moorman, C. (2016), "12 reasons you aren't making use of customer insights", American Marketing Association (https://www.ama.org/publications/MarketingNews/Pages/12-reasons-making-use-customer-insights.aspx#sthash.DYa2dVyC.dpuf) retreived: 18.04.2016.

More, R. (2011), "What is success in innovation", Ivey business journal, Vol. 75 No. 4, pp. 1-6.

Morgan, T., Anokhin, S. A., Song, C. and Chistyakova, N. (2019), "The role of customer participation in building new product development speed capabilities in turbulent environments", International Entrepreneurship and Management Journal, Vol. 15 No. 1, pp. 119-133.

Nardi, V. A. M., Jardim, W. C., Ladeira, W. J. and Santini, F. (2020), "A meta-analysis of the relationship between customer participation and brand outcomes", Journal of Business Research, Vol. 117 No. 9, pp. 450-460.

Nunnally, J. C. (1967), Psychometric theory, McGrow-Hill, New York.

OECD (2000), "SME Outlook", https://doi.org/10.1787/1999138x.

Olson, E. M., Slater, S. F. and Hult, G. T. M. (2005), "The performance implications of fit among business strategy, marketing organization structure, and strategic behavior", Journal of Marketing, Vol. 69 No. 3, pp. 49-65.

Pataki, B. (1996), "Mérnökök és marketingesek együttműködése a termékfejlesztésben", Vezetéstudomány, Vol. 27 No. 4, pp. 17-21.

Pee, L. G. (2016), "Customer co-creation in B2C e-commerce: does it lead to better new products?", Electronic Commerce Research, Vol. 16 No. 2, pp. 217-243.

Persson, A. and Ryals, L. (2014), "Making customer relationship decisions: Analytics v rules of thumb", Journal of Business Research, Vol. 67 No. 8, pp. 1725-1732.

Piller, F. T. and Walcher, D. (2006), "Toolkits for idea competitions: a novel method to integrate users in new product development", R&D Management, Vol. 36 No. 3, pp. 307-318.

Piskóti, I. (2016), "A business marketing identitása - elméleti, kutatási trendek, az innováció vezérelt modell", Vezetéstudomány, Vol. 47 No. 4, pp. 35-44.

Plé, L. and Chumpitaz, R. (2009), "Not always co-creation: introducing interactional co-destruction of value in service-dominant logic", Journal of Services Marketing, Vol. 24 No. 6, pp. 430-437.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y. and Podsakoff, N. P. (2003), "Common method biases in behavioral research: A critical review of the literature and recommended remedies", Journal of Applied Psychology, Vol. 88 No. 5, pp. 879-903.

Porter, M. E. (1980), Competitive strategy, Free Press, New York.

Prahalad, C. K. and Ramaswamy, V. (2004), "Co-creation experiences: The next practice in value creation", Journal of interactive marketing, Vol. 18 No. 3, pp. 5-14.

Preacher, K. J. and Hayes, A. F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", Behavior Research Methods, Vol. 40 No. 3, pp. 879-891.

Saldanha, T., Mithas, S. and Krishnan, M. S. (2017), "Leveraging customer involvement for fueling innovation: The role of relational and analytical information processing capabilities", MIS quarterly, Vol. 41 No. 1, pp. 267-286.

Schumpeter, J. A. (1934), The Theory of Economic Development, Oxford University Press, Oxford.

Solazzo, G., Elia, G. and Passiante, G. (2021), "Defining the big social data paradigm through a systematic literature review approach", Journal of Knowledge Management, Vol. ahead-of-print

Srivastava, R. K., Shervani, T. A. and Fahey, L. (1998), "Market-based assets and shareholder value: A framework for analysis", Journal of marketing, Vol. 62 No. 1, pp. 2-18.

Stanko, M. A. and Bonner, J. M. (2013), "Projective customer competence: Projecting future customer needs that drive innovation performance", Industrial marketing management, Vol. 42 No. 8, pp. 1255-1265.

Stendahl, M. (2009), "Management of product development projects in the wood industry", Scandinavian Journal of Forest Research, Vol. 24 No. 5, pp. 434-447.

Storey, C. and Larbig, C. (2018), "Absorbing customer knowledge: how customer involvement enables service design success", Journal of Service Research, Vol. 21 No. 1, pp. 101-118.

Szakály, D., Berényi, L. and Harangozó, Z. (2006), "Gyorsított fejlesztés-Integrált irányítás-Az After Market környezet kihívásai", Marketing & Menedzsment, Vol. 40 No. 2-3, pp. 49-64.

Szunyogh, Z. (2010), "Az innováció mérésének módszertani kérdései", Statisztikai Szemle, Vol. 88 No. 5, pp. 492-507.

Tang, Y. E. and Marinova, D. (2019), "When less is more: the downside of customer knowledge sharing in new product development teams", Journal of the Academy of Marketing Science.

Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", British Journal of Management, Vol. 14 No. 3, pp. 207-222.

Tseng, F.-M. and Chiang, L.-L. L. (2016), "Why does customer co-creation improve new travel product performance?", Journal of Business Research, Vol. 69 No. 6, pp. 2309-2317.

Weiss, D. S. and Legrand, C. (2011), Innovative intelligence: The art and practice of leading sustainable innovation in your organization, John Wiley & Sons.

Yang, F. and Zhang, H. (2018), "The impact of customer orientation on new product development performance", International Journal of Productivity and Performance Management, Vol. 67 No. 3, pp. 590-607.

Zhang, H. and Xiao, Y. (2020a), "Customer involvement in big data analytics and its impact on B2B innovation", Industrial Marketing Management, Vol. 86, pp. 99-108.

Zhang, H. and Xiao, Y. (2020b), "Customer involvement in big data analytics and its impact on B2B innovation", Industrial Marketing Management, Vol. 86 No. 4, pp. 99-108.

Zhang, H. and Yang, F. (2016), "The impact of external involvement on new product market performance", Industrial Management & Data Systems, Vol. 116 No. 8, pp. 1520-1539.

Zhao, X., Lynch, J. G. and Chen, Q. (2010), "Reconsidering Baron and Kenny: Myths and truths about mediation analysis", Journal of Consumer Research, Vol. 37 No. 2, pp. 197-206.

Zhao, Y., Feng, T. and Shi, H. (2018), "External involvement and green product innovation: The moderating role of environmental uncertainty", Business Strategy and the Environment, Vol. 27 No. 8, pp. 1167-1180.

5 APPENDIX

1. Survey questions

MARKETING KNOWLEDGE MANAGEMENT AND COMPETITIVENESS

1. Customer involvement To what extent do you involve your customers to the process of new product development?"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
Our customers are actively involved in NPD projects	1 2 3 4 5 6 7
Customers were involved at every stage of the project	1 2 3 4 5 6 7
There is a wide variety of methods and channels we apply to involve our customers	1 2 3 4 5 6 7
The frequency of the meetings with customers is high during new product development	1 2 3 4 5 6 7
Customers are involved in identifying the directions of innovation	1 2 3 4 5 6 7

Customers are involved in generating new product ideas	1 2 3 4 5 6 7
Our customers are involved in testing and evaluating new products	1 2 3 4 5 6 7

2. NPD innovativeness "Please evaluate the firm's / business unit's new product development performance"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
We enter first-to-market with our product innovations	1 2 3 4 5 6 7
We have more product innovations than our competitors	1 2 3 4 5 6 7
Our NPDs were more successful than our competitors'	1 2 3 4 5 6 7
Our NPDs were more novel and innovative compared to my competitors'	1 2 3 4 5 6 7
The market response to my NPDs were more positive than to my competitors'	1 2 3 4 5 6 7

3. NPD performance "Please evaluate the firm's / business unit's new product development performance"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
NPD sales goals relative to stated objectives	1 2 3 4 5 6 7
NPD return on investment related to stated objectives	1 2 3 4 5 6 7
NPD return on assets related to stated objectives	1 2 3 4 5 6 7
NPD profitability relative to stated objectives	1 2 3 4 5 6 7

4. Market turbulence "To what extent are the following statements specific to your firm / business unit?"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
In our kind of business, customers' product preferences change quite a bit over time	1 2 3 4 5 6 7
Our customers tend to look for new products all the time	1 2 3 4 5 6 7
We are witnessing demand for my products and services from customers who never bought them before	1 2 3 4 5 6 7
New customers tend to have product related needs that are different from those of my existing customers	1 2 3 4 5 6 7

5. Sales-marketing encroachment "Please evaluate the extent to which sales is involved in carrying out the following tasks!" seven-point Likert (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
Active participation in market research tasks (e.g., analysis of market potential)	1 2 3 4 5 6 7
Active participation in service tasks (e.g., definition of product-related services and training offers)	1 2 3 4 5 6 7
Active participation in various strategic tasks (e.g., definition of a market strategy)	1 2 3 4 5 6 7
Active participation in product-development related tasks (e.g., design and introduction of new products)	1 2 3 4 5 6 7
Active participation in pricing-related tasks (e.g., definition of price positioning, discounts, and price promotions)	1 2 3 4 5 6 7

6. Product specificity "To what extent are the following statements specific to the products / services of your firm / business unit?"; seven-point Likert scale (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
Our products/services are very complex	1 2 3 4 5 6 7
The content of the product we produce is specific	1 2 3 4 5 6 7
Specific knowledge is needed to fully understand the benefits our products bring	1 2 3 4 5 6 7

7. Differentiation strategy "To what extent are the following statements describing the strategy of your firm / business unit?"; (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
Our firm / business unit emphasizes competitive advantage through superior products	1 2 3 4 5 6 7
Our firm / business unit emphasizes building up a premium product or brand image	1 2 3 4 5 6 7
Our firm / business unit emphasizes new product development	1 2 3 4 5 6 7

8. Knowledge sharing "To what extent colleagues in your firm / business unit would be willing to share their knowledge?"; (1 = "Not at all," and 7 = "To a large extent")	1 = "Not at all," and 7 = "To a large extent"
I would allow my colleague to spend significant time observing and collaborating with me for him/her to better understand and learn from my work	1 2 3 4 5 6 7
I would willingly share with my colleague rules of thumb, tricks of the trade and other insights	1 2 3 4 5 6 7
I would willingly share my new ideas with my colleague	1 2 3 4 5 6 7

9. Firm net income "How much was your firm's / business unit's net income in thousands of forints last year?	…….. HUF
10. Firm size "Approximately how many people the company employs in Hungary?"	1.) -20 2.) 20-99 3.) 100-299 4.) 300-499 5.) 500-999 6.) 1000-4999 7.) 5000-