Measuring the unmeasured:
An exploratory study of customer co-creation

Shinta Ayunia (4187695)
2013
Measuring the unmeasured: 
An exploratory study of customer co-creation

Master Thesis for MSc. Management of Technology

Prepared by:

Shinta Ayunia (4187695)  
MSc. Management of Technology 
Faculty of Technology, Policy, and Management 
Delft University of Technology

Graduation Committee:

Prof. Dr. Cees Van Beers 
Dr. J.Roland Ortt 
Dr. Erik den Hartigh 
Dr. Haiko van der Voort
Preface

At last, the two year journey is complete and I would not be here without the help and support from a long list of people that have been with me from the start.

First of all, I would also like to thank Prof. Cees van Beers as the chairperson of my graduation committee, for allowing me to graduate in this topic. I am deeply grateful to both of my first supervisors, Dr. Erik den Hartigh, and, Dr. J.Roland Ortt for taking me under your wings, giving me the opportunity to work on this topic of my interest, providing crucial feedback, helping to keep it simple and providing constant guidance throughout the process. I would also like extend my gratitude to my second supervisor Dr. Haiko van der Voort, for providing me with feedback as a decision making expert and also giving me exciting ideas to keep my research going.

Recognition is also given to the Ministry of Communication and Information Technology of Indonesia that has given me the chance to come to the TU Delft and complete my studies under their scholarship. I also would like to thank to Ms. Marja Brand, and John Stals who helped me during difficult times while keep on motivating me to finish this study.

A big warm thank you goes out to all my friends that I have met along the way here in the Netherlands, especially fellow survivors of MoT, EPA, and SEPAM at TPM. Thank you for the extraordinary friendship and experience during the last two years. A special thank you goes out to Pratap Thapa for being my rock throughout the process, especially in times of doubt. I would like to thank my “Indonesian Mafia” that has showed unconditional love and support as my second family in Delft.

Finally I would like to show my love to my amazing family, without them I would not be here at all. They have shown unconditional love and support through my whole two year journey in the Netherlands. I owe them everything. Above all and the most importantly, thanks to God the Almighty for each of His blessings.

Delft, November 2013
Shinta Ayunia
Executive Summary

A shift is happening across industries, the traditional firm-centric, product-centric, service-centric meaning of value and the process of value creation paradigm is being challenged by personalized consumer experiences paradigm. Customer co-creation, as the up-and-coming paradigm might provide an answer for the posed challenges of today’s world.

Customer co-creation emerges created at the intersection of different fields of knowledge such as design, marketing and innovation. Therefore, the concept of customer co-creation has been described through different lenses of research. This in turn lead to no consensus of what customer co-creation is. Moreover claims on the implementation of customer co-creation implementation in innovation process, could lead to sustainable competitive advantage. Although such claims has been made, there is no measurement instrument develop for customer co-creation that will help researcher in proving this causal relationship. Therefore before researches on testing and proving relation between customer co-creation and other concepts such as sustainable competitive advantage could be done, a construct of customer co-creation should first be proposed. One characteristic of construct is that it is measurable. This construct is a foundation for developing measures of customer co-creation.

The objectives of this research are to summarize previously-researched co-creation concepts and furthermore propose a construct of customer co-creation, and to propose measures of co-creation. Before recommendations on measures of customer co-creation can be given; a construct needs to be defined first.

Serving as building blocks for the customer co-creation construct are the dimensions of customer co-creation. Dimensions of customer co-creation were identified and validated from literature review and academia interview. In total 15 dimensions are identified. This research uses nomological network to build the construct. Nomological network is a representation of the concepts of interest in a study, their observable manifestations, and the interrelationships among and between these. It is a tool to ensure construct validation of a construct. After a validated dimensions of co-creation were obtained, a categorization is done to these dimensions using customer co-creation related concepts as categories (refer to following table) to draw the interrelationships of among the concepts. In categorizing, a sorting task with Management of Technology students as respondents was done to ensure the face validity. Since no empirical data for any dimension was collected during the research, the nomological network is preliminary in nature.
From this process a proposed definition of customer co-creation was formulated.

“Customer co-creation is a tool used in innovation process that engages customers as active problem owners in collaboration with firm, during which different size and types of customer groups might participate in the process that is governed and stimulated by the firm to create co-created values as expected in the initiation.”

Upon defining the construct of co-creation using nomological network, it is possible to operationalize customer co-creation by defining the methodology and indicators. However the indicators and methodologies presented here are suggestive. These indicators and methodologies are formulated through literature review and interviews with industry experts.

The findings of this research are relevant not only for researcher but also for firm manager. The results achieved in this research are relevant for both researcher and firm. This research serves as a starting point for researcher who aspires to enrich the body of knowledge on customer co-creation measurement. As for firm, the insights from this research can be used in different ways, as a base to decide on co-creation implementation, to measure performance, or to evaluate previous co-creation activities, depending on the stage of co-creation implementation the firm is in.
## Contents

1  Introduction .................................................................................................................. 11

1.1  Background .................................................................................................................. 11

1.2  Previous Research ....................................................................................................... 12

1.3  Conceptual model ......................................................................................................... 13

1.4  Research Objectives and Research Question ............................................................... 13

1.4.1  Research Objectives ................................................................................................. 14

1.1.1  Research Question ..................................................................................................... 14

1.5  Research Scope ............................................................................................................. 15

1.6  Research Approach ....................................................................................................... 16

1.7  Report Outline ............................................................................................................. 18

2  Theoretical Framework : Customer Co-creation ............................................................ 19

2.1  Relevancy of Customer Co-Creation .......................................................................... 19

2.1.1  Firm Perspective ......................................................................................................... 19

2.1.2  Customer Perspective ............................................................................................... 20

2.2  Definitions of Customer Co-Creation .......................................................................... 21

2.3  Conceptualising Customer Co-Creation : Existing Models ........................................ 24

2.3.1  Co-Creation as a Continuum .................................................................................... 24

2.3.2  DART model ............................................................................................................. 25

2.3.3  Diamond of Value Creation for Co-Creation ............................................................ 27

2.3.4  A Reference Model of Co-Creation ......................................................................... 27

2.3.5  Taxonomic Model of Co-creation ............................................................................ 29

2.4  Dimensions of Customer Co-Creation ....................................................................... 30

2.4.1  Co-created Values ..................................................................................................... 30

2.4.2  Collaboration Platform .............................................................................................. 30

2.4.3  Duration .................................................................................................................... 30

2.4.4  Governance ............................................................................................................... 31

2.4.5  Firm’s internal support system ............................................................................... 32

2.4.6  Impediments of co-creation .................................................................................... 32

2.4.7  Initiator ..................................................................................................................... 33
2.4.8 Level of Intimacy ............................................................................................................. 33
2.4.9 Locus of Interaction ....................................................................................................... 33
2.4.10 Motivation ....................................................................................................................... 35
2.4.11 Number of Participating Co-Creators ........................................................................... 36
2.4.12 Nature of Business Relationship .................................................................................. 37
2.4.13 Purpose ........................................................................................................................… 37
2.4.14 Stimulators ...................................................................................................................... 38
2.4.15 Type of Co-creators ...................................................................................................... 38
2.4.16 Unit of Analysis .............................................................................................................. 39
2.5 Benefits and Costs of Customer Co-Creation ................................................................... 39
2.6 Risk of Implementing Customer Co-Creation: Value co-destruction ................................. 40
2.7 Chapter Conclusion ............................................................................................................ 41
3 Research Methodology ....................................................................................................... 43
  3.1 Research Design ............................................................................................................... 43
    3.1.1 Preparation .................................................................................................................... 43
    3.1.2 Data Collection ............................................................................................................. 46
    3.1.3 Data Analysis ................................................................................................................ 49
  3.2 Building Co-Creation Construct: Nomological Network ................................................... 50
  3.3 Designing Measures of Co-Creation ............................................................................... 53
  3.4 Chapter Conclusion ........................................................................................................... 54
4 Customer Co-Creation as a Construct .............................................................................. 56
  4.1 Designing the Construct .................................................................................................... 56
    4.1.1 Defining Customer Co-Creation Dimensions .............................................................. 56
    4.1.2 Validating the Dimensions .......................................................................................... 56
    4.1.3 Categorizing the Dimensions ..................................................................................... 57
  4.2 Dimensions of Customer Co-Creation ............................................................................ 57
    4.2.1 Co-created (or Co-Destructed) Values ....................................................................... 57
    4.2.2 Collaboration Platform ............................................................................................... 58
    4.2.3 Duration ....................................................................................................................... 59
    4.2.4 Firm’s Internal Support System ................................................................................... 60
    4.2.5 Governance .................................................................................................................. 60
    4.2.6 Impediments of Co-Creation ...................................................................................... 61
4.2.7 Initiator........................................................................................................................................... 62
4.2.8 Level of Intimacy .......................................................................................................................... 63
4.2.9 Locus of Interaction ....................................................................................................................... 64
4.2.10 Motivation (Customer-Perspective) ............................................................................................ 64
4.2.11 Purpose ....................................................................................................................................... 65
4.2.12 Size of Co-Creating Groups ........................................................................................................ 65
4.2.13 Stimulators .................................................................................................................................. 66
4.2.14 Type of Co-creators .................................................................................................................... 66
4.2.15 Use of Mediator .......................................................................................................................... 67
4.3 Interdependence and Categorization of Co-Creation Dimensions .................................................. 68
4.4 Customer Co-Creation Construct .................................................................................................. 69
4.5 Chapter Conclusion .......................................................................................................................... 72
5 Designing Measurement for Customer Co-Creation ............................................................................ 75
5.1 Obtaining the Data for Measurement .............................................................................................. 76
5.1.1 Primary Data .................................................................................................................................. 76
5.1.2 Secondary Data .............................................................................................................................. 77
5.2 Measuring Dimensions of Co-creation ............................................................................................ 78
5.1.1 Co-Created (or Co-Destroyed) Values.......................................................................................... 78
5.1.2 Collaboration Platform .................................................................................................................. 80
5.1.3 Duration (Firm-Perspective) .......................................................................................................... 81
5.1.4 Firm’s Internal Support System ..................................................................................................... 82
5.1.5 Governance .................................................................................................................................... 83
5.1.6 Impediments of Co-Creation ......................................................................................................... 83
5.1.7 Initiator .......................................................................................................................................... 84
5.1.8 Level of Intimacy ............................................................................................................................ 85
5.1.9 Locus of Interaction ....................................................................................................................... 86
5.1.10 Motivation (Customer-Perspective) .......................................................................................... 87
5.1.11 Purpose (Firm-Perspective) ......................................................................................................... 87
5.1.12 Size of Co-Creating Groups ........................................................................................................ 88
5.1.13 Stimulators (Firm-Level) .............................................................................................................. 89
5.1.14 Type of Co-Creators .................................................................................................................... 90
5.1.15 Use of Mediator .......................................................................................................................... 91
5.3 A Guide for Future Research on Measuring Co-creation ................................................................. 92
5.4 Managerial Implications .................................................................................................................. 96
5.5 Chapter Conclusion .......................................................................................................................... 97
6 Conclusion and Recommendations .................................................................................................. 100
   6.1 Conclusion .................................................................................................................................. 100
   6.2 Reflections and Research Limitations ....................................................................................... 104
      6.2.1 Reflections .......................................................................................................................... 104
      6.2.2 Research Limitations ......................................................................................................... 105
   6.3 Recommendations ....................................................................................................................... 106
Bibliography ........................................................................................................................................ 108
Appendices .......................................................................................................................................... 111
List of Figure

Figure 1. Conceptual model ........................................................................................................ 13
Figure 2. Focus of current research ........................................................................................... 13
Figure 3 Research Approach ...................................................................................................... 16
Figure 4. Report outline ............................................................................................................. 18
Figure 5. Illustration of Co-creation as differing implementation degree (Source: Bhalla, 2010) .... 24
Figure 6. Co-production to Co-creation Matrix (Source: Chathoth, 2013) ................................. 25
Figure 7. DART model of Co-creation (Source: Prahalad & Ramaswamy, 2004) ..................... 25
Figure 8. Co-creation as expanding conventional value creation [Source: Ramaswamy & Gouillart (2010)] .......................................................... 27
Figure 9. A reference model of co-creation ................................................................................ 28
Figure 10. Differences in co-creation choices across B2B and B2C contexts .............................. 29
Figure 11. Taxonomic model of co-creation (Source: Zwass, 2010) .......................................... 29
Figure 12. Co-creation locus in product lifecycle ....................................................................... 35
Figure 13. Literature review illustration - snowball method ....................................................... 47
Figure 14. Process of data analysis ............................................................................................ 50
Figure 15 Steps in building co-creation construct ..................................................................... 52
Figure 16. Procedure for Developing Better Measure (Source: Churchill, 1979) ................. 53
Figure 17. Co-created (or co-destructed) values as dimension of co-creation ......................... 58
Figure 18. Collaboration platform as dimension of co-creation ................................................ 59
Figure 19. Duration as dimension of co-creation ....................................................................... 59
Figure 20. Firm’s internal support system as dimension of co-creation ..................................... 60
Figure 21. Governance as dimension of co-creation ................................................................. 61
Figure 22. Impediments of co-creation as dimension of co-creation ........................................ 62
Figure 23. Initiator as dimension of co-creation ....................................................................... 62
Figure 24. Level of intimacy as dimension of co-creation ........................................................ 63
Figure 25. Locus of intimacy as dimension of co-creation ......................................................... 64
Figure 26. Motivation as dimension of co-creation ................................................................... 64
Figure 27. Purpose as dimension of co-creation ....................................................................... 65
Figure 28. Size of co-creating groups as dimension of co-creation .......................................... 66
Figure 29. Stimulators as dimension of co-creation .................................................................. 66
Figure 30 Type of co-creators as co-creation dimension .......................................................... 67
Figure 31. Use of mediator as dimension of co-creation ............................................................ 67
Figure 32. Interdependence of Co-Creation Related Concepts .................................................. 69
Figure 33. Final construct of customer co-creation .................................................................... 71
Figure 39. Two possible delineation of dimension for measurement ........................................ 75
Figure 35. Types of Secondary Data and Examples of Source (Adapted from: Churchill & Iacobucci, 2009) .............................................................................................................. 77
Figure 40. Illustration on measuring co-created values ............................................................... 79
Figure 41 KPIs of co-creation result based on phase of innovation process ............................ 80
Figure 42. Illustration on measuring collaboration platform .................................................... 81
List of Tables
Table 1. Definitions of Co-Creation ................................................................. 22
Table 2. The concept of co-creation (Source: Prahalad & Ramaswamy, 2004) ......................... 26
Table 3. Types of co-created value (Adapted from Tynan, 2010) ........................................ 30
Table 4. Length of co-creation collaboration (Adapted from Roser, 2013) ............................. 31
Table 5. Characteristic of each level of co-creation implementation (Source: Bhalla, 2010) .... 33
Table 6. List of Possible Motivators of Co-Creation (Source: Zwass, 2010) ......................... 35
Table 7. Purpose of co-creation (Adapted from Roser, 2013) ........................................ 37
Table 8. List of co-creation academicians contacted for interview ..................................... 44
Table 9. List of co-creation practitioners contacted for interview ..................................... 45
Table 10. Research questions and data collection methods .............................................. 46
Table 11. List of Participating Academia ........................................................................... 48
Table 12. List of Participating Practitioners ........................................................................ 48
Table 13. Result of Sorting Task for the Nomological Network ........................................... 69
Table 14. Innovation models evolution ............................................................................. 112
Table 15. Product Development Decisions within a Project .............................................. 113
1 Introduction

“It ain’t what you don’t know that gets you into trouble. It’s what you know for sure that just ain’t so.”
Mark Twain

1.1 Background
A shift is happening across industries, the traditional firm-centric, product-centric, service-centric meaning of value and the process of value creation paradigm is being challenged by personalized customer experiences paradigm (Prahalad & Ramaswamy, 2004). This new paradigm implies that a previously firm-centric view of value creation effort is now seen as a joint effort between customer and the firm. Furthermore, it changes the role of customer from a passive recipient of value to an active role, by enabling customer in becoming the co-creator of her own experience and value with the firm. Therefore, both customer and firm are active actors in both the joint problem definition and problem solving process.

Co-creation, as the up-and-coming paradigm might provide an answer for the posed challenges of today’s world. Several research results argued that co-creation of value is an important source of competitive advantage especially in current converging business environment (Chung, 2009; Zhang & Chen, 2008). Another research showed that a deeper and more frequent communications and interactions between a firm and its customers, two characters of co-creation, are the determinants for product success and later market success (Kristensson, Gustafsson, & Witell, 2011). Moreover, the strategic importance of customer involvement in value creation with firm’s cross-functional team implies that a new strategy is required to increase the probability of the product success (Zhang & Chen, 2008). In a more comprehensive manner, this strategy would give guidelines not only on the commercialization phase of the product, but also on the entire innovation process phases.

In co-creation, multiple points of interaction between customers and the firm will be seen as the locus of value creation. Since the predictability of experience that a customer will have during the process is second to none, it is imperative for firms to create a robust experience environment (Durugbo, Hutabarat, Tiwari, & Alcock, 2011). Furthermore, in order to ensure the effectiveness of the process a co-creation management plan is necessary. This is for both, to have a better co-creation result and reduces the frustration of company managers, making the paradigm shift smoother for the firm (Zhang & Chen, 2008). Likewise, the construct of co-creation has been the focus of a number of researches, yet there is no consensus of what co-creation is. For example in their paper published in 2008, Prahalad and Ramaswamy expand the co-creation paradigm by extending the related actors list with suppliers. This implies that the co-creation is still a growing; not yet mature concept, where a proposed definition of construct would help current state of knowledge.
1.2 Previous Research
In 1986, Eric von Hippel publish a paper in which he proposed that firms producing high-technology products or novel products should collaborate with lead users, since most potential users i.e. mass market customers do not have the skill and knowledge to solve the problem. In the same paper, he explored how the collaboration could be done and how the results could be incorporated into industrial and customer marketing research analyses (von Hippel, 1986). This research of lead user analysis is the antecedent of co-creation concept.

Between 1986 and 2004 there were some researches focusing on collaborative innovation. Nevertheless, it was not until 2004 when Prahalad and Ramaswamy coined the co-creation terminology. It challenges the traditional firm-centric view of value creation by suggesting a different process. In co-creation, individual customers should be able to choose method and depth of involvement with the firm based on individual preference (Prahalad & Ramaswamy, 2004). In the same paper, A DART (Dialogue, Access, Risk Benefits, and Transparency) model which elaborates on the building blocks of firm-customers interaction that support co-creation experience was also introduced. The two-way nature of co-creation requires firms to create a robust experience platform so that customer are empowered to co-construct a personalized experience (Prahalad & Ramaswamy, 2003).

Since the introduction of the terminology, research interest on the subject has been growing. Its rapid growth is driven by the awareness of the central role of cumulative knowledge of key stakeholders such as customers and employee in maintaining competitiveness and information sharing (Chung, 2009; Durugbo, Hutabarat, et al., 2011). The importance of co-creation is considered a strategic one, and in itself can be seen as a strategy such as a learning strategy (Chung, 2009) or business strategy (Ramaswamy & Gouillart, 2010; Sawhney, Verona, & Prandelli, 2005).

Most of the literatures on co-creation have a focus in developing theoretical foundations and the testing of the conceptual frameworks for understanding co-creation dimensions. Dimensions such as frequency, direction, modality, and content of communication (Kristensson et al., 2011) or the types of value created from co-creation (Tynan, McKechnie, & Chhuon, 2010) were tested. Furthermore, these foundations have been used in research within telecommunication industry (Matthing, Sandén, & Edvardsson, 2004), retail industry (Oh & Teo, 2010), and pharmaceutical and automotive industry (Sawhney et al., 2005). In spite of this research trend, a consensus on co-creation construct has yet to be made.

A popular stream of co-creation research is aiming at exploring the value co-creation process. As seen in work of Durugbo (2011), where customer practices and group formation methodologies in co-creation process has been identified (Nuttavuthisit, 2010; Payne, Storbacka, & Frow, 2008; Roberts, 2008; Vargo & Lusch, 2008). Moreover, there has also been research on the co-creation process within innovation efforts, although it is still rare but it has been done before, in FMCG context (Roberts, Baker, & Walker, 2005). A comparative study of co-creation methodologies has also been done, proposing a unified co-creation model using previously researched methodologies (Durugbo, Riedel, & Pawar, 2011).
1.3 Conceptual model
A conceptual model has been formulated beforehand to narrow the research scope and to gain more focus. The following conceptual model (Fig 1.) was created during preliminary literature review using snowball method to identify ten most relevant papers. An explanation about snowball method could be found in chapter 3.

![Conceptual model](image)

The conceptual model proposes that co-creation implementation will affect the innovation process, and in turn sustainable competitive advantage. By implementing it in the existing innovation process it is proposed that co-creation will be able to both fulfill customer’s needs, create a unique experience and bond with the firm. Since experience is something that could not be easily imitated by the competitors, it suggests that it will create sustainable competitive advantage for a firm.

This research, (Fig 2.) due to time constraints will focus on the measuring co-creation. Nevertheless the linkage between co-creation and innovation process is acknowledged. Moreover, the proposition of sustainable competitive advantage as a dependent variable in this model will not be elaborated. Though, an argumentation why co-creation implementation in a firm’s innovation process might lead to the creation of sustainable competitive advantage will be given by exploring co-creation benefits.

![Focus of current research](image)

1.4 Research Objectives and Research Question
This research is done as a final thesis project, a requirement in completing Management of Technology Master programme of TU Delft. A thesis report was delivered upon the completion of the research. Moreover, the final thesis report is intended primarily for three audiences. First, it is hoped that new researchers entering the field of innovation management (e.g., master students, and PhD students) can benefit from this research. Second, it is also addressed to experienced researchers who are interested in exploring co-creation construct and its implementation in the innovation process. Three, firm managers who work at a considering to implement co-creation, or at firm where co-creation is in the process of implementation, or at a firm where co-creation has been implemented, will also find this research relevant.
1.4.1 Research Objectives
The objectives of this research are two-fold:

1. To summarize previously-researched customer co-creation concepts and furthermore propose a construct of co-creation.
2. To propose measures of customer co-creation

The main objective of this research is to propose a way to measure customer co-creation. The measures are meant to be used in the context of innovation process, i.e. co-creation implemented in the innovation process. By doing so, an initial list of indicators of co-creation effort will also be recommended. Though an elaborate analysis using these indicators will not be done in this research, and is considered as out of the scope of this research.

Nevertheless, before defining a list of indicators of co-creation measures, it is essential that co-creation as a construct is defined first. By doing so boundaries will be made clear and this will then set a domain of research. Therefore, this research also has a second objective, which is to propose a construct of co-creation.

Aligned with the objectives, there are two deliverables which are going to be delivered at the completion of the research:

1. A construct of co-creation
2. Suggestive indicators for measuring co-creation process

1.1.1 Research Question
The thesis project will aim to answer the following research question:

How to operationalize customer co-creation so that further research on customer co-creation can be done and the implementation of customer co-creation in innovation process can be facilitated?

In order to achieve the research objectives, the aforementioned research question will be divided into the following sub-questions:

1. What is customer co-creation?
   In order to be able to operationalize co-creation, the researcher needed to explore on the existing concept and perspective of co-creation. Different streams of literature will be investigated, aiming for a comprehensive view on co-creation.

2. What are the dimensions of customer co-creation?
   With the aim of understanding co-creation, the phenomenon was delineated into dimensions which serve as its building blocks. Critical dimensions were also identified. A dimension is considered to be a critical one when only after purposely deciding upon this dimension co-creation could be implemented in the innovation process.
3. How could customer co-creation be measured?
   Before the researcher delves into the effort of operationalizing co-creation, it is imperative to define the steps to do so. One particular methodology was chosen and used in giving recommendations on measuring customer co-creation.

4. What indicators can be used to characterize customer co-creation process?
   By asking this question, a measurement instrument of co-creation can be created. The indicators explained would be suggestive ones, since they would not be validated through further analysis. For each dimension, a set of indicators would be recommended. A preliminary view on the suitable methodology would also be given.

1.5 Research Scope
In this sub-section, the research scope will be defined by explaining activities that were done during the research and the ones that were not conducted to draw a clear boundary of the research. Furthermore, the research scope is aligned with the objectives of this research.

This research was a qualitative research, exploratory in nature. Moreover in this research no specific industry context was chosen. Moreover, the unit analysis of the research was at an individual project level. Customer co-creation would then be treated as a methodology that could be implemented in innovation efforts. Although in practice researcher dove into firm-level factors such as firm’s internal support system; but this is necessary since it affects the implementation of co-creation in the project level. Moreover, in this research the relationship between customer co-creation and innovation process concepts were considered as out of scope. Therefore this research did not delve into the varieties of customer co-creation practices and did not focus on a specific implementation or practice of customer co-creation within the innovation process. Nevertheless this research acknowledged the relationship between these two concepts. In order to make an impact for a company, customer co-creation has to be implemented in the innovation process.

In gaining a broader view of co-creation, researcher relied on academic literature coming from different fields. Starting with the school of innovation, customer co-creation related literatures were examined. The search was then enlarged to decision-making, design, and marketing literature streams. No paper published by consulting firm or innovation intermediary was used in this process. A list of customer co-creation dimensions were produced as a result of this step.

To validate and complete the list of co-creation dimensions, expert interviews were used. Both academician and industry practitioners were interviewed. During these interviews concepts that could help in unifying or categorizing the dimensions of customer co-creation were also explored. Nevertheless further validation such as the application of these dimensions to analyse current or past customer co-creation activities done by firms have not been conducted. Therefore no comparison between one customer co-creation activities to another is provided.

The input from experts interviews were also used in building a nomological network of customer co-creation. A nomological network was a mean used in defining the construct, and in drawing the relations among customer co-creation related concepts through customer co-creation dimensions. The
nomological network proposed in this research was of a preliminary version, since it did not quantify the strength of the relationship.

For each dimension, indicators and methodology were proposed in the effort to measure co-creation. This research however was not meant to answer what would be the best indicators and methodology to measure co-creation. Therefore, indicators and methodology which are presented here are suggestive ones. Hence, no validation of indicators was given. This strategy takes into account the trade-off between depth and breadth of the research in the time constraint that the research had for master thesis project.

1.6 Research Approach

This research is a qualitative research. Due to the existing gap in the body of knowledge, this research is exploratory in nature. Following figure describes the research approach taken in this study.

To start the research, theories on qualitative research and trustworthiness of qualitative research will be studied in order to create a research protocol. The research proposal will contain detailed explanations about the study methodology, which serves as a guideline in doing the research. It will be structured in a way with the intention of giving concise guidance to do a systematic research and to increase reliability of the research result. After that a preliminary literature review was done to get an overview of current condition of customer co-creation research. In doing so researches on customer co-creation, innovation process, and sustainable competitive advantage were skimmed through. From this step the conceptual model explained in section 1.3 was created. Upon getting this conceptual model, researcher then used this to draw the boundary of the scope. As explained in section 2.3 this research focus on co-creation
measurement, although a relationship between co-creation and innovation process is acknowledged. A deeper literature review on customer co-creation was also done in this step. The outputs of this step are theoretical framework, including proposed list of dimensions of customer co-creation that would be used in later step to define customer co-creation construct.

Furthermore, in the second step the outputs from previous step were used in conjunction with expert interviews targeting academia as respondent. The objectives of the interviews were to gain insight about co-creation in general, validate co-creation dimensions construct while exploring the measurement instruments or indicators for co-creation. A validated list of customer co-creation dimensions was the output of this step.

In the last step of the research, a sorting task with TU Delft Management of Technology students or graduates as respondents in order to categorize the dimensions was done as the final step to define the construct of co-creation. Besides that, in this step expert interviews targeting practitioners were done. In combination with previous research of measurement methodology of customer co-creation dimensions the interview results were used to come up with recommendations for measuring co-creation. Therefore, a final deliverable of co-creation construct and recommendation on its measurements instruments or indicators was achieved. In doing so, the research protocol still served as guidelines for research.
1.7 Report Outline
Before starting the research, this sub-section intends to provide a visualized overview of the document structure of this research. Please consult Figure 1 for a graphical overview.

Figure 4. Report outline
2 Theoretical Framework: Customer Co-creation

“There is only one valid definition of business purpose: to create a customer. …. Therefore, any business enterprise has two – and only two – basic functions: marketing and innovation”

Peter Drucker

The core topic encompassed by this thesis is customer co-creation. Customer co-creation relates to the innovation process, since it is being implemented within the process. Nevertheless in this research the relationship between these two concepts were considered as out of scope. Therefore this research did not delve into the varieties of customer co-creation practices and did not focus on a specific implementation or practice of customer co-creation within the innovation process.

Co-creation term was coined by Prahalad and Ramaswamy (2004), as the next practice in value creation; it might be able to answer the challenge of creating customers. The shift from a firm-centric to personalized experience of value creation entails more frequent or more intense interaction between the firm and the customer. As customers begin to influence more parts of the business system, the interactions between them is becoming not only as the locus of value extraction, like the traditional market view, but also as locus of value creation (Prahalad & Ramaswamy, 2004).

2.1 Relevancy of Customer Co-Creation

In examining the growing number of co-creation practices in today’s business world, there are several factors that need to be taken into account. To be able to clearly delineate the relevancy of co-creation, these factors should be explained based on differing perspectives of firms and customers.

2.1.1 Firm Perspective

From the point of view of the firms, there are several main drivers backing up the implementation of customer co-creation. These drivers both come from both internal and external sources relative to the firm.

*Increasing competitions in the time of converging business*

In the era of converging business supported by ICT development, competitions are not only coming from firms within the same industry but also from different industries (Gassmann, 2006). With this growing number of competitions, shrinking profit margins there is even higher urge for a firm to maintain its competitive advantage by innovating (Prahalad & Ramaswamy, 2003). Moreover, traditional prescriptions such as cost reduction, reengineering and outsourcing, while critically important, cannot relieve the pressure from shrinking profit margin (Prahalad & Ramaswamy, 2003). Keeping customer’s needs in mind, some firms invited customers to their new product or service development process to enhance the experience customers get while using the products or services (Prahalad & Ramaswamy, 2004). Because even though products can be commoditized but co-creation experiences cannot be (Prahalad & Ramaswamy, 2004).
Raising awareness about the importance of cumulative knowledge of the key stakeholder

Cumulative knowledge which is usually come in the form of tacit knowledge is considered to be one of the key aspects in maintaining competitiveness. This started as early as when Adam Smith introduced the concept of division of labour, continued with the creation of the first assembly line by Ford emphasizing the tacit knowledge of the worker. However, different from before nowadays the accumulated knowledge is proposed to be leveraged and be used in junction with the knowledge of other actors i.e. customers, suppliers, and different business units, to co-create new values. The intangible and highly inimitable characteristics of the knowledge and the output of such interaction are argued to lead to a competitive advantage.

Economic shifts to emerging markets

The stagnant growth of developed markets have made firms looked into the opportunity of expanding its wings to the developing market. With 5.3 % annual growth compared to between 1.9% growth of developed markets, emerging markets are not to be dismissed (IMF, 2013). Nevertheless, the lower purchasing power, and different values and culture bring about challenges to the existing business model of the market. In order to become successful in the developing markets, firms would have to do more than to bring a plug-and-play products and services from the prior markets of developed countries. Moreover, technology firms constantly face a challenge in ensuring that their technological innovations are not merely a bundle of cutting-edge features and gadgets, but rather are designed in the service of customer needs (Thompson, Hamilton, & Roland, 2005)

Decreasing effectiveness of traditional market-learning efforts

With the raising competitions, customers are being offered with more alternatives to choose from. However, the increase of available alternatives is not accompanied with significant increase in customer’s satisfaction. Initiatives in market-learning that are done by firms to listen to the voice of customer [VoC] and to embed the result of it in firm offerings such as Focus Discussion Group and market research are not enough. This implies initiatives that not only listen but also engage customers in the making of firm offerings need to be taken.

Declining innovation success rates

Procter & Gamble, one of the leading company in FMCG industry serves as a good example. P&G lost more than half of its market capitalization when its share dropped to $52 from $118 (Bartl, Jawecki, & Wiegandt, 2010). Company executives took this as a cue that the traditional invent-it-ourselves model was not capable of sustaining the desired level of growth. Thereafter, a directive of collaboration with innovators outside the company for at least 50% innovation projects in P&G was imposed.

2.1.2 Customer Perspective

While looking from the customer’s eyes, there are several reasons why it makes sense for customers to collaborate and co-create.
The Rise of Educated and Knowledgeable Customer

The rise of internet and supported with the ubiquity of mobile telecommunication have made it easier for customer to seek for information, anytime, anywhere. With an easier access to information, the search cost entailing in a purchase decision is becoming less expensive. Customers could easily find the information about the available offerings; which lead to the rise of knowledgeable customer. The more knowledgeable customers are about the alternatives, the more articulated they are. In Von Hippel seminal piece, one of the reasons he proposed to co-create with the lead users is because they are able to articulate their needs in clearer manner as compared to the rest of the users. The emerging number of knowledgeable and educated customers means that the number of sources of knowledge waiting to be tapped is also rising. This increases the opportunity of customer-firm collaborations (Ramaswamy, 2009)

Customers are actively seeking ways to Collaborate

The development of ICT industry is also responsible for creating empowered customer. It amplifies the strength of the Voice of Customer and Word of Mouth to a completely different level. Customers are voluntarily, backed by different motivations, writing reviews on products/services in blogs or customers forums. Moreover, it created firms with business models such as tripadvisor where its value proposition lies on the feedback and reviews of travellers that are showcased transparently to other travellers. This movement implies a shift in the market role. Previously, a firm saw the market as merely a target for the firm’s offerings, where little meaningful interactions between firm-customers happened after they leave the market. But the situation development questions the status quo of market, showing a tendency that the market should be seen as the start of a journey of experiencing the value, offered by the firms, during the product/service-life cycle. In this way market could also be seen as a forum for co-creation experiences

2.2 Definitions of Customer Co-Creation

The term co-creation is used in many different streams of literature, ranging from innovation to e-commerce literature (Reay & Seddighi, 2012; Zwass, 2010). Many researchers employ the term of co-creation to illustrate how the changes in social, cultural, economic, and technological aspects of life allow different organisations, groups and individuals to interact, collaborate, and to solve problems by jointly generating solutions and creating value (Russo Spena, 2012).

This wide presence is understandable since the coincidence of multi developments: the ubiquity of internet technologies, the orientation towards services and experiences, a more open approach to innovation (Chesbrough, 2006) and the growth of social, collaboration and customization technologies are responsible for the emergence of co-creation. Moreover, this wide range presence is one of the reasons why a consensus on a definition of co-creation has not been reached. To give an illustration, below a list of co-creation definitions is given. Although the list is far from exhaustive, but it gives the illustration on the differing definitions and concepts of innovation.
<table>
<thead>
<tr>
<th>Source</th>
<th>Definitions of Co-creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown &amp; Hagel 2005</td>
<td>&quot;co-creation is a powerful engine for innovation: instead of limiting it to what companies can devise within their own borders, pull systems throw the process open to many diverse participants, whose input can take product and service offerings in unexpected directions that serve a much broader range of needs&quot;</td>
</tr>
<tr>
<td>Vargo, 2008</td>
<td>&quot;..co-creation is the integration of existing resources with those available from a variety of service systems that can contribute to system well-being as determined by the system’s environmental context&quot;</td>
</tr>
<tr>
<td>Payne, 2008</td>
<td>&quot;...(co-creation) is the relationship between the provider and the customer as a longitudinal, dynamic, interactive set of experiences and activities performed by the provider and the customer, within a context, using tools and practices that are partly overt and deliberate, and partly based on routine and unconscious behaviour&quot;</td>
</tr>
<tr>
<td>Kristensson et al., 2008</td>
<td>&quot;..co-creation is described as involving a high level of customer participation in customising the product or service, which requires collaboration with customers for the purpose of innovation&quot;</td>
</tr>
<tr>
<td>Kirah, 2009</td>
<td>&quot;...co-creation as the continual feedback loop and collaboration with all stakeholders in a value network throughout any given process of designing, developing and implementing meaningful products, services, organizational and strategic changes&quot;</td>
</tr>
<tr>
<td>Zwass, 2010</td>
<td>&quot;Co-creation is here treated broadly as the activities of individuals/customers/users in the production domain, generated independently or at the behest of producer organizations.&quot;</td>
</tr>
<tr>
<td>Ramaswamy, 2010</td>
<td>&quot;Co-creation is the process by which products, services, and experiences are developed jointly by companies and their stakeholders, opening up a whole new world of value.&quot;</td>
</tr>
<tr>
<td>Ramaswamy &amp; Gouillart, 2010</td>
<td>&quot;..co-creation is about putting the human experience at the center of the enterprise’s design.&quot;</td>
</tr>
<tr>
<td>Reay &amp; Seddighi, 2012</td>
<td>&quot;...(co-creation) have enabled a new form of innovation, co-creation, in which value is co-created by the company and customer, and exchanged with the customer.&quot;</td>
</tr>
<tr>
<td>Ind &amp; Coates, 2013</td>
<td>&quot;...co-creation (ought to be viewed) as a process that provides an opportunity for on-going interaction, where the organization is willing to share its world with external stakeholders and can generate in return the insight that can be derived from their engagement.&quot;</td>
</tr>
<tr>
<td>Roser, DeFillippi &amp; Samson, 2013</td>
<td>&quot;Co-creation is advocated as a means to expand the innovation and value creation capability of the firm, while nurturing customer relationships and lowering cost for marketing and research and development (R&amp;D) (from Sawhney et al., 2005; Prandelli et al., 2006; von Stamm, 2004)&quot;</td>
</tr>
</tbody>
</table>

From the above definitions it can be seen that there are differing concepts, some take co-creation as a process and some take co-creation as an end-result. Indeed, co-creation is both the means and the end
(Prahalad & Ramaswamy, 2004). Zooming in to the innovation literature, there are two different schools. One which sees the whole innovation process as a series of co-creation, proposing that the whole innovation process could be categorized into 5 different co-creation activities, co-ideation, co-evaluation, co-design, co-test, and co-launch (Russo-Spena & Mele, 2012). While the other sees co-creation as a means in creating a richer innovation and value creation which is being implemented in the innovation process.

An essential issue in defining the co-creation of services is providing the customer with the leverage to participate or interact in the production process. In such cases, according to Prahalad and Ramaswamy (2004), “the firm is still in charge of the overall orchestration of the experience.” Yes, they focus on customer experience, but their customers are basically treated as passive. Such companies disproportionately influence the nature of the experience. They are primarily product-centric, service-centric, and, therefore, company-centric. This show co-creation differs from the rest of collaboration methods. In co-creation customer is seen as an active partner in co-creating value. Hence, from its passive role in traditional market paradigm where firm is the problem owner now customer is considered to be the problem owner as well with joint problem definition and problem solving(Prahalad & Ramaswamy, 2004).

In a later research, an extended paradigm of co-creation was proposed (Ramaswamy, 2009). Here it was proposed that co-creation could also be done with suppliers and even competitors. Though it was noted that mostly co-creation was done with customers. In this research the co-creation phenomenon in scrutiny is indeed customer co-creation. Therefore co-creation with other parties are not within the scope of this research. Going forward, the term of customer co-creation and co-creation is used interchangeably in this report since the focus of this research is customer co-creation only.

In order to further explore this issue, a working definition of customer co-creation was adopted. It would be appropriate to see co-creation as a methodology which could be applied in the innovation process. Since in this research, assumes such relationship does exist due to the implementation of customer co-creation within innovation process. Bearing all this in mind, a working definition of customer co-creation combining the definition from Ramaswamy (2010) and Roser, DeFillippi & Samson (2013) which came from merging the work of Sawhney et al., 2005; Prandelli et al.,2006; von Stamm, 2004 was used. For this working definition, researcher decided not put the purpose of “…to and lowering cost for marketing and research and development (R&D)”, since it will constrict the notion of customer co-creation. Moreover, this implication of co-creation has not been empirically proved. To be noted, this working definition will be enriched as the research progresses. Hence, it is not the same as the final definition of customer co-creation.

“Customer co-creation is the process of expanding the innovation and value creation capability of the firm, by which products, services, and experiences are developed jointly by companies and their customers (existing, potential) while nurturing customer relationships”
2.3 Conceptualising Customer Co-Creation: Existing Models

In the quest of delineating the concepts of co-creation, researchers made models trying to capture the essence of co-creation. The aim of this sub-subsection is to capture the complexity of co-creation. Therefore, models presented here are the important ones. These models are not exhaustive and mutually exclusive in explaining all the available models of co-creation.

2.3.1 Co-Creation as a Continuum

In contrary to the view, where co-creation should be seen with a dichotomous approach in relation to co-production (Kristensson et al., 2008; Payne et al., 2008; Prahalad and Ramaswamy, 2004), there are several researches that proposes that an alternative exist. Rather to see co-creation in a rather black-and-white manner, some researchers proposed that co-creation should be seen as a continuum.

In his book, Collaboration and Co-creation: New Platforms for Marketing and Innovation, Gaurav Bhalla (2010) tried to illustrate co-creation based on the focus (i.e from the idea generation until value-creation) and level of customer collaboration and interaction in the implementation.

![Figure 5. Illustration of Co-creation as differing implementation degree (Source: Bhalla, 2010)](image)

He proposed that a firm could be in three shades of co-creation implementation level, light, moderate and high (Differences between levels will be elaborated in subsequent subsections).

The same notion of seeing co-creation as a continuum instead of a dichotomous category was proposed in a recent research (Chathoth et al, 2013). What they proposed was absolute co-creation, which is the extreme right end of the continuum, is the natural expansion of absolute co-production (which is the extreme left end of the continuum). Moreover, they also proposed a co-production to co-creation matrix which is based on the value creation stage and the type of dialogue between the customer and the firm.
2.3.2 DART model
Prahalad & Ramaswamy (2004) took a rather practice-based approach in conceptualizing co-creation by posing the question of “how do we build a system of co-creation value?” . They start by defining the building blocks of firm-customer interaction which will facilitate co-creation experience. Dialog, access, risk-benefits, and transparency (DART) are emerging as the basis for interaction between the customer and the firm (Figure 2).

Dialogue implies interactivity, deep engagement, and the ability and willingness to act on both sides. It is difficult to envisage a dialog between two unequal partners. So, for an active dialogue and the development of a shared solution, the firm and the customer must become equal and joint problem solvers.
But dialogue is difficult if customers do not have the same access and transparency to information. Firms have traditionally benefited from exploiting the information asymmetry between them and the individual customer. Because of ubiquitous connectivity, it is possible for an individual customer to get access to as much information as she needs from the community of other customers as well as from the firm. Therefore, access and transparency are critical factors to have a meaningful dialogue.

More importantly, dialog, access, and transparency could lead to a clear assessment by the customer about the risk-benefits of a course of action and decision. Should I change my medication? What are the risks? Instead of just depending on the doctor—the expert—the patient has the tools and the support structure to help make that decision—not in some generic risk category but “for me”—with a medical condition, a lifestyle, or social obligations. This is a personalized understanding of risk-benefits.

The DART model(Fig 7.) illustrates on how co-creation challenges the practices of high-discretionary that managers have on subjects such as labeling laws, disclosure of risks (as in smoking or genetically modified plants), transparency of financial statements, and open access and dialogue with customers and communities (Prahalad & Ramaswamy, 2004). Furthermore, they also tried to demystify what is and what co-creation is not.

Table 2. The concept of co-creation (Source: Prahalad & Ramaswamy ,2004)

<table>
<thead>
<tr>
<th>WHAT CO-CREATION IS NOT</th>
<th>WHAT CO-CREATION IS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Customer focus</td>
<td>• Co-creation is about joint</td>
</tr>
<tr>
<td>• Customer is king or</td>
<td>creation of value by the</td>
</tr>
<tr>
<td>customer is always right</td>
<td>company and the customer. It</td>
</tr>
<tr>
<td>• Delivering good</td>
<td>• Not the firm trying to</td>
</tr>
<tr>
<td>customer service or</td>
<td>please the customer</td>
</tr>
<tr>
<td>pampering the customer</td>
<td>• Allowing the customer to</td>
</tr>
<tr>
<td>with lavish</td>
<td>co-construct this service</td>
</tr>
<tr>
<td>customer service</td>
<td>experience to suit her context</td>
</tr>
<tr>
<td>• Mass customization of</td>
<td>• Joint problem definition</td>
</tr>
<tr>
<td>offerings that suit the</td>
<td>and problem solving</td>
</tr>
<tr>
<td>industry’s supply chain</td>
<td>• Creating an experience</td>
</tr>
<tr>
<td>• Transfer of activities</td>
<td>environment in which</td>
</tr>
<tr>
<td>from the firm to the</td>
<td>consumers can have active</td>
</tr>
<tr>
<td>customer as in self-</td>
<td>dialogue and co-construct</td>
</tr>
<tr>
<td>service</td>
<td>personalized experiences. The</td>
</tr>
<tr>
<td>• Customer as product</td>
<td>product may be the same</td>
</tr>
<tr>
<td>manager or co-designing</td>
<td>(e.g., Lego Mindstorms) but</td>
</tr>
<tr>
<td>products and services</td>
<td>customers can construct</td>
</tr>
<tr>
<td>• Product variety</td>
<td>different experiences</td>
</tr>
<tr>
<td>• Segment of one</td>
<td>• Experience variety</td>
</tr>
<tr>
<td>• Meticulous Market</td>
<td>• Experience of one</td>
</tr>
<tr>
<td>research</td>
<td>• Experiencing the business</td>
</tr>
<tr>
<td>• Staging experiences</td>
<td>• Consumers do in real time</td>
</tr>
<tr>
<td>• Demand-side innovation</td>
<td>• Continuous dialogue</td>
</tr>
<tr>
<td>for new products and</td>
<td>• Co-construct personalized</td>
</tr>
<tr>
<td>services</td>
<td>experiences</td>
</tr>
<tr>
<td>• • Innovating experience</td>
<td>• Environments for new</td>
</tr>
<tr>
<td>• Co-creation experiences</td>
<td>co-creation experiences</td>
</tr>
</tbody>
</table>
2.3.3 Diamond of Value Creation for Co-Creation

Co-creation is, by its very nature, not about “build it and they will come”, but “build it with them, and they are already there.” Therefore, co-creation is argued as a a “win more – win more” approach to value creation (in contrast to “win-win” collaboration) (Ramaswamy & Gouillart, 2010). In turn, it will open up new sustainable growth, business advantage, and innovation opportunities. In order for firms to achieve the desired results, they need to expand their mindset, management and organization practices with regards to value creation (Ramaswamy, 2009).

As it can be seen from figure 8 that shows the whole diamond of value creation, co-creation requires a paradigm shift, particularly in these areas:

- Beyond activities to interactions in the system as the focus of value creation opportunities (WHERE).
- Beyond the competence base of the firm and its suppliers, to networks and communities of individuals (customers and all other stakeholders outside and inside the firm), as the locus of competence in value creation (WHO).
- Beyond products and services to environments of human experiences as the basis of value to all involved individuals (WHY).
- Beyond assets and activities to engagement platforms as the means of value creation (HOW).

2.3.4 A Reference Model of Co-Creation

Another model is the reference model where co-creation is captured and synchronised onto the value creating business processes and embedded in a dynamic co-creation environment (T. Roser, DeFillippi, & Samson, 2013). In this model six dimensions and decision support questions of co-creation were identified. These questions were meant for managers to contemplate on whether implementing or extending co-creation efforts would be suitable. Although not exhaustive, but the dimensions and
questions are useful as a reference point for in-depth research since they are indicative of the choices involved in designing and implementing co-creation:

- Co-creator type. Who will be involved?
- Purpose. Co-creating for what purpose?
- Locus. Where in the innovation process should it occur?
- Intimacy. How much involvement should there be?
- Time. How long should co-creators be involved?
- Incentives. How should co-creators be motivated?

![Figure 9. A reference model of co-creation](image)

The reference also offers a comparison on how firms might systematically decide to manage a mix of co-creation activities within B2B versus B2C business relationships, utilising either crowd-sourced or non-crowd-sourced approaches by doing case studies. The case studies suggest that within B2B vs B2C co-creation there are fewer differences compared to crowd-sourced vs non-crowd-sourced co-creation environment (T. Roser et al., 2013). Moreover, decisions in one dimension of co-creation design (i.e. purpose, co-creator type, incentives) will affect dimensions of implementation and governance (i.e. intimacy, locus, time) which focuses on how co-creation should be managed environment (T. Roser et al., 2013).
2.3.5 Taxonomic Model of Co-creation

Based on a longitudinal study of e-commerce activity and its analysis from literature a taxonomic model of co-creation was proposed (Zwass, 2010). Consists of 4 dimensions, co-creators, task, process and co-created value. This model tried to dig deeper by delineating the dimensions through its aspects. For example, co-creators are being explained by the type of performers and the motivation. The model is shown in the following figure.

Moreover, this model only includes aspects specific to co-creation which is why the typology of co-created value is divided into two parts. While in the Process dimension, characteristics are not delineated beyond Governance since Incentives follow from the Motivation factors and IT support does not necessarily benefit from a taxonomic approach. Although the model is far from exhaustive, writer argued that it has included the most salient aspects co-creation. Therefore, suggesting that it will be
expanded in the future which will lead to further refinement of the model, one way by doing a cluster analysis of its various segments.

2.4 Dimensions of Customer Co-Creation

From previous sub-sections which explore models of co-creation it can be seen that co-creation is indeed a complex multi-faceted phenomenon. To simplify the varied opinion of co-creation dimensions, a list of dimensions are presented here. Research will further discuss about the different views on each dimension and eventually will try to merge the variation in the hope of offering a more comprehensive view. Dimensions need not be necessarily derived from the proposed model in previous sub-section. It might be the case that the explained dimensions were derived from other literatures which did not explicitly propose a model.

2.4.1 Co-created Values

From co-creation activities, besides the traditional output of products and services, process, and business models, certain values were also produced. An innovative and useful general theoretical framework of customer value creation, which led to a typifying of created value perceived by customers (Smith & Colgate, 2007) might help in delineating the wide-ranged values. Their framework includes types of value (i.e. functional/instrumental value, experiential/hedonic value, symbolic/expressive value, and cost/sacrifice value) plus sources of value. An improved list of values can be found as follows (Tynan et al., 2010)

<table>
<thead>
<tr>
<th>Types of value</th>
<th>Target of value</th>
<th>Source of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilitarian</td>
<td>Excellence, craftsmanship</td>
<td></td>
</tr>
<tr>
<td>Symbolic/Expressive</td>
<td>Outer-directed</td>
<td>Conspicuous consumption, bandwagon, snob effects, Veblen effects, perfectionism effect, signs, status/esteem, prestige, social identity, uniqueness, authenticity</td>
</tr>
<tr>
<td></td>
<td>Inner-directed</td>
<td>Bandwagon effect, personal identity, aesthetics, self-gift giving, uniqueness, nostalgia, authenticity</td>
</tr>
<tr>
<td>Experiential/Hedonic</td>
<td></td>
<td>Hedonic effect, aesthetics, the experience</td>
</tr>
<tr>
<td>Relational</td>
<td></td>
<td>Customer-brand relationships, brand community</td>
</tr>
<tr>
<td>Cost/Sacrifice</td>
<td></td>
<td>Perfectionism effect, exclusivity, rarity</td>
</tr>
</tbody>
</table>

2.4.2 Collaboration Platform

Collaboration platform is defined as physical or virtual arenas where co-creation activity takes place (Bhalla, 2011). In his book he draws the relationship between collaboration platform and the level of intimacy of the co-creation (Bhalla, 2011).

2.4.3 Duration

The time in co-creation reflects how long the collaboration between firms and co-creators should be. There is no standardized time or period one should collaborate with its co-creators. Nevertheless the length might be estimated based on the nature of the co-creation project and its number of participating co-creators. For example a co-creation in the form of partnership (for example between
Xerox and P&G) is expected to have the longest time (T. Roser et al., 2013). In the next place are projects in which multiple involvements of (potential) customers from first stages of NPD to experiencing the finished product. On the other hand, crowd-sourced co-creation projects typically have shorter duration which could be completed in a matter of weeks or months (T. Roser et al., 2013).

<table>
<thead>
<tr>
<th></th>
<th>Crowd-sourced</th>
<th>Non-crowd-sourced</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2B</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>B2C</td>
<td>Short to Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### 2.4.4 Governance

Since co-creation entails extending enterprise boundaries outside its internal environment, the dynamics should be managed by ensuring proper alignment, boundaries and commitment (Owen et al., 2008). Governance refers to both formal and informal rules of exchange and the initiation, maintenance, and termination of relational between two or more parties (T. Roser et al., 2013). Therefore in co-creation activities, governance gives structure to the decision-rights allocation and policies (Zwass, 2010).

There are different views on forms or methods of Governance. Herewith two opinions will be presented. The generic form of co-creation consists of market, hierarchical, and relational approaches (T. Roser et al., 2013):

- Hierarchical structure is the set of rules imposed by a governing authority upon participating actors in co-creation. Examples of such hierarchic governance structure might include steering committees which establish both basic rules for co-creation behaviour, establish metrics for measuring co-creation performance and allocate resources and provide rewards for performance. All co-creation ventures need to utilise these basic governing practices to some extent.
- Market-based governance refers to incentives rooted in the supply and demand for interaction and transactions for which prices or explicit market based value may be determined. For example, the posting of prizes for some co-creation offerings represents a clear market governance practice. Moreover, market based governance is based on voluntary transactions between more or less anonymous parties.
- Relational governance refers to the trust based forms of interaction in which past prior experience shapes future expectations of cooperation. Co-creation relies upon relational governance to the extent that co-creation parties perceive themselves to share similar or compatible values which set the intrinsic motives to participate in the activities.

While the other is a summary of noteworthy governance method related to co-creation (Zwass, 2010):

- **Individual autonomy**, which is widely-used in uncoordinated co-creation.
- **Collective norms** are a powerful mechanism controlling community-based behavior. In a collective action it was asserted that norms are more powerful than formal rules as a governance mechanism (Ostrom, 1990)
• **Facilitator (or mediation)** is another party which serves to support the activities by stimulating and maintaining the relationship between the involved parties.

• **Adhocracy** is grounded in an organically emerging structure and highly informal relationships. It is a method to maintain an organized distribution of decision-rights and coordination of work with a degree of improvisation due its ad-hoc nature. This method emerges from Web-based collaborations.

• **Bureaucracy** may be established—generally in a longer-term evolution of co-creation efforts—with formal rules and strict distribution of rights and responsibilities. This method is usually imposed in order to maintain quality and consistency.

• **Market mechanism** is when the law of supply and demand governs the interaction, which could be found in innovation markets or information markets.

• **Hybrid forms** of governance generally emerge in practice; Wikipedia would be a great example of this method.

• **Software code** and the rules embedded in it may form an implicit governance regime. This only applies either in co-creation activities in online realm or software-related co-creation.

Moreover, regardless of the chosen method of governance the interaction happening in co-creation should be supported by a certain environment. That is an environment with dialog, access, risk-benefits, and transparency (DART) which serves as a basis for interaction between the customer and the firm (Prahalad & Ramaswamy, 2004)

### 2.4.5 Firm’s internal support system

In order to create value from the information gained from the interaction between customer and firm, the information needs to be processed into actionable items (Grönroos, 2012). The input has to be registered, processed, and then turned into actionable information by firm’s internal support system (Grönroos, 2012). Additionally, a typical internal support system includes reporting system who monitors co-creation process and in the end will be the decision maker in co-creation implementation (Grönroos, 2012).

### 2.4.6 Impediments of co-creation

Impediments of co-creation are firm-level factors may halt or hold back co-creation process (Hoyer et al., 2010). The impediments could be in the form of:

1. Concerns about secrecy
2. Sharing of intellectual property
3. Information overload
4. Production infeasibility

This impediments list is not exhaustive, and this dimension is still under researched (Hoyer et al., 2010). Moreover, further research is needed to identify other impediments of co-creation and ways to manage these impediments (Hoyer et al., 2010).
2.4.7 Initiator
It is also possible to see co-creation depending on which party initiates the activities. In the taxonomic model of co-creation, they are differentiated into sponsored co-creation and autonomous co-creation. In sponsored co-creation the activities are conducted by customer communities or by individuals who are directed by a firm for its benefit (Zwass, 2010).

Meanwhile, in autonomous co-creation the individuals or customer communities produce marketable value in voluntary activities conducted independently of any established organization, although they may be using platforms provided by firms (Zwass, 2010). Here marketable value is not limited to values given from market-dynamics. It might also come from the commons, implying a broader meaning of marketable value. Iconic products of autonomous co-creation such as open source software (OSS) and Wikipedia have changed the competitive landscape of the software and knowledge industries—and continue to do so. Another simpler form of autonomous co-creation is customer reviews provided by individuals.

2.4.8 Level of Intimacy
The intimacy level of co-creation explains how much involvement should there be in the process. Bhalla (2010) tried to delineate this by categorizing the implementation of co-creation into three categories. The characteristics of each level can be found as follows (Table 5)

<table>
<thead>
<tr>
<th>Range of collaboration</th>
<th>Light</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of collaboration</td>
<td>Listen only</td>
<td>Listen + Engage</td>
<td>Listen + Engage + Respond</td>
</tr>
<tr>
<td>Customer empowerment</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Customer ideas</td>
<td>Mainly invited</td>
<td>Invited and generated through engagement</td>
<td>Generated mainly through ongoing engagement</td>
</tr>
<tr>
<td>Selection of ideas</td>
<td>Company decides</td>
<td>Customers provide inputs, final decision rests with company</td>
<td>Customers vote and collaborate with the company in selecting which ideas to develop</td>
</tr>
<tr>
<td>Development of ideas</td>
<td>Company leads</td>
<td>Company leads; occasionally customers participate in refining value</td>
<td>Company and customers collaborate to co-create value</td>
</tr>
<tr>
<td>Collaboration platform</td>
<td>Company websites, occasionally customer communities</td>
<td>Company websites; occasionally dedicated physical collaboration spaces; customer communities</td>
<td>Company websites, dedicated websites and/or dedicated physical collaboration spaces, customer communities</td>
</tr>
</tbody>
</table>

2.4.9 Locus of Interaction
Locus of interaction refers to where co-creation should take place. Using the phases of innovation process, co-creation could take place in any phase. A true co-creation should enable customers to choose when and where she feels appropriate to co-create based on her preference (Prahalad & Ramaswamy, 2004). Although most of the co-creation literatures focus on the front-end of innovation, but the locus for co-creating is also possible at the back-end of the innovation process. To give an illustration, possible co-creation activities in the innovation process will be elaborated (T. Roser et al., 2013; Zwass, 2010):

1. Ideation and Idea Evaluation
In this stage customers and customer communities are expected in helping to generate new product ideas, elaborate on ideas generated within organizations, identify prospective solutions, and help to assess the viability of the proposed new products. Idea competitions, ideation jams, and idea-generation markets are used to assess, and often generate, new product and market ideas.

2. **Product Co-Design**
   Users could be involved in product design, supporting them with toolkits which may be offered online (over the web) or offline depending on the targeted number of co-creators. After this, subsequently the effort would be bringing the products to the market.

3. **Product Testing**
   The beta testing of software by potential users has been joined by the testing of other products, with software prototypes and test kits provided by the firms.

4. **Product Promotion**
   Many firms have deployed Word-of-Mouth (WoM) in co-creation activities. Word-of-mouth communication refers to interpersonal information exchanges among adopters and potential adopters of a product(Maxham Iii, 2001). Both personal WoM and virtual WoM can encourage customers to try new uses; thereby increasing the perceived value of those uses and reducing perceived risk. (Kawasaki, et al, 2012)

5. **Customer Self-Revelation**
   By uploading self-description, lifestyle documents, and photos to corporate Web sites, customers offer the firm’s marketers, with support from mining software and other software tools, an opportunity to obtain a rich picture of the firm’s customers. This will help in enabling firm to stay on the edge of the emerging trend.

6. **Customer-Side Customer Service**
   Members of user communities are drawn upon by the producer firms to respond to questions and resolve use-oriented issues from other users. Requesting “help from the communities” is a well-known method of dealing with software problems—frequently used by employees of the producers as well.

An alternative to using the innovation process is to use the product life-cycle in determining the locus of co-creation (Orcik, Tekic, & Anisic, 2013).
2.4.10 Motivation
Motivation refers to the reason causing leading participants to articulate themselves and to actively take part in co-creation activities. Psychological theories draw a distinction between extrinsic motivators (i.e. external rewards) and intrinsic factors such as the inner motivation of the individual, which generally are found to bind more tightly (T. Roser et al., 2013). This dichotomized categorization is not fully satisfactory, since motivation could have both extrinsic and intrinsic elements (Zwass, 2010), for example the desire to learn. Therefore, the most frequent motivators will be stated in order from absolute altruistic to absolute monetary.

Table 6. List of Possible Motivators of Co-Creation (Source: Zwass, 2010)
Although a motive could be a mix of intrinsic and extrinsic drivers, it appears that intrinsic motivations are more determinative than extrinsic motivations in engaging customers and other participants in these co-creation activities (T. Roser et al., 2013). Ultimately, extrinsic and intrinsic incentives both play important but different roles in co-creation (Fuller, 2006, 2010). While intrinsic rewards are needed to render co-creation activity meaningful in the B2B relationship, extrinsic rewards can be an effective mean to foster competition among co-creators in the B2C.

### 2.4.11 Number of Participating Co-Creators

Here, the dimensions are dichotomized into crowd-sourced and non-crowd-sourced. In a crowd-sourced approach; rather from traditional employees or suppliers, firms are soliciting contributions from a large group of people (Brabham, 2008) Although most of crowd-sourced approach happens online, it could also be done offline.

A crowd-sourced approach usually involves a greater variety of participants. This is consistent with the philosophy of crowd-based technologies and practices for tapping into the so-called wisdom of crowds. In wisdom of crowds it was argued that the aggregation of a group’s opinion is more accurate than that of an expert individual (Surowiecki, 2005). Hence, the larger and more diverse the participating crowd, the faster and more varied the solutions will be. This wisdom of crowd size and diversity is seen as a

---

**Table 1. Potential Motivators in Co-Creation.**

<table>
<thead>
<tr>
<th>Motivator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altruistic desire to contribute</td>
<td>Based on the expression of personal values, ideological beliefs, or deeply felt needs</td>
</tr>
<tr>
<td>Passion for a task</td>
<td></td>
</tr>
<tr>
<td>Inner need to reciprocate in view of the contributions by others</td>
<td></td>
</tr>
<tr>
<td>Enjoyment, state of flow, playfulness</td>
<td>The essential motivators of participants in virtual worlds</td>
</tr>
<tr>
<td>Self-expression, speaking the truth as one sees it</td>
<td></td>
</tr>
<tr>
<td>Identity construction — co-creators can derive their sense of identity from the co-creating communities and projects</td>
<td></td>
</tr>
<tr>
<td>Forming personal relationships</td>
<td></td>
</tr>
<tr>
<td>Community norms</td>
<td></td>
</tr>
<tr>
<td>Competitive spirit — expressed prominently in idea competitions, but also in OSS development and other co-creative pursuits</td>
<td></td>
</tr>
<tr>
<td>Learning through co-creation from and with others</td>
<td></td>
</tr>
<tr>
<td>Satisfying one's affiliation needs</td>
<td></td>
</tr>
<tr>
<td>Self-esteem and self-efficacy</td>
<td></td>
</tr>
<tr>
<td>Thymotic strivings — desire for social standing, recognition, and renown</td>
<td></td>
</tr>
<tr>
<td>Acquiring social capital and peer recognition</td>
<td></td>
</tr>
<tr>
<td>Career advancement — acquiring skills and experience, and becoming known, akin to the outcomes of traditional volunteering</td>
<td></td>
</tr>
<tr>
<td>Own use of the object of co-creation may be the object. Some OSS developers aim to respond to their own software needs. The co-creators of Delicious organize their own Web bookmarks; the aggregated bookmarks of all users serve the world.</td>
<td></td>
</tr>
<tr>
<td>Nonmonetary rewards — home-page recognition, high review rankings</td>
<td></td>
</tr>
<tr>
<td>Signaling to potential employers and investors</td>
<td></td>
</tr>
<tr>
<td>Financial rewards — indirect and direct monetary payoff from co-creation activity</td>
<td></td>
</tr>
</tbody>
</table>

* Surowiecki expands on the concept of thes means in Plato’s Republic as lying at the origins of the motivation to contribute through work ([36]).
means to offset the local search biases of solution searches undertaken by a smaller number of participants, i.e. non-crowd-sourced approach (Zwass, 2010)

2.4.12 Nature of Business Relationship
The nature of business relationship is divided into two contexts, B2B and B2C. Here the terms are not addressed to a specific type of industry but rather to the relationship between participating actors of co-creation. For example, the relationship between a co-creation intermediary such as Innocentive with their client, i.e. firm is considered to be a B2B relationship regardless in which sector or industry the firms operates.

In building the reference model, Roser’s case comparisons (2013) suggest that even though there are differences in co-creation in B2B versus B2C; they are less significant when compared to the crowd-sourced versus non-crowd-sourced approaches. (Strategy and all –SD logic may fall into this category as well) and one is as a methodology)

2.4.13 Purpose
Purpose is the reason why a firm embarks on the journey of implementing co-creation. This dimension is different from Motivation, since Purpose explains the driver from a firm-point of view while the other explains why co-creators participate willingly. In its extended diamond model of co-creation, Ramaswamy proposed that firms chase for a base of value co-creation which translates to a human experience environment (Ramaswamy, 2009). This paved way for the concept of co-creation purpose but a further delineation was in order, due to this vague description.

In relation to its nature of business relationship and the number of participating co-creators, a pattern of purpose in co-creation was recognized. The purposes are listed below.

<table>
<thead>
<tr>
<th></th>
<th>Crowd-sourced</th>
<th>Non-crowd-sourced</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2B</td>
<td>Problem solving</td>
<td>Co-innovation</td>
</tr>
<tr>
<td>B2C</td>
<td>Search, develop, buy &amp; buzz</td>
<td>Validate &amp; improve</td>
</tr>
</tbody>
</table>

Comparing the purpose between the crowd-sourced and the non-crowd-sourced one, it can be seen that in the latter the reasons appear to be more strategic and long term than the more transactionally discrete associated with a crowd-sourcing project. Moreover, to gain access in a relatively quick manner and at relatively low cost a diverse array of innovation inputs not available from internal sources of expertise seems to be one of the drivers behind the crowd-sourced approach.

Other alternatives in delineating the purpose of co-creation are also available. One example is a delineation by dichotomizing the purpose into the exploration and exploitation of innovation opportunities which is seen as a factor of corporate agility (Sambamurthy, Bharadwaj, & Grover, 2003).
2.4.14 Stimulators
Stimulators are moderators of the relationship between customer willingness to participate in co-creation and the actual participation in co-creation (Hoyer et al., 2010). To participate in co-creation, customer will weigh the benefit and cost of engaging in such activity. If the benefits involved are too low or the costs incurred are too high, a customer might decide not to take a part in co-creation (Hoyer et al., 2010). In order to increase the likelihood of customer participation firm then need to give stimulations to customer.

Firm can stimulate co-creation in two ways (Hoyer et al., 2010). Firm can either increase the benefits customer receives from engaging in co-creation or decrease the costs for customer to take part in co-creation. In increasing the benefits a multi-aspect approach targeting financial, social, technological, and psychological aspect can be used (Hoyer et al., 2010). While in decreasing the costs for customer, approaches such as providing user-friendly toolkit for potential participants to create ideas, products or marketing material (Hippel & Katz, 2002)

2.4.15 Type of Co-creators
Co-creators are other actors who are involved in the process of co-creation. Here the type of co-creators would be seen from a firm perspective. In the early days, Von Hippel (1986) suggested that firm should collaborate with the lead user. Lead users are users who are at the leading edge of each identified trends in terms of related new products and process needs and who expect to obtain a relatively high net benefit from solutions to those needs. In 2004 Prahalad and Ramaswamy implicitly proposed that firms should co-create with empowered and informed customers.

The limited view on the type of co-creators began when it was proposed that firms could benefit by collaborating with global network and communities of individuals inside and outside a firm (Ramaswamy, 2009). In this current stream of opinion co-creators are not limited to present customers but also extended to potential customers (Zwass, 2010). The opinion continues to evolve, extending to the list of co-creators to suppliers, firm partners etc. (T. Roser et al., 2013).

Nevertheless, when people talk about co-creation or co-creating value there is an unspoken understanding that (potential) customers are the co-creators or at least make up for the largest proportion of co-creators. Therefore, it is important to delve on the type of (potential) customers (Zwass, 2010).

- **The world.** Any individual can contribute to the best of his or her ability. Therefore anyone could participate regardless of their skills and profile.
- **Prequalified individuals.** An opinion provider may be prequalified by a previous episodic experience, a consummated transaction, or, more demandingly, an accumulated experience as in the Zagat guides. In doing the prequalification, individual’s profile might be used which makes the contribution far more valuable, beyond aiming to validate its authenticity.
- **Community members.** A member of a specific community bearing the same characteristic or having an interest in the same field is considered to be another type of co-creator. Community
members are bounded by the values and mission of the community. Therefore, they exhibit a level of mutual trust which might be used in lending weight to the contributions.

- **Skilled contributors.** An individual needs to have certain skills which were predefined by firms.

A special note should be taken that an intermediary could bridge the relationship between firms and the (potential) customers. Each intermediary has its own pool of co-creators which is not limited to only one of the above type.

### 2.4.16 Unit of Analysis

Since co-creation is a multi-faceted phenomenon, it is understandable that there are differing units of analysis. Although in a national or industry level there is no available literature, but in the level of enterprise, and individual projects there are quite a few number of literatures. This differing unit of analysis affects the other dimensions of co-creation (Ramaswamy, 2009) It is important to drive co-creative thinking into the management of human capital and (re) design of business processes, and back to points of interactions with customers. [Co-creation at as a high level concept]

On an enterprise unit of analysis, co-creation is also seen as a strategy that is integrated on a corporate level (Bartl et al., 2010). While on an individual level of business, co-creation is seen as a method or tool used in the innovation process so that customers can actively participate. (Piller, 2010)

### 2.5 Benefits and Costs of Customer Co-Creation

The benefits of implementing co-creation are not only be enjoyed by firm but also by customer, due to its interactive nature. Here is some benefits that could be gained by implementing co-creation (Zhang, Roberts *et al*, Chathoth *et al*, Gouillart *et al*):

1. Products will better fit the customer needs
2. An efficient method in attaching value to the offering relative to a use context
3. Enable the firm to precisely target customer groups
4. Source of more original and valuable ideas
5. Creating barriers to imitation
6. Proposed to lead to sustainable competitive advantage

Moreover, co-creation avoids other critical disadvantages of traditional strategy formulation. Following are some argued limitations of conventional thinking in business design and strategy formulation (Ramaswamy & Gouillart, 2010):

- **It is solely focused on the economics of the firm and its industry**
  
  With co-creation, the careful weaving of new interactions between stakeholders and new experiences tends to stay below the radar screen of traditional strategists. However, because these interactions and experiences are difficult to monitor and copy, they often can provide a more enduring source of advantage.

- **It fails to allow for the possibility of co creating an ecosystem whose members all win**
Strategy formulation in the co-creation paradigm, on the other hand, starts with a focus on the entire ecosystem—not the individual firm’s position in it—and tries to imagine a new value chain that benefits all players, including, of course, the company itself. In co-creation, strategy formulation involves imagining a new value chain that benefits all players in the ecosystem.

- It assumes that a strategy will be completely defined at the outset, though uncertain circumstances often make that impossible.

The co-creation paradigm, strategy emerges slowly through a process of discovery by the individuals in the firm.

Implementing co-creation also comes with certain costs. The costs are not only limited to direct costs of resources dedicated to implement co-creation but also covers the indirect costs coming from creating an environment that would support and enable co-creation to function well. These indirect costs are the resources spent to create a culture of transparency in terms of money, time, and human resources (R. F. Lusch & S. L. Vargo, 2006) Customer also burdened costs of co-creation in terms of opportunity cost for the amount of time and effort they used for co-creation (Robert F. Lusch & Stephen L. Vargo, 2006).

### 2.6 Risk of Implementing Customer Co-Creation: Value co-destruction

Although co-creation promises a brighter future for firms and customer, implementing co-creation does come with a risk. When firms and customers co-create, they are opening their boundaries, letting other entities to take part into its decision making process. These interactions between entities have two possible outcomes. Likewise with human interaction, the interactions either will have beneficial consequences or detrimental consequences. In co-creation activities, instead of resulting to a value co-creation, such process could lead into value co-destruction (Plé & Cáceres, 2010). There are many factors and reasons leading up to these differing outcomes.

One identified trigger which lead to a co-destruction rather than to the intended co-creation process is the misuse of resources by at least one of the entities i.e firm or customers. Misuse is defined as the integration or application of resources by an entity which is not in the way the other entity predicted it would be (Plé & Cáceres, 2010). This misuse could happen due to either an accidental misuse or an intentional misuse. If the misuse decreases the well-being of the customers, it will bring dissatisfaction of customers or even a frustrated community member phenomenon. In this particular phenomenon previously enthusiastic and excited customers switch stance to an active resistance and public attacks against the firm, which would trigger an enormous wave of resistance in this age of digital communication (Gebauer, Füller, & Pezzei, 2013).

Accidental misuse can happen for several reasons. Firstly, it may happen because customers have limited knowledge about the (new) technologies which makes it hard for them to forecast the future usage of innovations or possible innovations that may be created (Ulwick, 2002). Therefore, customers may be unable to use their resources or the firm’s resources as expected by the firm. Secondly, the same process could also happen if one of the entities has a different level of commitment in doing co-creation (Day, Fawcett, Fawcett, & Magnan, 2013; Plé & Cáceres, 2010). Thirdly, accidental misuse can also happen because of a role conflict resulting from competing expectations of the firm and the customers (Eddleston et al., 2002; Wetzels et al., 1999). In this case innocent unawareness of the
customers about firm’s policy may lead to unintentional misuse of firm’s resources. From these reasons, we could see the importance of continuous communication and transparency for co-creation.

On the other hand, the intentional misuse happens when one entity plans to use resources in favor of its well-being but to the detriment of the other entity’s well-being. For example employee of a firm may participate in a ‘sabotage behaviors’ i.e. behaviors that are designed to decrease the level of service/product given (Harris & Ogbonna, 2002). This will lead to a lower quality of delivered service and in turn bring a negative impact to firm’s performance(Harris & Ogbonna, 2002). Another example is when firm co-creates with ‘jay customers’, who acts in a thoughtless and abusing way which cause problems not only for the firms but also for other customers (Gebauer et al., 2013). This type of customers initiates opportunistic behavior for their own advantage (Plé & Cáceres, 2010). Lastly, intentional misuse can happen when firm imposes a new policy or technology to all customers regardless of their preference towards the policy or technology. Although the firm has a sound reasoning behind this (e.g. reducing cost, productivity improvement), but from the customers’ perspective the unexpected use of firms’ resources will have a negative effect on their well-being (Plé & Cáceres, 2010).

2.7 Chapter Conclusion

<table>
<thead>
<tr>
<th>Chapter Subject</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevancy of Customer Co-Creation</td>
<td>• Customer co-creation is relevant for both customer and firm.</td>
</tr>
<tr>
<td></td>
<td>• From firm perspective customer co-creation is relevant because: 1) increasing competitions in the time of converging business;</td>
</tr>
<tr>
<td></td>
<td>2) raising awareness about the importance of cumulative knowledge of the key stakeholder; 3) economic shifts to emerging markets;</td>
</tr>
<tr>
<td></td>
<td>4) decreasing effectiveness of traditional market-learning efforts; 5) declining innovation success rates.</td>
</tr>
<tr>
<td></td>
<td>• From customer perspective customer co-creation is relevant because: 1) the rise of educated and knowledgeable customer;</td>
</tr>
<tr>
<td></td>
<td>2) customers are actively seeking ways to collaborate</td>
</tr>
<tr>
<td>Definitions of Customer Co-Creation</td>
<td>• The term co-creation is used in many different streams of literature, ranging from innovation to e-commerce literature. No consensus on</td>
</tr>
<tr>
<td></td>
<td>the definition of co-creation</td>
</tr>
<tr>
<td></td>
<td>• Working definition of customer co-creation: “Customer co-creation is the process of expanding the innovation and value creation</td>
</tr>
<tr>
<td></td>
<td>capability of the firm, by which products, services, and experiences are developed jointly by companies and their customers (existing,</td>
</tr>
<tr>
<td></td>
<td>potential) while nurturing customer relationships”</td>
</tr>
<tr>
<td></td>
<td>• Customer co-creation and co-creation are used interchangeably in this report. For the purpose of the report, they refer to the same</td>
</tr>
<tr>
<td></td>
<td>phenomenon.</td>
</tr>
<tr>
<td>Conceptualizing Customer Co-creation</td>
<td>• There are numerous models depicting customer co-creation.</td>
</tr>
<tr>
<td></td>
<td>• The high variety of models implies lack of consensus. Since different models focus on different aspect of customer co-creation.</td>
</tr>
<tr>
<td></td>
<td>• Explanation of customer co-creation models given here is not exhaustive and mutually exclusive in explaining all the available</td>
</tr>
</tbody>
</table>
models of co-creation.

### Dimensions of Co-creation
- From literature review 16 proposed dimensions of co-creation were distilled.

<table>
<thead>
<tr>
<th>Co-created values</th>
<th>Collaboration platform</th>
<th>Duration</th>
<th>Firm’s Internal support system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>Impediments of co-creation</td>
<td>Initiator</td>
<td>Level of Intimacy</td>
</tr>
<tr>
<td>Locus of interaction</td>
<td>Motivation</td>
<td>Purpose</td>
<td>Number of Participating Actors</td>
</tr>
<tr>
<td>Nature of business relationship</td>
<td>Stimulators</td>
<td>Type of co-creators</td>
<td>Unit of Analysis</td>
</tr>
</tbody>
</table>

### Benefits and Costs of Customer Co-creation
- Benefits of customer co-creation from various literature:
  1. Products will better fit the customer needs;
  2. An efficient method in attaching value to the offering relative to a use context;
  3. Enable the firm to precisely target customer groups;
  4. Source of more original and valuable ideas;
  5. Creating barriers to imitation;
  6. Proposed to lead to sustainable competitive advantage

- Costs of customer co-creation are burdened by customer and firm. The costs are in the form of direct costs (related to resources) and indirect costs (for example, opportunity cost).

### Risk of Implementing Customer Co-Creation: Value co-destruction
- Customer co-creation has a risk of value co-destruction. In such situation creation activities lead into value co-destruction instead of resulting to value co-creation.
- One identified trigger which lead to a co-destruction is the misuse of resources by at least one of the entities i.e firm or customers. The misuse could either be accidental or intentional
- Accidental misuse might happen because:
  1. Customers have limited knowledge about the (new) technologies;
  2. Different level of commitment in doing co-creation between customer and firm;
  3. Competing expectations of the firm and the customers
- Intentional misuse happens when one entity plans to use resources in favor of its well-being but to the detriment of the other entity’s well-being.
3 Research Methodology

“Data do not give up their secrets easily. They must be tortured to confess.”
Jeff Hopper

3.1 Research Design

A qualitative research methodology is applied throughout this thesis project. During the project, researcher will seek to gain an understanding about the phenomena (in this case co-creation implementation in the innovation process) using naturalistic approach in context-specific settings without any attempt to manipulate the phenomenon in question. As mentioned in Patton’s book (2002) in a qualitative research, “the researcher is the instrument”.

To answer the research question, this study is divided into three phases:

1) Preparation
2) Data Collection
3) Data Analysis

The following sub-subsections will elaborate on the various activities done in each phase of the research. Starting from the preparation phase where potential sources for the interview were chosen and data collection instruments were designed. Followed by the process of data collection where a multi-methods data collection is employed. Finally continued by data analysis phase where the gathered data are analysed, and steps in ensuring validity and reliability are further explained.

3.1.1 Preparation

In the preparation phase there are three main activities namely: 1) interview design; 2) expert and practitioner selection for interview purpose; 3) questionnaire design. All of these activities were the foundation for data collection. Therefore, details about the data collection itself were also touched upon in this sub-section.

3.1.1.1 Interview Design

In this study, two different kinds of interview were conducted. The difference lies in the participant and the purpose of the interview.

1. Academia Interview
   The purposes of this interview are two-fold. First, it is to gain insights on the possible ways of measuring co-creation and risks of co-creation. Second, it is to validate the dimensions of co-creation. Moreover, the benefits and risks of co-creation will also be explored. As to give a foundation for the next interview with practitioner, opinions on how co-creation should be measured are also being sought. The academia interview is divided into three parts. The first part, general questions about co-creation and its implementation in innovation process were asked. Second, participants were asked to fill up a questionnaire focused on dimensions of co-creation and their relative importance. Then to finish up, follow-up questions on co-creation dimensions based on the questionnaire result were also asked.
2. Practitioner Interview
The purpose of practitioner interview is to gain data on how co-creation process are being measured and monitored. Next to it is the exploration on measuring the result of co-creation depending on the purpose of co-creation. Since the implemented co-creation from one firm to the other usually had different purposes. In this interview, the challenges and risks of co-creation are also explored.

Both interview types are semi-structured interview. For each interview type, different set of questions were formulated (Sets of questions can be found in Appendix C and Appendix D). In designing the interview, dummy interviews were conducted to ensure the clarity of each question and to prepare researcher with the different possible directions that the interview might lead. It is due to this fact that semi-structured interview method was employed. The participants for the dummy interview are TU Delft Management of Technology Master students (batch 2011-2013), since they are knowledgeable about innovation and customer involvement.

3.1.1.2 Expert and Practitioner Selection for Interview Purpose
In conducting the interviews, the researcher aimed for a balanced number of participants in each category of the respondent. The interview categories are as follow:

1. Academia Interview
   In the academia interview, the targeted participants are academicians who consider co-creation as their research interest.
2. Practitioner Interview
   The target participants for this interview are industry professionals who are involved in the new product development projects or give recommendation for such projects.

Interview target is to have between 5 to 10 participants in total. During the interviews, a balance between academia and practitioner interview participants is targeted. It is necessary to have a more or less the same number of participants in each category than to have more participants in one type only. This is to align with the objective that this research should be relevant for both researchers and managers.

Moving on to the next activity of the preparation phase i.e., search for potential participants; this will employ the identification of researchers specialized or having an interest in co-creation research regardless of the location of the institution. Moreover, experts who have an association with Co-creation Association, Co-creation Forum, or co-creation event (e.g. Co-creation award 2012, co-creation workshop), will also be categorized as potential participants. A list of potential participants can be found (in Tables 8 & 9):

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frank Piller</td>
<td>Professor of management at RWTH Aachen University, German</td>
</tr>
</tbody>
</table>
Table 9. List of co-creation practitioners contacted for interview

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthony Flynn</td>
<td>Co-founder of You Bar</td>
</tr>
<tr>
<td>Bas van Abel</td>
<td>Co-founder of FabLab</td>
</tr>
<tr>
<td>Bob Postma</td>
<td>Brand Lay’s and Customer Engagement Manager at PepsiCo</td>
</tr>
<tr>
<td>David Kohel</td>
<td>Director Global Digital Commerce at Nike</td>
</tr>
<tr>
<td>David ten Have</td>
<td>Co-founder of Ponoko</td>
</tr>
<tr>
<td>Fred Henny</td>
<td>Co-founder of aQysta</td>
</tr>
<tr>
<td>Jeff Perkins</td>
<td>Head of Customization Department at Nike</td>
</tr>
<tr>
<td>Jeroen de Kempenaer</td>
<td>Senior Consultant at The Bridge business innovators</td>
</tr>
<tr>
<td>John Jacobson</td>
<td>Head of development of Quirky</td>
</tr>
<tr>
<td>Tim Mulder</td>
<td>Senior Brand Manager Lay’s at PepsiCo</td>
</tr>
<tr>
<td>Pratap Thapa</td>
<td>Co-founder of aQysta</td>
</tr>
<tr>
<td>Robbert Broekhof</td>
<td>Manager Design Center Europe at Giant Europe</td>
</tr>
<tr>
<td>Thijs Pit</td>
<td>Marketeer at Florius</td>
</tr>
</tbody>
</table>

3.1.1.3 Questionnaire Design

The questionnaire for the academician interview was designed to be administered during the interview by the respondents themselves. Two questions were asked in the questionnaire, one is whether the dimensions of co-creation are really a dimension or not. Then, the second question is whether this dimension is a critical or not, in the case that respondents answered yes to the first question (See questionnaire in appendix E).

Dimensions were prepared in alphabetical order, so are the examples for each dimension. This action was taken to avoid signalling to the respondents that one dimension is more important than the other, and to avoid signalling one example is more dominant as compared to the other. To ensure that the
questionnaire could be easily understood by the respondents, the questionnaire was checked using a dummy test. The participants of this dummy test are fellow students or former students of MoT. Respondents were all studying in the same year, to warrant that they all have in average the same level of knowledge about the research methodology, so that to minimize the bias that could come from having different groups of respondents.

3.1.2 Data Collection
Both primary and secondary sources of information will be used in this research to answer the research question, five research sub-questions was posed. As previously mentioned, a desk research and expert methodologies will be employed in the research. To give an overview of data collection process for each sub-question, please refer to following table.

<table>
<thead>
<tr>
<th>No</th>
<th>Research sub-questions</th>
<th>Method</th>
</tr>
</thead>
</table>
| 1  | What is co-creation?   | • Literature review  
|    |                        | • Expert interview  |
| 2  | What are the dimensions of co-creation? | • Literature review  
|    |                        | • Desk research  
|    |                        | • Expert (Academia) interview |
| 3  | How can co-creation be measured? | • Literature review  
|    |                        | • Expert (Practitioner) interview  
|    |                        | • Sorting Task |
| 4  | What indicators can be used in measuring co-creation? | • Literature review  
|    |                        | • Expert (Practitioner) interview |

Moreover, following methods of data collection will be employed:

3.1.2.1 Literature Review
In literature review, various information sources such as academic papers, journal articles, textbooks, and conference proceedings will be used. A mixed method of literature will be used in this research. In order to come up with the initial conceptual model and research proposal, a snowball method was used. Snowball method was used since time was of the essence at this stage. In later stages of the research a building block method and bibliographic mining will be used instead. This is due to the possibility of bias by limiting the search to a certain stream of literature when snowball method is used.

The snowball method was used to identify relevant papers within SCOPUS’ repository. It started with previously identified seminal papers of co-creation, from Von Hippel, Prahalad and Ramaswamy. The result shows that the Von Hippel paper\(^1\) alone, has been cited 808 times and the Prahalad and Ramaswamy's paper\(^2\) has been cited 294 times. Using these seminal papers as a starting point, written by some of the founding fathers of co-creation, the researcher attempted to obtain a holistic view of co-creation. Employing the snowball method, other

papers that cited these seminal papers were also browsed and scanned through. This action is taken in order to check the state of knowledge and research about co-creation.

While doing the snowball method, the researcher first scanned the title of the researches (research papers). The aim is to get the researcher acquainted with some of the research topics of co-creation. Upon completing this step, a second round of search was done, using keywords such as ‘innovation’, ‘competitive advantage’, and ‘new product development’ to search within the results of the snowball method. The Researcher delved deeper into the research by reading the abstract, conclusion, future research, and limited other sections of the paper. This is not only to narrow down and to sharpen the topic but also to define the scope of research. Ten most relevant papers were identified and from them the research conceptual model was derived.

While in using building block method various research questions and the needed information were divided into distinct group “blocks” of search terms. The identified key terms of the research question would then be used in creating search statements for each block. In this step, Boolean operators were also used to account for synonyms or related items. Then combinations of these search statements for each “block” into one query were used in literature search. Search was done in various repositories such as SCOPUS, IEEE, and TU Delft etc.
3.1.2.2 **Academia Interview**

Expert interviews were conducted to choose and validate the dimensions of co-creation constructs. The interviews would be a semi-structured one, so that a balance between getting a focused answer and exploring a relevant, unforeseen aspect can also be achieved. This interview will be carried out after a list of co-creation dimensions was completed from literature and document review. In choosing the academicians, a purposive sampling was used. In this research a special form of purposive sampling, the maximum variation sampling was used. This particular sampling method was chosen to cover the broad spectrum and diverse perspectives in relation to the phenomenon under study (Barbour, 2001). Since this method promotes the inclusion of typical cases and extreme cases, experts from different study backgrounds (e.g. marketing, design, innovation) were contacted for the interviews. Moreover, experts with a different stance toward co-creation were also contacted since co-creation is a normative phenomenon which has both believers and non-believers.

<table>
<thead>
<tr>
<th>Name</th>
<th>Field of Specialty</th>
<th>Stance toward co-creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilde Bekker</td>
<td>Design</td>
<td>Believer</td>
</tr>
<tr>
<td>Prof.dr.ir. J.A. Buijs</td>
<td>Product Innovation Management</td>
<td>Non-believer</td>
</tr>
<tr>
<td>J.W. Hoftijzer, MSc</td>
<td>Design</td>
<td>Believer</td>
</tr>
<tr>
<td>Frank Piller</td>
<td>Innovation Management</td>
<td>Believer</td>
</tr>
<tr>
<td>Wina Smeenk</td>
<td>Design</td>
<td>Believer</td>
</tr>
</tbody>
</table>

Table 11. List of Participating Academia

3.1.2.3 **Practitioner Interview**

An experts survey will be conducted in order to compare the findings from previous research with practices in industry regarding both co-creation activities and measurement indicators of co-creation effort. Experts will be industry practitioners that have taken part in co-creation activities. Manager of product development, marketing or R&D division of a firm with co-creation activities, or members of consulting firms who work on such projects would most likely fit into these criteria. Since the same sampling method with academician interviews was used for the practitioner interviews, practitioners in firms with atypical cases were also interviewed. By using the maximum variation sampling method, managers of firms with no co-creation activities were also interviewed, this is to investigate in detail the consideration and important factors that play a role in implementing co-creation in innovation process.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of Industry</th>
<th>Stage of Co-creation Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob Postma</td>
<td>Product</td>
<td>Consideration phase</td>
</tr>
<tr>
<td>Jeroen de Kempenaer</td>
<td>Consulting</td>
<td>Post-implementation phase</td>
</tr>
<tr>
<td>Pratap Thapa</td>
<td>Product</td>
<td>Implementation phase</td>
</tr>
<tr>
<td>Robbert Broekhof</td>
<td>Product</td>
<td>Post-implementation phase</td>
</tr>
<tr>
<td>Thijs Pit</td>
<td>Product</td>
<td>Implementation phase</td>
</tr>
</tbody>
</table>

Table 12. List of Participating Practitioners
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthony Flynn</td>
<td>Co-founder of You Bar</td>
</tr>
<tr>
<td>Bas van Abel</td>
<td>Co-founder of FabLab</td>
</tr>
<tr>
<td>Bob Postma</td>
<td>Brand Lay’s and Customer Engagement Manager at PepsiCo</td>
</tr>
<tr>
<td>David Kohel</td>
<td>Director Global Digital Commerce at Nike</td>
</tr>
<tr>
<td>David ten Have</td>
<td>Co-founder of Ponoko</td>
</tr>
<tr>
<td>Fred Henny</td>
<td>Co-founder of aQysta</td>
</tr>
<tr>
<td>Jeff Perkins</td>
<td>Head of Customization Department at Nike</td>
</tr>
<tr>
<td>Jeroen de Kempenaer</td>
<td>Senior Consultant at The Bridge business innovators</td>
</tr>
<tr>
<td>John Jacobson</td>
<td>Head of development of Quirky</td>
</tr>
<tr>
<td>Tim Mulder</td>
<td>Senior Brand Manager Lay’s at PepsiCo</td>
</tr>
<tr>
<td>Pratap Thapa</td>
<td>Co-founder of aQysta</td>
</tr>
<tr>
<td>Robbert Broekhof</td>
<td>Manager Design Center Europe at Giant Europe</td>
</tr>
<tr>
<td>Thijs Pit</td>
<td>Marketeer at Florius</td>
</tr>
</tbody>
</table>

3.1.2.4 Sorting Task: Categorizing the Dimensions

Sorting task was done in order to categorize the dimensions into co-creation related concepts. The targeted number of respondents for this task was between 10 and 20. The respondents were Management of Technology (MoT) students or former students from the same batch with the researcher. This is to ensure respondents in average have the same level of knowledge, since they all had done a course in preparing for master thesis project. Moreover, all of them are familiar with innovation and its related concepts.

3.1.2.5 Desk research

Based on the category of information sources, the desk research was divided into three, 1) Podcasts, videos and presentation slides; 2) document review; 3) analysis of website (of certain companies/co-creation projects). Extra care is taken when dealing with articles or documents from websites in order to ensure the reliability; by excluding data from various discussion forums.

3.1.3 Data Analysis

After the data has been collected, data analysis will be carried out. In doing it, the highly varied collected data will then be organized through the introduction of categorization information, continued with pattern identification between categories and ended with interpretation of these patterns.
The process in doing qualitative data analysis are illustrated and explained as follows:

- **Coding**
  In the coding phase both primary and secondary data will be analyzed and scanned for relevant ideas, concepts, behaviors, terminology or phrases used. These relevant phrases will then be coded based on themes. Next, the coded themes will be organized into coherent categories. The categories may be preset (anticipated) ones or emergent ones. In this research, a manual coding will be used due to the current situation of the body of knowledge.

- **Patterns and connections identification**
  Upon finishing categorization, different patterns and connections are easier to identify. Possible transpiring forms of patterns and connections are; 1) patterns within categories ; 2) larger categories from the specific categories; 3) relative importance of the categories ; 4) connections between categories.

- **Interpretation**
  In interpretation, efforts are directed to making sense of the key points and important findings from the two previous steps. This step will require a switch from details point of view to bigger-picture point of view. Since the goal is to attach meaning and significance to the analysis.

### 3.2 Building Co-Creation Construct: Nomological Network

In defining the construct of co-creation the nomological network is chosen. Nomological network is a representation of the concepts of interest in a study, their observable manifestations, and the interrelationships among and between these (Trochim, 2006). Cronbach and Meehl (1955) developed the idea as a tool to guide efforts in ensuring construct validation. This tool was first used in psychological field. The goal of using nomological network is to link observable measurements to unobservable theoretical constructs. Moreover nomological network could also serve as guidance in testing the relationship between observable variables (i.e. dimensions), theoretical constructs to observable dimensions, or between constructs (Cronbach & Meehl, 1955). This is possible since nomological network could also be seen as a system of intertwined laws (i.e. observable and theoretical) which make up a theory, and therefore the laws or relationship in the network should generate testable predictions (Cronbach & Meehl, 1955).

Since the objective of this research is to move forward from a conceptual view of co-creation to a construct of co-creation; so that the phenomenon itself could be measured, by using the nomological network this leap would be possible. The nomological network approach is most useful in new areas of
research where there are few prominent models or in areas where there are problems of measurement validation for theoretical constructs (Nadon, 1997). Hence, to address the definitional puzzle of co-creation we follow these guidelines epistemology developed to build “constructs,” i.e., concepts suitable for scientific manipulation.

Both constructs and concepts represent, to some extent abstractions, i.e., generalizations from particulars. Constructs, however, differ from concepts in at least in two ways. First, constructs can be measured. Providing a way to measure a construct, which can be either “speed” in physics or “leadership” in behavioral sciences, is a specific way of defining a construct. In nomological network following items are included the theoretical framework for what you are trying to measure, an empirical framework for how you are going to measure it, and specification of the linkages among and between these two frameworks (Trochim, 2006).

Such direct operational definitions play a pivotal role in the development of a scientific system, as they hook ideas to observables and, hence, allow the empirical disconfirmation of theories (Popper, 1950). Second, constructs do not exist as stand-alone entities, but are in turn related to other constructs within a theoretical system. Science, in fact, can explain and predict the behavior of systems only by establishing cause-effect relationships across different constructs. The network of relations that involves a certain construct is named nomological network of the construct (Cronbach & Meehl, 1955).

![Diagram of a nomological network](image)
The nomological network of a construct may serve a definitional purpose as well, both at a theoretical and at an operational level. If the nomological network of construct “A” relates it to constructs “B” and “C,” it may be possible to define “A” at a theoretical level in terms of “B” and “C,” say “A” is the simultaneous presence of “B” and “C” (see Fig. 1). This is also termed as constitutive definition of construct “A.” “Quantity of motion,” for example, can be defined in terms of the constructs “mass” and “speed.” If there is no direct operational measure for construct “A,” but we have it for constructs “B” and “C” (see Figure 1(2) and (3)), we can use the constitutive definition implied by its nomological network to articulate an indirect operational definition of construct “A,” provided that we can define “mass”.

This research will follow aforementioned principles in defining the construct of co-creation. From previous research, dimensions of co-creation will also be collected and analysed. These dimensions would then be the constitutive definition of co-creation construct. As mentioned before, a construct should be measurable. By using its constitutive definition, measures of co-creation effort will be explored. So that in the end a recommendation can be produced as a result of this research.

In building co-creation construct, several steps were taken. Since dimensions of co-creation serves as building blocks for the construct, the process began by collecting and identifying dimensions of co-creation through the literature review. Once the list of dimensions were ready, academicians interviews were carried out. These interviews focused on validating the dimensions of co-creation. Once the dimensions were validated by academicians, these dimensions were then categorized into co-creation related concepts. Guidelines on how the categorization should be done were obtained from various discussions with academicians. A sorting task was then performed by TU Delft Management of Technology students or graduates; this approach was done to ensure the face validity of the construct. Upon finishing the sorting task, a nomological network of co-creation was formed.

![Diagram of steps in building co-creation construct]

Figure 15 Steps in building co-creation construct
3.3 Designing Measures of Co-Creation

To come up with co-creation effort measurement indicators, a procedure suggested by Churchill (1979) will be used. He proposed that in order to develop measures that satisfy the standard measurement criteria of validity, reliability, and sensitivity, a more critical approach should be used.

The approach consists of 8 activities. Due to the exploratory nature of the research and the limitation of time this research would only cover the first two of the steps. The first step is to specify the domain of the construct by delineating what is included in the definition and what is excluded. Here the definitions of construct serve as a means rather than ends in themselves (G.A. Churchill, 1979). While in the 2nd step, using the specified domain of constructs, the item which captures the domain characteristic will be specified. Techniques such as literature review, experience surveys, and insight-stimulating are productive here (Selltiz et al., 1976).
### 3.4 Chapter Conclusion

#### Chapter Subject | Conclusion
--- | ---
**Research Design** | - The research is divided into three phases: 1) preparation; 2) data collection; 3) data analysis  
- In the preparation phase there are three main activities namely: 1) interview design; 2) expert and practitioner selection for interview purpose; 3) questionnaire design.  
- Following methods are employed in data collection phase: 1) literature review; 2) academia interview; 3) practitioner interview; 4) sorting task with Management of Technology students or graduates; 5) desk research  
- Both building block method and snowball method are used in literature review.  
- In doing the interviews, the aim is to have a balanced number of academia and practitioner participants.  
- For both type of interviews maximum variation sampling is used, so that a comprehensive view of co-creation can be obtained.  
- Sorting task participants are Management of Technology students or graduates from the same study batch with the researcher.  
- In data analysis phase 1) coding; 2) patterns and connections identification; 3) interpretation  
- Due to the current state of the knowledge a manual coding was done.

**Building Co-Creation Construct: Nomological Network** | - Nomological network is a representation of the concepts of interest in a study, their observable manifestations, and the interrelationships among and between these. It is a tool to ensure construct validation.  
- Nomological network is used as research approach since it is most useful in new areas of research where there are few prominent models or in areas where there are problems of measurement validation for theoretical constructs.  
- Nomological network will include: 1) the theoretical framework for what you are trying to measure; 2) an empirical framework for how you are going to measure it; 3) specification of the linkages among and between these two frameworks.  
- The nomological network in this research is preliminary in nature, since it does not quantify the relations of between frameworks  
- The steps in building nomological network of co-creation

![Diagram](image-url)
- Dimensions of co-creation serve as constitutive definition of co-creation construct.

因探索性研究的性质及时间限制，本研究仅涵盖测量开发的前两步。

**Designing Measures of Co-Creation**

- Due to the exploratory nature of the research and the limitation of time this research would only cover the first two steps of developing measurements.

**Recommended Techniques or Coefficients**

- Literature search
- Experience survey
- Insight stimulating examples
- Critical Incidents
- Focus groups
- Coefficient alpha
- Factor Analysis
- Coefficient alpha
- Split-half reliability
- Multitrait-multimethod matrix
- Criterion validity
- Average and other statistics summarizing distribution of scores

(source: Churchill, 1979)
4 Customer Co-Creation as a Construct

“The human mind has first to construct forms, independently, before we can find them in things.”

Albert Einstein

In defining construct of co-creation, several steps were taken. In the following sub-chapter the taken steps are explained in details. Dimensions of co-creation which are the building blocks of co-creation will then be described.

4.1 Designing the Construct

There are three steps in building the construct of customer co-creation. It started with defining the dimensions of customer co-creation, continued with validating the dimensions, and finally categorizing the dimensions in order to create the nomological network. These steps are further explained in following section.

4.1.1 Defining Customer Co-Creation Dimensions

Dimension in Oxford dictionary is defined as (1) a measurable extent of a particular kind, such as length, breadth, depth or (F et al.) an aspect or feature of a situation. In this research, dimension is an aspect or feature of the phenomenon in scrutiny i.e. co-creation. A rather loose definition of dimension will be used in this research in order to not to be trapped in the academic debates of what constitute a dimension and what is not.

Furthermore, dimension here symbolize the decision that a firm and customer would need to take in implementing co-creation in the innovation process. These series of decisions on the dimensions will affect what kind of co-creation being done. Which comes to one assumption taken in this research, in the process of implementing co-creation firm will take these decisions regardless whether they make the decision process consciously or not. So even if a firm chooses not to decide on some aspects, this stance itself is a decision.

This research objective is to create a measurement for co-creation. The straightforward association of dimension and measure is the reason in this research the term dimension will be used to explain aspect that portrays co-creation. With the research question in mind to differentiate whether a variable is a component of a theoretical model or simply a description of co-creation; potential dimensions were sought from literature.

4.1.2 Validating the Dimensions

From the literature review researcher distilled 15 potential dimensions of co-creation. These 15 potential dimensions were then consulted to the experts using a questionnaire. For each potential dimension, it was asked whether or not the potential dimensions is a dimension and if it was a dimension then another question on the criticality of the dimension was asked.

In effort to aim a comprehensive view of co-creation, experts were also asked was there any dimension that should be added, or merged. A dimension would be added or deleted if two or more experts on it.
A dimension name or its explanation could be reformulated. This will happen if during expert interviews it was found that experts had a different opinion compared to the literature on how the dimension should be framed. The aim of any reformulation is to make sure that the dimensions could capture the different essence of the decision, leading to a collectively exhaustive kinds of co-creation activities.

4.1.3 Categorizing the Dimensions
In defining the construct of co-creation, a nomological network will be used. By defining co-creation construct with the help of nomological network, it is necessary to identify to which other concepts co-creation is related. Therefore after choosing the dimensions they will then be categorized into different concepts. In categorizing the dimensions, a sorting task with former MoT students as participants was done to ensure the face validity of the constructed nomological network.

This research was designed to be relevant not only for researchers who are interested in co-creation but also for managers who are looking into the possibilities of implementing co-creation or optimizing the co-creation activities that the firm has done. Therefore, it was hoped that by categorizing the dimensions it would be easier for practitioners to grasp the construct since it was logically defined and categorized. As for the researcher the categorization might help in further research of measuring co-creation by using the existing measures or generally accepted measures that were designed to concepts which are related to co-creation. Moreover, in choosing the co-creation related concepts it is important to ensure that they could be explained using observables of empirical domain (i.e. dimensions). Hence, concepts which might be related to co-creation but fail in participating to any constitutive definition will not be included in this nomological network.

4.2 Dimensions of Customer Co-Creation
In this sub-chapter, an explanation will be given for all dimensions of co-creation. The dimensions that are elaborated here are the result of a validation between dimensions from literature review which were described in sub-chapter 2.4 and result from expert interviews on dimensions of co-creation. A note should be taken on the selection of project as a unit of analysis of this research. Because of this, unit of analysis is not considered as a dimension in this research.

4.2.1 Co-created (or Co-Destructed) Values
Co-created valued refer to the realized values from co-creation process. The generated values are not limited to values produced when the co-creation ends; they also cover values which were generated during the process itself. From literature review it was found that there are types of co-created value which could be generated throughout the entire process of co-creation. Nevertheless, from expert interviews it was pointed out that instead of defining co-created values in terms of the type of value it will be more relevant to divide co-created values based on the party who experiences them. Hence co-created values consist of co-created values for customers and co-created values for firms.
Special note should be taken; co-creation implementation co-creation will not always lead to creation of values. In certain conditions it could also lead to destruction of value, hence leaving customers, firms, or both worse off. These conditions are mentioned in sub-chapter 2.1.6. From the explanation of risk of co-destruction it was suggested that in order to increase the probability of a co-creation process leading to co-created values, the dimensions should be managed and a high fit between dimensions of co-creation should be aimed. For example, for a certain purpose of co-creation there is a group of (potential) customers that can perform the task in the most effective and efficient way compared to other groups. Nevertheless, this does not guarantee the success of co-creation. One possible cause for this is the fact that by involving customers in the innovation process, it added a factor which introduces uncertainty of the result (Interview with A, B).

4.2.2 Collaboration Platform
Collaboration platform is defined as physical or virtual arenas where co-creation activity takes place. Physical arenas examples are dedicated physical space for co-creation, workshop, or customer community meeting. While for online collaboration platform, firm website, and website dedicate for co-creation activities are the examples. In implementing co-creation, it might be decided that a mix of these collaboration platforms will be employed. The adoption of mix platforms could be meant for one type of task (or phase in innovation process) or for more than one task in different stage of innovation phase.
Both literature review results and expert interviews results suggest that the type of collaboration platform used will affect the level of intimacy and in a way limit the type of task that could be carried out in the arena of collaboration.

### 4.2.3 Duration

Duration reflects the length of collaboration between firms and co-creators with regards to phases of innovation process. Co-creation activity could take place only in one of the phases of innovation process, in multi-phase of innovation process, or in a continuous manner throughout the innovation process. Originally this dimension captured the length in terms of days, months or years. When experts were asked about this dimension, most of them explicated that by describing the duration terms of days this dimension will merely become descriptive of co-creation, which does not bring added value in explaining co-creation (Interview with A, B, D). Therefore this dimension was framed in a different way, reflecting the duration of co-creation in relation to the whole innovation process (Interview with D).
There’s a direct relationship between duration and locus of interaction. A multi-locus (of interaction) co-creation process represents co-creation done in multi-phases.

4.2.4 Firm’s Internal Support System
Firm’s internal support system refers to firm’s system that supports co-creation by processing the information gathered from customers’ participation in innovation process, into actionable information for firms. Literature review result suggested that reporting system, knowledge management system, and customer management system will help in translating gathered information. While from the expert interviews, a different opinion emerged. Some experts think that regarding the firm’s internal support system it is important to know its degree of robustness ((Interview with A, B). A robust system will be able to support the co-creation process efficiently. Hence, a categorization of adhoc or systematic for firm’s internal support system dimension is adopted.

![Firm’s Internal Support System](image)

Figure 20. Firm’s internal support system as dimension of co-creation

In relation to other dimensions, an ideal firm’s internal support system to some degree will be affected by the choices made in collaboration platform, level of intimacy, and size of co-creating groups dimensions. This is due to the fact that these dimensions are directly related to the type of gathered information and how big it is.

4.2.5 Governance
Governance refers to both formal and informal set of rules which are administered in relationship initiation, maintenance, and termination between customers and firm. Though in literature there are several popular forms of co-creation governance, this list is far from exhaustive. A generic alternative will be to explain co-creation governance as the combination of hierarchical governance, market-based governance, and relational governance.
In describing governance, it is necessary to explain rules in all three stages of customers-firm relationship. Therefore, governance dimension is elaborated through the formal and informal sets of rules that are imposed in each stage.

During the expert interviews, an emphasize were put on how should firm treat customers. Firm should be as transparent as they can when laying the foundations for the relationship (Interview with E). Moreover firm should be able to switch their mind set in seeing customer as merely a recipient of values to a partner in creating something, so that a sincere discussion can happen between them (Interview with B). This validates a part of the DART (dialog, access, risk-benefits, and transparency) model of Ramaswamy.

4.2.6 Impediments of Co-Creation
Impediments of co-creation are firm-level factors may halt or hold back co-creation process. The impediments could be in the form of:

5. Concerns about secrecy
6. Information overload
7. Production infeasibility
8. Dispute or unclear ownership of intellectual property
9. Lack of co-creation culture
Experts when interviewed were especially concerned about the ownership of intellectual property of co-creation (Interview with A, B, C, E). In tackling the impediments of co-creation, it is necessary to address them in other dimensions of co-creation. For example for the ownership of IP concern, by addressing this in governance the severity level of the impediments could be lowered. A note should be added on the kinds of impediments here, the list described here is far from exhaustive.

4.2.7 Initiator

Initiator specifies which party initiates the co-creation activities, implying that the strategic intent co-creation could be originated either in customers of in firm. In the case that co-creation was initiated by customers it does not necessarily mean that this co-creation happens outside the boundaries of the firm. There are cases when using firm’s collaboration platform customers initiated the co-creation activities. The former case of co-creation initiator is considered rare compared to the latter, where firm initiated the process.
Example of a case where co-creation was initiated by customers happens in aerospace industry. Companies like Boeing and Airbus who are the customers of airplane manufacturer or part supplier firms, were the one who sought for a chance to co-create by articulating their expectation about the new product of the airplane manufacturer company (Interview with B). Their participations do not end there; Airbus and Boeing are also involved in other stages of the innovation process (Interview with B).

4.2.8 Level of Intimacy
Level of intimacy explains the level of firm-customers involvement in co-creation process. From the literature, this dimension was described having three shades of intensity, which are light, moderate and intensity. These different shades are different in the scope of firm-customers involvement. How are they differ depends on which phase of innovation process does co-creation activity take place (i.e. locus of interaction dimension).

From the expert interviews, there are two opinions on this. One opinion is that it is only co-creation when firm-customers involvement is characterised with a high level of intimacy. The other one is that it is possible to have different level of intimacy in co-creation. These differing opinions came from the lack of consensus on what constitutes co-creation. This research will adopt the latter opinion since this dimension is necessary in capturing the ‘how’ part of implementing co-creation in innovation process.
4.2.9 **Locus of Interaction**
Locus of interaction refers to where exactly in innovation process will co-creation activity take place. Hence it is pretty straightforward that this dimension covers all the phases of innovation process which were explained in previous sub-chapter 2.2.2.

- Strategic planning
- Idea development and screening
- Business and market opportunity analysis
- Technical development
- Testing and validation
- Post-launch

**Figure 25. Locus of interaction as dimension of co-creation**

Locus of interaction is directly affected by the purpose of the firm or the motivation of the customers. Moreover, it might be the case that for each locus of interaction, different types of customer are needed to co-create.

4.2.10 **Motivation (Customer-Perspective)**
Motivation refers to the reason for customers to participate in co-creation activity. Motivation ranges from absolute extrinsic to absolute intrinsic. In practice customer motivation usually falls within the range, where extrinsic and intrinsic elements are both apparent. As stated in sub-chapter 2.1.4.10 compared to extrinsic motivators, intrinsic motivators are found to bind more tightly. A customer driven by a more intrinsic will most likely show a higher level of commitment on co-creation activity.

**Figure 26. Motivation as dimension of co-creation**
4.2.11 Purpose
Purpose is the reason why firm implement co-creation in innovation process. The exercise of delineating purpose of co-creation was not as easy task since there is no inventory on all possible purpose of co-creation and the case of overlapping purpose is not uncommon. A firm might come to a decision to implement co-creation from different ‘push’ factors which are highly context dependent ((Interview with D). Therefore with the aim to strike a balance between gaining a collectively exhaustive set of purpose and minimizing the overlap between them, this set of purpose was chosen:

1. Problem solving
2. Co-innovation
3. Validation and improvement
4. Search, develop, buy, and buzz

![Figure 27. Purpose as dimension of co-creation](image)

From the interview, all experts agreed that this is one of the critical dimensions or decisions that must be made before deciding upon other dimensions. Decision taken for this dimension will affect the options of other dimensions.

4.2.12 Size of Co-Creating Groups
Size of co-creating groups explains the scale of co-creation effort by the size of the co-creating groups. This dimension was originally named number of participating co-creators with crowd-sourced and non-crowd-sourced as the categories. But later during expert interviews this categorization was seen as inconsistent as crowd-sourced does not directly explain about the number of participating co-creators (Interview with A, B). Upon this feedback, this dimension was renamed and the categories are reformulated as small, medium and large.
4.2.13 Stimulators
Stimulators are efforts done by firms to stimulate co-creation. In doing so, a firm has two options of decreasing the customer costs for participating in co-creation or increasing the customer benefits received from co-creation activities. Moreover, a fit between motivation and given stimulators will affect the efficiency of co-creation activity.

4.2.14 Type of Co-creators
Type of co-creators refers to the categorization of co-creators based on their skills, experiences, and profile. In co-creation, the type of participating customers might be different depending on other factors such as purpose. A note about the co-creators, customers here does not necessarily mean a person that previously had purchased the product/service a firm. Here customers are covered in a broad sense.
which also covers potential customers. In order to cover the possibility of co-creating with different types of customers, this dimension will be explained by customer skills, customer while, and whether the customer is a lead user or not.

![Figure 30 Type of co-creators as co-creation dimension](image)

### 4.2.15 Use of Mediator
Use of mediator explains whether firm use the service of innovation intermediary or consulting firm in implementing co-creation. Previously this dimension was named the nature of business relationship but since in the expert it was seen that the name is misleading, this dimension is renamed into the use of mediator. Mediator of co-creation is responsible of the carrying out the co-creation activities which covers different kind of tasks in their side. Task such as designing the collaboration platform, selecting customers for co-creation activity, until managing the co-creation activity itself could be delegated to them.

![Figure 31 Use of mediator as dimension of co-creation](image)

From the interviews there are some reasons which make a firm prefer implementing co-creation with the help of mediator. These factors range from brand image, product or service quality, to product safety (Interview with C). Another reason would be to provide a safe space for co-creation from day-to-
day operation, to minimize the intrusion co-creation posed into existing innovation process (de Kempennaer, 2013).

4.3 Interdependence and Categorization of Co-Creation Dimensions

During the analysis phase of the research it was found that there are two ways of seeing interdependency between dimensions. One way is to see it from a strategic point of view of implementing co-creation (deductive). While the other way is to examine the interdependency starting from operational level and then moving to a higher level (inductive). In explaining the interdependence, the deductive approach will be employed.

When experts were asked to fill up the questionnaire comments regarding the interdependence and dynamics between dimensions were uttered. The implementation of co-creation in innovation process starts from strategic intent, continued with implementation in innovation process, which then will bring results of added value embodied in the product, service, marketing, or organisational innovation (Interview with E). All dimensions could be seen as critical dimensions, depending on which phase of implementing co-creation is in scrutiny (Interview with D).

Moreover experts stated different opinions when it came to how the implementation of co-creation in innovation process should be approached. One opinion is to see co-creation as another tool which supports innovation such as market research (Interview with D). Hence the level of complexity in implementing co-creation is alike to the one of implementing supporting tools for NPD project. Another opinion is the implementation of co-creation could not be seen as a simple process, this is due to the fact that co-creation is different compared to other innovating methods (Interview with A, E). The human factor of co-creation makes it imperative for firms to see customers as an equal and treat them in a sincere manner (Interview with E). This of course not a simple task to do, remembering that for many decades firm-centric has been the norm (Interview with B).

In order to capture this interdependence of co-creation dimensions, related concepts were chosen. Having in mind the comments and remarks of the interviewee, customer co-creation was delineated into these 4 concepts.
In the nomological network of co-creation, these 4 concepts are the constitutive definitions. The 15 dimensions which were defined earlier are categorized into these 4 constitutive definitions:

1. Co-creation initiation: The setting up stage for implementing co-creation. Strategic intent of co-creation takes place in this stage.
2. Customer involvement: Customers engage with firms in some way, leading to a benefit for the firms and customers.
3. Innovation process: The process of translating an idea or an invention into an innovation which creates value for customers and in turn for firms.
4. Result of Co-Creation: Result of co-creation activity which can be in the form of end result obtained at the end of co-creation process or result that emerged during the process itself.

4.4 Customer Co-Creation Construct

As previously mentioned in the research scope, a nomological network was used in this research to define the construct. Dimensions serve as the building block of the nomological network as observable items.

In the sorting task, respondents were asked to group the dimensions into 4 concepts related to co-creation. The rule is each dimension corresponds to one of the four concepts. Before the sorting task started each respondent were given the explanation on each of the concept and how they are related to one another. Then they were given the choice on how would they finish the task, either they could think out loud while doing the task or they could first sort all of the dimensions and then explain the reasoning behind. All of the respondents opted for the latter option. The result of this sorting task then was used in defining the nomological network.

Table 13. Result of Sorting Task for the Nomological Network
When it comes about categorizing the result of co-creation, the decision was unanimous. All respondents agreed that co-created values are the result of co-creation process. Almost all of the respondent agreed on the same arrangement of dimensions. Only after the co-creation has been initiated, then customer could be involved in innovation process which then leads to result of co-creation.

As for co-creation initiation, the result showed that most of the respondent agreed that it is characterized by the initiator, purpose of the firm and motivation of customer. For the last dimension some of the respondent first put the dimension under customer involvement, but when asked what will be the case if the co-creation was initiated by the customer, they agreed that motivation belongs to initiation of co-creation. A slightly different view was voiced by one of the respondent, that in co-creation initiation infrastructures need to be prepared from the beginning. Another interesting finding is that all the respondents agreed that firms are the ones who are responsible for setting such an infrastructure regardless of who the initiator is.

On the other hand for customer involvement and innovation process there were different opinions. All of the respondents spent most of the time categorizing dimensions into these two concepts. They felt that the concepts are interrelated in a way that sometimes a dimension could belong in both categories. But since in the beginning of the sorting task respondents were asked to decide to which one specific concept the dimensions belong to, the respondents decided on the categorization based on their opinion and view. Below the construct of co-creation in nomological network form could be found.

<table>
<thead>
<tr>
<th>Result</th>
<th>Co-Creation Initiation</th>
<th>Customer Involvement</th>
<th>Innovation Process</th>
<th>Result of Co-Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-Created Values</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Collaboration Platform</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Duration</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Firm’s Internal Support System</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Governance</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Impediments of Co-creation</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Initiator</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Level of Intimacy</td>
<td>0</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Locus of Interaction</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Motivation</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Use of Mediator</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Size of Co-creating Groups</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Purpose</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Stimulators</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Type of Co-Creators</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Finally, a definition of customer co-creation is formulated from the combination of dimensions and interview result. Customer co-creation is a tool used in innovation process that engage customers as active problem owners in collaboration with firm, during which different size and types of customer groups might participate in the process that is governed and stimulated by the firm to create co-created values as expected in the initiation.
### 4.5 Chapter Conclusion

**Designing the Construct**
- There are three steps in building the construct of customer co-creation. It started with defining the dimensions of customer co-creation, continued with validating the dimensions, and finally categorizing the dimensions in order to create the nomological network.
- Dimension reformulation can take place during the validation process of dimensions. The aim of any reformulation is to make sure that the dimensions could capture the different essence of the decision within each dimension.
- In choosing the co-creation related concepts for categorization it is important to ensure that they could be explained using dimensions of co-creation.

**Dimensions of Customer Co-Creation**
- Unit of analysis is not considered as a dimension in this research because decision regarding unit of analysis was made to draw the research scope.
- A summary of classification for each dimension of customer co-creation.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Sub-dimensions/ Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-created (or co-destructed) values</td>
<td>Values for customer</td>
</tr>
<tr>
<td></td>
<td>Values for firm</td>
</tr>
<tr>
<td>Collaboration platform</td>
<td>Physical</td>
</tr>
<tr>
<td></td>
<td>Combination</td>
</tr>
<tr>
<td></td>
<td>Virtual</td>
</tr>
<tr>
<td>Duration</td>
<td>Specific phase of innovation</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
</tr>
<tr>
<td>Firm's internal support system</td>
<td>Reporting system</td>
</tr>
<tr>
<td></td>
<td>Knowledge management system</td>
</tr>
<tr>
<td></td>
<td>Customer management system</td>
</tr>
<tr>
<td>Governance</td>
<td>Relationship initiation</td>
</tr>
<tr>
<td></td>
<td>Ongoing relationship maintenance</td>
</tr>
<tr>
<td></td>
<td>Relationship termination</td>
</tr>
<tr>
<td>Impediments of co-creation</td>
<td>Concerns about secrecy</td>
</tr>
<tr>
<td></td>
<td>Information overload</td>
</tr>
<tr>
<td></td>
<td>Production infeasibility</td>
</tr>
<tr>
<td></td>
<td>Ownership of intellectual property</td>
</tr>
<tr>
<td>Initiator</td>
<td>Lack of innovation culture</td>
</tr>
<tr>
<td>Level of intimacy</td>
<td>Customer</td>
</tr>
<tr>
<td></td>
<td>Light</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td>Locus on interaction</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Strategic planning</td>
</tr>
<tr>
<td></td>
<td>Idea development and screening</td>
</tr>
<tr>
<td></td>
<td>Business and market opportunity analysis</td>
</tr>
<tr>
<td></td>
<td>Technical development</td>
</tr>
</tbody>
</table>
### Testing and validation

<table>
<thead>
<tr>
<th>Testing and validation</th>
<th>Post-launch</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Extrinsic</th>
<th>Intrinsic</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Problem solving</th>
<th>Co-innovation</th>
<th>Validate and improve</th>
<th>Search, develop, buy and buzz</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Size of Co-creating Group</th>
<th>Small</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Stimulators</th>
<th>Decreased customer cost</th>
<th>Increased customer benefit</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Type of Co-creators</th>
<th>Skills</th>
<th>Customer profile</th>
<th>Lead user</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Use of mediator</th>
<th>Co-creation using mediator service</th>
<th>Co-creation without mediator service</th>
</tr>
</thead>
</table>

### Interdependence and Categorization of Co-Creation Dimensions

- A deductive approach is employed in explaining the interdependence of customer co-creation concept
- Interdependence of co-creation related concepts

#### Customer Co-Creation

- **Co-Creation Initiation**
- **Customer Involvement**
- **Innovation Process**
- **Result of Co-Creation**

#### Customer Co-Creation Construct

- Categorization of the dimensions based into customer co-creation related concepts.

<table>
<thead>
<tr>
<th>Co-Creation Initiation</th>
<th>Customer Involvement</th>
<th>Innovation Process</th>
<th>Result of Co-Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiator</td>
<td>Level of Intimacy</td>
<td>Collaboration Platform</td>
<td>Co-created values</td>
</tr>
<tr>
<td>Motivation</td>
<td>Locus of Interaction</td>
<td>Duration</td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td>Use of Mediator</td>
<td>Firm's Internal Support</td>
<td></td>
</tr>
</tbody>
</table>
- Final definition of customer co-creation:
  “Customer co-creation is a tool used in innovation process that engages customers as active problem owners in collaboration with firm, during which different size and types of customer groups might participate in the process that is governed and stimulated by the firm to create co-created values as expected in the initiation.”
5 Designing Measurement for Customer Co-Creation

“Measurement is the first step that leads to control and eventually to improvement. If you can’t measure something, you can’t understand it. If you can’t understand it, you can’t control it. If you can’t control it, you can’t improve it.” — H. James Harrington

In this chapter an explanation on how each dimension of co-creation could be measured will be given. In measuring one dimension, depending on its type, it might be needed to measure sub-dimensions which form the whole dimension. Each dimension (or sub-dimension) will have classification or categories. Here the classification represents the scale of each dimension or sub-dimension. To be able to conclude in which category a co-creation effort lies, indicators will be used. Thereafter, in order to observe the indicator a methodology will be suggested. An illustration of delineating a dimension of customer co-creation in logical order is given below.

![Diagram of dimension classification and indicator methodology](image)

Figure 34. Two possible delineation of dimension for measurement
Furthermore, depending on how the dimension is classified a type of measurement scale will be defined. In defining the classification the highest possible level of consistency is aimed. However in the case of a dimension for which the classification is less straightforward, the classification might not be collectively exhaustive.

Both the indicators and the methodology elaborated in this section are suggestive in nature. Therefore, process on how to measure the indicators and how to decide on which classification is the object in question from the indicators will not be covered. An additional note for the indicators is that it varies depending on the industry and sometimes it is dependent on the choice made in another dimension. Hence, the listed indicators are to some extent conceptual and general. This was again done with an aim to be consistent in defining the set of indicators.

Before describing the dimensions, the following section will identify possible methodologies to measure the indicators.

5.1 Obtaining the Data for Measurement
There are two types of data, primary data and secondary data. The distinction between these two categories is the purpose of the research. Therefore data which was gathered first-hand for a specific research purpose is considered primary data, while data that exist previously is considered as secondary data. This subsection is meant to explore all the possible methodologies in obtaining the necessary data based on its type. Moreover, in this sub-section, classification, advantages, disadvantages and of each data type will be elaborated.

5.1.1 Primary Data
Based on book from Churchill & Iacobucci (2009) these are the types of primary data:

1. Demographics & socioeconomic
2. Psychographic & lifestyle
3. Attitudes & opinions
4. Awareness & knowledge
5. Intentions
6. Motivation
7. Behavior

Primary data can be collected in several ways. The critical decision is whether to use communication or observation technique as a methodology (G. A. Churchill & Iacobucci, 2009). The former involves a questionnaire or survey, oral or written. In the latter rather than questioning, facts or behaviors are recorded (G. A. Churchill & Iacobucci, 2009). In recording the facts, the observer can either be in the form of a mechanical device or a person.

Communication has the general advantages of versatility, speed, and lower cost. On the other hand, observation usually leads to more objective and accurate data (G. A. Churchill & Iacobucci, 2009). Additionally, in contrast to secondary data, if the data had to be collected using questionnaire or observation, the following steps would have to be executed (G. A. Churchill & Iacobucci, 2009):
1) Data collection form designed and pre-tested
2) Field interview staff selected and trained
3) Sampling plan devised
4) Data gathered and checked for accuracy and omissions
5) Data coded and tabulated

5.1.2 Secondary Data
Secondary data are statistics that had been gathered for a previous purpose and not for your particular research (G. A. Churchill & Iacobucci, 2009). Secondary data can be classified in several ways. Based on its sources they can be classified into internal data and external data (G. A. Churchill & Iacobucci, 2009). Internal data are those found within one's own organization, whereas external data are those obtained from outside sources. The external sources can then be classified into those that publish statistics regularly and make them available to the user at no charge (such as by the European Union) and the commercial organizations that sell their services to users (for example, ACNielsen).

The advantages of using secondary data are many. The most significant advantages are cost and time (G. A. Churchill & Iacobucci, 2009). If the required information is available in secondary data form then the researcher does not gather the data herself. Instead she could simply go to a library or get online to obtain the data. Compared to the process to obtain the primary data obtaining secondary data needs little time and less costs.

The disadvantages of using secondary data are problems of fit and problems of accuracy (G. A. Churchill & Iacobucci, 2009). Since secondary data are in essence gathered data for a previous purpose, most of the time they do not completely fit the problem. Hence, it creates problems of fit. This problem may arise for three reasons: 1) difference in units of measurement, 2) class definitions do not match the research need, or 3) outdated publication currency. The other problem is problems of accuracy which revolves on the accuracy of the secondary data. Errors could be introduced to the data throughout the
process of data collection, data analysis, and presentation of information. In order to assess data’s accuracy this following criteria should help: 1) data source, 2) the purpose of publication, and 3) general evidence regarding quality. Whenever possible it is better to use the primary source of secondary data from a reputable institution in order to obtain objective data.

In order to use secondary data effectively, most of the time assumptions need to be made (G. A. Churchill & Iacobucci, 2009). A practical way to do this is by developing different scenarios to determine how much it affects the conclusion. The aim is to gain robust data which do not change much if the assumptions are changed.

Due to its significant advantages of cost and time, the general advise is to always start with secondary data. Before looking into primary data every researcher should look into secondary data (G. A. Churchill & Iacobucci, 2009). Although these data rarely completely answer all your question, but they will:

1. Help in clarifying the phenomenon under investigation
2. Suggest improved methods or data for investigating the problem
3. Provide comparative benchmarks against which primary data can be more insightfully interpreted.

5.2 Measuring Dimensions of Co-creation

5.1.1 Co-Created (or Co-Destructed) Values
Co-created (or co-destructed) values as a result of co-creation activities is experienced by firm and customers, the actors involved in co-creation. There are two possibilities in the result of the process, which are a joint co-creation of value or a joint co-destruction of value. The type of realized outcome depends on the process and events that took place during co-creation activities.

Co-created (or co-destructed) values are classified from low to high. In low, the result might be negative i.e. values were co-destructed or values were co-created but to an insignificant degree. While for high, the co-creation activities result in significant co-created values. This classification is an ordinal scale.
In measuring this dimension, the researcher recommends the use of indicators such as 1) monetary value; 2) use or experience value; 3) social value. Since the indicators are different in nature and scales, different methodologies need to be employed to measure the indicators. To give an example, monetary value, measured along the ratio scale, could be derived from financial statement of companies assuming the report is made available to public. While social value which is more intangible and tacit could be examined by evaluating the result in terms of learning effect, behavior change, and happiness, a mixture of items measured along nominal scale or ordinal scale where market research or customer survey will be a suited methodology.

Although captured in three indicators of value, the deliverables of co-creation activities will take many different forms. It will vary depending on the phase of the innovation process where co-creation was done (Figure 41).
5.1.2 Collaboration Platform

Collaboration Platform is differentiated into three categories, purely physical, combination of physical and virtual, and pure virtual collaboration platform. In pure physical, collaboration platform will enable co-creators to physically meet each other and personally interact. On the other end of the continuum is pure virtual where co-creation takes place in a virtual, IT-enabled online setting only.

---

**Figure 37 KPIs of co-creation result based on phase of innovation process**
(Thorsten Roser, Samson, Humphreys, & Cruz-Valdivieso, 2009)
Possible interaction channel should be examined and considered as indicators in measuring this dimension. For example, customer community and living lab would be indicators that co-creation is happening in physical collaboration platform. On the other hand, company websites which support co-creation to happen or a dedicated website for the sole purpose as co-creation collaboration platform are indicators that co-creation takes place in a virtual setting. In order to get a full reading on this dimension, a mix of website analysis and questionnaire should be done. In the case that the report of co-creation activities is made publicly available then instead of using questionnaire, document review could be employed.

5.1.3 Duration (Firm-Perspective)
Since duration captures the length of co-creation with regard to the phases of innovation process, this dimension is categorized into during one (specific) phase of innovation process up to continuous where co-creation takes place in multi-phases of innovation. Therefore, this dimension has an ordinal scale.

Indicators such as type of task were carried out during co-creation activities, in which phase of innovation process co-creation took place and relative period of co-creation activities to the whole innovation process. Moreover, if the measurement of locus of interaction results in the identification of more than one locus of interaction then it can be said that the co-creation activity is a multi-phase or continuous in the sense of duration.

In measuring the indicators, an array of methodology is available depending on the data availability. If the co-creation is still ongoing, observation would be one option in obtaining the data. Moreover, if documentation is made available to public or co-creation took place online, a desk research employing a
A mix of document analysis and website analysis might be sufficient to gain some understanding on this dimension. If data is not publicly available, then it will be necessary to use a questionnaire directed to firm employees who were involved in the process.

### 5.1.4 Firm’s Internal Support System

Firm’s internal support system is measured with ordinal scale. It will range from an ad-hoc arrangement to a systematic one. In ad-hoc, there is no dedicated internal support system which helps in registering, evaluating, and applying customer input got during co-creation process. While in a systematic arrangement, there is a dedicated support system. In this particular category, co-creation is well described in the business process and considered as ‘business as usual’. Hence in firms with systematic internal support system, information from co-creation process is processed efficiently so that maximum value could be reaped from gained information.

![Figure 40. Illustration on measuring firm’s internal support system](image)

The indicators that could be used to measure this dimension are state of reporting system, knowledge management system, and customer management system. Depending on the type and size of the industry the firm is operating in, the robustness and the degree of complexity of these systems might vary. 

Reporting system, a basic necessity for firms regardless of its size and industry, would be a good indicator for this dimension especially in firms where there are no well-defined customer management system and knowledge management system. Moreover, a questionnaire or observation would be a recommended methodology because usually such information is sensitive. Hence the possibility of finding publicly available information for the indicators is low. Middle managers who were involved in a co-creation process would be a good source of information.
### 5.1.5 Governance

Governance has three sub-dimensions that represents the phase of the firm-customer relationship in which the set of formal or informal rules are imposed. Hence, this dimension is divided into initiation of relationship, ongoing relationship maintenance, and termination of relationship. Each sub-dimension will be measured using nominal scale, which are 1) hierarchical governance; 2) market-based governance; 3) relational governance. The reasoning behind the selection of these 3 types of governance for classification purpose is because firm can define its own unique governance depending on their purpose, context and other factors. Although popular forms of governance are presented, this does not guarantee that it will cover all the possible form of governance.

**Figure 41. Illustration on measuring governance**

Governance should define the rules of exchange for the whole co-creation process. Therefore, indicators such as transparency, authority, accountability, responsibility and rights of each party could be used. From these indicators then it could be concluded to which category of the governance co-creation activity belongs. Governance in each stage could also be a mix between possible categories. Moreover, since it is not usual to divulge firm’s choice of governance, a questionnaire will be a good choice of methodology in measuring this dimension.

### 5.1.6 Impediments of Co-Creation

Impediments of co-creation will be measured using ordinal scale. A low reading on the impediments of co-creation means that the impediments existence is of insignificant level which might enhance the performance of co-creation or increase the value created from the process. While a high reading means that the factors that could halt or hold back co-creation process exist in a significant level which can negatively affect the co-creation process.
The indicators for this dimension are in itself the factors or events that may halt the co-creation process. Of course to measure different variables different sets of question in the questionnaires are needed. Since it is rare that firms release information of such kind a questionnaire addressed to firm managers would be a good method in obtaining insight for all indicators. The indicators here is not collectively exhaustive, there are other impediments of co-creation which are dependent on the context of co-creation process. Therefore it would be necessary in further research to look at context-dependent impediments of co-creation.

5.1.7 Initiator

Co-creation can either be initiated by firm or customers. Therefore, this dimension will be measured using a nominal scale. Indicators such as the purpose of the firm, customers’ motivation and collaboration platform could be used. Since purpose and motivation are considered personal, questionnaire should be used for measuring the indicators. One set of questionnaire is addressed to the firm managers and another set to customers. As for the collaboration platform, questionnaire could also be used regardless whether co-creation takes place in physical or virtual environment.
5.1.8 Level of Intimacy
Level of intimacy will be measured using ordinal scale. A classification divides this dimension into three categories, 1) light; 2) moderate; 3) high. Since the categories are based on the intensity of the relationship between firms and customers, an ordinal scale is used.
In measuring this dimension, indicators such as the type of activities, collaboration platform, and level of customer empowerment could be used. For example, in a given phase of innovation process such as idea generation, task of connecting with ideas only will be considered as a light level of intimacy. Selecting ideas in addition to connecting ideas will translate to a moderate level of intimacy. Similarly, developing ideas after connecting and selecting them will be considered as a high level of intimacy. As for collaboration platform the higher number of collaboration platform used and the more personal (i.e. collaboration platform enabling high user involvement such as workshop) it is, the higher the level of intimacy. A high degree of customer empowerment, i.e. higher degree of control given to customer and easier access of information for customers, will mean higher level of intimacy.

5.1.9 Locus of Interaction
Since co-creation is implemented in innovation process, it would make sense that the locus of interaction takes place in the phases of innovation process. Hence, defining this dimension into 4 categories where each category represent different phase of innovation process. Although the phases are in a sequential manner but the category itself is of a nominal scale.

![Diagram illustrating measuring locus of interaction](image)

In deciding to which category a co-creation activity belongs to, indicators such as type of task or the product or service maturity could be used. Depending on the collaboration platform a selection on the methodology should be made. If the co-creation activity takes place in an online collaboration platform then a website analysis could be done. On the other hand if it happens in a physical setting then questionnaire would be an appropriate methodology.
5.1.10 Motivation (Customer-Perspective)
Motivation of customers is measured based on whether the motivation is driven by extrinsic and intrinsic factors. In practice, motivation usually is a mixture of these two factors. This dimension is measured using nominal scale.

In investigating this dimension, the motivation will be measured by looking at the characteristics of financial, psychological, social and technological factors that are embedded in the motivation itself. These four types of factors were chosen with the aim that by using them, motivation could be measured in a comprehensive way allowing a collectively exhaustive combinations. Since motivation is personal in nature then a questionnaire will be a good methodology to measure.

5.1.11 Purpose (Firm-Perspective)
In this research the classification of purpose is divided into four categories of 1) co-innovation; 2) problem solving; 3) search, develop, and buzz; 4) validate or improve products. Obviously there are other ways in classifying purpose of co-creation (e.g exploration vs exploitation), but this particular classification was chosen with the hope that by not using dichotomous category a more distinctive and collectively exhaustive classification of purpose could be achieved.
In gaining insight of the co-creation purpose, the simplest way would be using questionnaire with undisguised questions addressed to the firms’ managers. Nevertheless, if this methodology is not possible then indicators that might point out to the purpose of co-creation could be used. Examples of such indicators are firm mission, growth vision of the firm, and industry trend at the time co-creation was initiated.

5.1.12 Size of Co-Creating Groups

Size of co-creating groups will be measured using ordinal scale and can be classified into small, medium, and large. To measure this dimension, indicators such as the ratio of participating co-creators to firm’s employee, the ratio of participating co-creators to firm’s NPD project team, or the ratio of participating co-creators to whole customer segment could be used. These indicators will need information that is usually not made available to public, so a questionnaire addressed to firm’s employee could be a good choice of methodology. If obtaining such data is not possible then an estimation of the size of co-creating groups could be obtained by analyzing the governance and collaboration platform (physical and virtual) of co-creation activity through project report or website analysis.
5.1.13 Stimulators (Firm-Level)
Firms have two generic options in stimulating co-creation. First, they can stimulate co-creation by increasing the benefits that customers receive from participating in co-creation process. Second is to decrease the costs that customers incur from participating in co-creation. Firms could choose one of the options or a combination. In measuring these sub-dimensions, ordinal scale is used since they will be measured in terms of level from low to high. A low reading on the decreased customer cost means that none or not enough efforts were done in lowering cost, i.e. costs were not lowered to a level that can give customers the needed stimuli. As for a high reading, it means that the efforts done were enough and succeeded in giving customers the push to participate. On the other hand, a low reading on the increased customer means that none or insufficient efforts were put in increasing the benefits customers will get for participating in co-creation. While a high reading on the increased customer participation means that sufficient increase of benefits were done so that customers were encouraged to participate. In giving the stimuli, it is necessary for firms to investigate customers’ motivation in the first place to ensure a fit between the motivation and stimulators sub-dimension.
To investigate the customer costs which are relevant to participate in co-creation firms should check the efforts done against the components of customer costs such as time, effort, and opportunity cost. Examples of such approach are to provide user toolkits which simplify the process of creating new ideas, products, and marketing materials for potential participants or to match potential participants with type of task where they have the greatest expertise and passion, and therefore more likely to complete the task efficiently. In measuring the customer benefits firms should check the efforts done against the type of factors (financial, social, technological, psychological). In measuring this dimension, questionnaire addressed to firm managers would be a good methodology since usually this kind of information is not made available to the public.

5.1.14 Type of Co-Creators
Type of co-creators consists of three sub-dimensions which are co-creator skills, co-creator profile and lead user. By delineating this dimension into three sub-dimensions, this research aims for a collectively exhaustive options of defining the types of co-creators. Co-creator skills sub-dimension will then be classified into skilled contributors, non-skilled contributors, and the rest of the world. Co-creator profile is classified to homogeneous and heterogeneous. As for lead-user, it will be classified into lead user, non-lead user, and the rest of the world. The rest of the world for co-creator skills and lead user sub-
dimensions means that co-creators was not picked in a specific way or picked in random manner. Therefore, nominal scale is used in defining sub-dimensions of type of co-creators.

To measure co-creators skills, indicators such as technical skills, non-technical skills, soft skills and hard skills could be used. For co-creator profile, demographic data and customer value over customer lifecycle could be used. As for identifying lead user indicators such as industry trends and benefit reaped by customers from adoption of trend related-solution could be an alternative. For all sub-dimensions, questionnaire for firm managers can be used to gain a more accurate reading of each sub-dimension. But in the case that it is not possible to employ aforementioned methodology, secondary data could also be used for example report of co-creation activity.

5.1.15 Use of Mediator

In implementing co-creation an innovation process, a firm might decide to use the service of a mediator (e.g. consulting firm, innovation intermediary) or might do this in-house using their own resources. This dimension has dichotomous categorization and measured using a nominal scale.

To gain some information for this dimension, indicators such as collaboration platform used for co-creation, or a report on the co-creation activities that had been done could be used. If one decides to use collaboration platform as the indicator, depending on the platform type, either website analysis or questionnaire will be useful in understanding this dimension. In cases that the co-creation was done with the help of mediator yet there is no information linking the firm and mediator then it will be necessary to use questionnaire.
5.3 A Guide for Future Research on Measuring Co-creation

Suggestive indicators and methodology for each of the dimension of co-creation have been proposed in previous section of this chapter. This sub-chapter in continuation from the previous ones will provide guidance on how one should measure the whole construct of co-creation. Moreover, recommendations for further research on measuring co-creation are also given here.

Previous section showed that in measuring co-creation there are different methodologies depending on the dimension one would like to measure. The variance among the nature of indicators is the reason why in measuring co-creation different methodologies should be employed (Refer to figure 56 available in the next page). A rather tangible indicator as financial reward is measured differently from intangible indicator such as customer empowerment.

One critical aspect of doing a measurement exercise is the accuracy of the result. By using different tool or methods of measurement, different accuracy levels can be achieved. A simple exercise of measuring the diameter of a pipe with a ruler and a vernier caliper will give a different level of accuracy. The same principle also applies in measuring co-creation through its dimensions. Different set of indicators for a dimension and methodology could affect the result of construct measurement. In turn the accuracy level will affect the validity of the measurement.
Figure 52. Co-Creation Measurement Framework
For further research, depending on the scope and the objective of the research, different strategies should be pursued. The scope of further research will be divided into dyadic categories which are, to focus on a specific dimension or to focus on the complete set of dimensions for the purpose of explaining the strategies. While for the research objective, although this categorization does not represent an exhaustive set, is divided into refinement or theory testing, and comparative study. In research with refinement or theory testing as an objective, the aim is to refine the measurement of co-creation. This could mean that researcher is either focusing on the indicators and/or the methodology of the dimension(s). On the other hand comparative study is benchmark study where researcher tries to compare co-creation in one project to the other, or in one company to the other.

![Diagram of research types]

**Figure 53. Illustration for types of further research**

1. **Whole construct and comparative study**
   In a comparative study, measuring the whole construct the researcher will be dealing with 15 different dimensions, for different co-creation projects or different companies which implemented co-creation in their innovation process. This type of study will require a lot of resources, especially if methodology such as observation is to be employed. Moreover, this research would benefit if previous case study researches has been conducted. This would then minimize the required resources, although the researcher should be aware of the comparability of the research since independent case studies might differ in industry, time period, region, and research methodology. In the case that such researches are not available, researcher will need to gather all the data by himself/herself. For this situation, using questionnaire as often as possible will be a good strategy. Since questionnaire result could be compared easily from one to another and it is
also more cost effective. Nevertheless, using questionnaire as the main methodology does not mean that it is the sole methodology in measuring co-creation. For example in measuring the financial reward of co-creation, a financial report will still be a better source assuming that researcher could get the percentage of sales or profit generated by co-creation effort.

If the aim of the research is to define or quantify the relationship between co-creation and other concept, such as sustainable competitive advantage, then it is advised to do it for companies in one industry, and preferably in one geographic region. The reason behind this is to minimize the effect of external factors such as macro-economic trends. By conducting the study for companies in the same industry, the macro-economic trends will affect the companies in more or less similar degree and fashion.

2. **One (specific) dimension and comparative study**

A comparative study, focusing on one or specific dimension will have a narrower scope if compared to the previous research type. In this research it is important to explore the dimension in a more extensive and deeper manner due to the emphasize put on a certain dimension.

Methodology such as interview and observation are particularly useful to gain a deeper understanding and to recognize the subtle differences that might not be captured using questionnaire. Therefore, in this research it would be a good strategy to use interview and observation in conjunction with questionnaire. The use of these mix methodologies will help researcher in obtaining deeper insight while still being efficient at the same time.

In the same note with the previous research type, if the objective of the research is to explore how a certain dimension of co-creation affects other concept (example. sustainable competitive advantage) then it is recommended to do the research in a certain industry context. By doing so, the effect of in-between factors could be minimized.

In the early stage of this type of research, researcher should scour first for prior study where co-creation is measured using the specific dimension preferably in the same industry. The reason is that by identifying these prior researches, the researcher could then build upon the methodology and insight from them. If this type of research is limited then it might be necessary for the researcher to have collaboration with companies or to target large group of sample depending the sensitivity of a dimension. It will be more difficult to obtain information about a dimension which is sensitive in nature since companies are usually unwilling to share. By having collaboration with companies, they are more welcoming and willing to share their experiences. While by targeting a large group of sample, the probability of a company sharing its information will be higher.

3. **One (specific) dimension and refinement/ theory testing**

In a research focusing the refining and testing a specific dimension, means that set of different indicators will be used in measuring the dimension. The experiment does not stop in using different set of items and indicators it also goes to the extent of testing what would be the best methodology to measure a dimension through the indicator. Therefore for this type of research, it is necessary to explore different kinds of methodology and evaluate which indicators and methodology capture the dimension in the most accurate way.
If the expected result of this research is a set of indicators and/or methodology in measuring them, robustness is a concern. A robust indicators and methodology will give accurate measurement of the dimension, regardless of the context where the measurement is being done. To do so, this set of proposed indicators and methodology should be tested in different context. This could be done by doing for example testing the proposed indicators and methodology in different industry, different geographical area, or companies of different size.

4. Whole construct and refinement/ theory testing
If the focus of the research is the testing and and/or refining the whole construct. A similar approach with the research in refining specific dimension will also be employed. Different sets of indicators and methodology could be used. Nevertheless, the broad scope of this research calls for a different strategy since we have limited resources and have bounded rationality.
Firstly, since the whole set of dimensions would be tested and some of the information related to those dimensions are not made available to the public, researcher should consider to collaborate with the company. So that the company will have higher commitment in supporting and making sure the research does well. By having a collaboration agreement, companies will be willing to share sensitive information to researcher which are useful for the research.
Special care needs to be taken in ensuring the correlation among the dimensions and among the indicators. A high correlation would mean that there might be overlapping between dimensions and research might be trying to measure two things that are closely related. If indicators with high correlation are simultaneously used, it will lead to accumulated inaccuracy from the double or triple counting coming from correlated items.

From above explanation, it can be concluded that different research scope and objectives will lead to a different strategy for the measurement methodology and the research methodology itself. Two assumptions were used for all research types. One is that the resources available to support the research is limited, and two is the researcher as human have bounded rationality.

5.4 Managerial Implications
The findings of this research also have practical implications for firm. The usability of the research findings for firms depends on their current condition of co-creation implementation. To be able to give further explanation, three scenarios of different co-creation implementation stages are drawn. Following are the scenarios and explanations on how the findings can be useful in such scenario:

1. Firms in the consideration phase of implementing customer co-creation
For a firm in this stage of co-creation implementation, the research findings can be used as a strategy tool. The dimensions can guide firm in deciding to implement co-creation or not. The dimensions represent the decisions that a firm need to take in order to co-create with customers. Moreover, the measurement of current situation of indicators should be used in deciding whether the firm is ready for co-creation and the consequences that follows its implementation. For example, in assessing the impediments of co-creation, a high reading on
this dimension indicates that a resistance might arise within the firm if further steps to implement co-creation are taken. Therefore, for the firm to successfully implement and gain from co-creation these factors have to be addressed and minimized.

2. Firm in the process of implementing customer co-creation
   During this phase, the findings of this research can be used to monitor the ongoing process and assess whether everything is going according to plan or not. By monitoring the dimensions if it is detected that one or more dimensions are deviating then an action plan can be develop to get these dimensions back on track.

3. Firm which has implemented co-creation
   As for firm which has implemented co-creation, the dimensions can be used in evaluating the co-creation implementation. Performance analysis can also be done with the help of the dimensions. Moreover, in evaluating past co-creation efforts firm can also analyse which combination of dimensions best fits its purpose.

Above explanations assume on firm using rational decision making in implementing co-creation. However, in practice it might be different. Because of factors such as incomplete information, bounded rationality, and the introduction of politic in the decision making process, firms might have irrational decision making instead.

First, the irrationality of the decision making can come from the fact that it is impossible to have all the required information to decide. At some point the marginal benefit of having the additional information will be outweighed by the marginal cost incurs in obtaining the information. Additionally, since we cannot predict the future we cannot cover and develop scenarios for all possible outcomes. Second, in the hypothetical case that perfect information is obtained, the notion of bounded rationality suggest that firm will not have the capacity to analyse all of this information. Third, political agenda might bypass the systematic decision making. For example, if the implementation of customer co-creation is the pet project of a top manager then it will be implemented without looking into other factors.

### 5.5 Chapter Conclusion

<table>
<thead>
<tr>
<th>Chapter Subject</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Obtaining the Data for Measurement</strong></td>
<td>• Observation and questionnaire can be used to obtain primary data</td>
</tr>
<tr>
<td></td>
<td>• Secondary data are available through reports or journals, which might either be published to public or obtain from the service of commercial organizations</td>
</tr>
<tr>
<td><strong>Measuring Dimensions of Co-creation</strong></td>
<td>• Following list is the summary of suggestive indicators for each dimension</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Co-Created Values</strong></td>
<td>• Monetary value</td>
</tr>
<tr>
<td></td>
<td>• Use or experience value</td>
</tr>
<tr>
<td></td>
<td>• Social value</td>
</tr>
<tr>
<td><strong>Collaboration Platform</strong></td>
<td>• Company websites</td>
</tr>
<tr>
<td></td>
<td>• Websites dedicated for co-creation activities</td>
</tr>
<tr>
<td></td>
<td>• Living Lab</td>
</tr>
<tr>
<td></td>
<td>• Customer community</td>
</tr>
<tr>
<td><strong>Duration (Firm-Perspective)</strong></td>
<td>• Type of task</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th><strong>Activities in innovation process where customers were involved as co-creators</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firm's Internal Support System</strong></td>
</tr>
<tr>
<td>• Reporting system</td>
</tr>
<tr>
<td>• Knowledge management system</td>
</tr>
<tr>
<td>• Customer management system</td>
</tr>
<tr>
<td><strong>Governance</strong></td>
</tr>
<tr>
<td>• Transparency</td>
</tr>
<tr>
<td>• Authority</td>
</tr>
<tr>
<td>• Accountability</td>
</tr>
<tr>
<td>• Responsibility of each party</td>
</tr>
<tr>
<td>• Rights of each party</td>
</tr>
<tr>
<td><strong>Impediments of Co-creation</strong></td>
</tr>
<tr>
<td>• Concerns about secrecy</td>
</tr>
<tr>
<td>• Information overload</td>
</tr>
<tr>
<td>• Production infeasibility</td>
</tr>
<tr>
<td>• Ownership of intellectual property</td>
</tr>
<tr>
<td>• Lack of innovation culture</td>
</tr>
<tr>
<td><strong>Initiator</strong></td>
</tr>
<tr>
<td>• Purpose of firm</td>
</tr>
<tr>
<td>• Motivation of customers</td>
</tr>
<tr>
<td>• Collaboration platform</td>
</tr>
<tr>
<td><strong>Level of Intimacy</strong></td>
</tr>
<tr>
<td>• Type of activities</td>
</tr>
<tr>
<td>• Collaboration platform</td>
</tr>
<tr>
<td>• Customer empowerment</td>
</tr>
<tr>
<td><strong>Locus of Interaction</strong></td>
</tr>
<tr>
<td>• Type of task</td>
</tr>
<tr>
<td>• Product or service maturity (related to its lifecycle)</td>
</tr>
<tr>
<td><strong>Motivation (Customer Perspective)</strong></td>
</tr>
<tr>
<td>• Financial factors</td>
</tr>
<tr>
<td>• Psychological factors</td>
</tr>
<tr>
<td>• Social factors</td>
</tr>
<tr>
<td>• Technological factors</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
</tr>
<tr>
<td>• Company mission</td>
</tr>
<tr>
<td>• Vision for growth</td>
</tr>
<tr>
<td>• Industry trend</td>
</tr>
<tr>
<td><strong>Size of Co-creating Groups</strong></td>
</tr>
<tr>
<td>• Ratio of participating co-creators to firm’s employee</td>
</tr>
<tr>
<td>• Ratio of participating co-creators to firm’s project team</td>
</tr>
<tr>
<td>• Ratio of participating co-creators to customers segment</td>
</tr>
<tr>
<td><strong>Stimulators (Firm-Level)</strong></td>
</tr>
<tr>
<td>• Time</td>
</tr>
<tr>
<td>• Effort</td>
</tr>
<tr>
<td>• Opportunity cost</td>
</tr>
<tr>
<td>• Financial factors</td>
</tr>
<tr>
<td>• Psychological factors</td>
</tr>
<tr>
<td>• Social factors</td>
</tr>
<tr>
<td>• Technological factors</td>
</tr>
<tr>
<td><strong>Type of Co-Creators</strong></td>
</tr>
<tr>
<td>• Technical skills</td>
</tr>
<tr>
<td>• Non-technical skills</td>
</tr>
<tr>
<td>Use of Mediator</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>- Soft skills</td>
</tr>
<tr>
<td>- Hard skills</td>
</tr>
<tr>
<td>- Demographic data</td>
</tr>
<tr>
<td>- Customer value during lifecycle</td>
</tr>
<tr>
<td>- Customer who are leading industry trend</td>
</tr>
<tr>
<td>- Customer who benefit from adoption of trend-related solution</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
6 Conclusion and Recommendations

“Somewhere, something incredible is waiting to be known.”

Dr. Carl Sagan

In this chapter, the conclusions of the research are presented in terms of research answers to the research questions presented in the first chapter. Later in the chapter, reflections about the research and its findings are presented. Finally, recommendations are provided to further develop the measurement of co-creation.

6.1 Conclusion

The research objective are to summarize previously-researched customer co-creation concepts and furthermore propose a construct of customer co-creation, and to propose a way to measure co-creation. To meet this objective, a main research question with three sub-questions is formulated in this research. The conclusions of the research are presented in the form of answers to these research questions. The research sub-questions are addressed first, and finally the main research question is answered.

Sub-question 1: What is customer co-creation?

From the result of literature review and interviews, a final definition of customer co-creation is proposed in this research.

“Customer co-creation is a tool used in innovation process that engages customers as active problem owners in collaboration with firm, during which different size and types of customer groups might participate in the process that is governed and stimulated by the firm to create co-created values as expected in the initiation.”

Sub-question 2: What are the dimensions of co-creation?

From the triangulation of results of the literature review and expert interviews, 15 dimensions are identified and explained in this research

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-Created Values</td>
<td>Realized values from co-creation activities for both firms and customers</td>
</tr>
<tr>
<td>Collaboration Platform</td>
<td>Physical or virtual space where co-creation activity takes place</td>
</tr>
<tr>
<td>Duration (Firm-Perspective)</td>
<td>The length of co-creation activity with regard to the phases of innovation process, whether it took place only in one phase or multi-phase.</td>
</tr>
<tr>
<td><strong>Firm's Internal Support System</strong></td>
<td>Firm's internal system that supports co-creation by processing customers' input into actionable information for firms.</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Governance</strong></td>
<td>Set of formal and informal rules which set the guidelines starting from the initiation until the termination of firm-customers relationship</td>
</tr>
<tr>
<td><strong>Impediments of Co-creation</strong></td>
<td>Firm-level factors that may halt or hold back innovation process</td>
</tr>
<tr>
<td><strong>Initiator</strong></td>
<td>The party who initiated co-creation activity, also marks where the strategic intent of co-creation originated</td>
</tr>
<tr>
<td><strong>Level of Intimacy</strong></td>
<td>Explains the level of firm-customers involvement in co-creation activity</td>
</tr>
<tr>
<td><strong>Locus of Interaction</strong></td>
<td>Where in innovation process (specific phase) co-creation takes place</td>
</tr>
<tr>
<td><strong>Motivation (Customer Perspective)</strong></td>
<td>The reason behind customers participating in co-creation activities</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>The reason why firm implement co-creation in innovation process</td>
</tr>
<tr>
<td><strong>Size of Co-creating Groups</strong></td>
<td>Explains the scale of co-creation effort by the size if the co-creating groups</td>
</tr>
<tr>
<td><strong>Stimulators(Firm-Level)</strong></td>
<td>Efforts done by firm to stimulate customer co-creation</td>
</tr>
<tr>
<td><strong>Type of Co-Creators</strong></td>
<td>Categories of co-creators (i.e.customers) depending on their skills and profile</td>
</tr>
<tr>
<td><strong>Use of Mediator</strong></td>
<td>Use of innovation intermediary or consulting firms in implementing co-creation.</td>
</tr>
</tbody>
</table>

*Sub-question 3: How can co-creation be measured?*

Before co-creation can be measured, a construct of co-creation needs to be defined first. In this research a nomological network was used to build the construct in order to ensure construct validity. Dimensions of co-creation serve as building blocks in making the nomological network. These dimensions then grouped into co-creation related concepts in order to see the interdependence between these dimensions. Upon categorizing the dimensions, a nomological network of co-creation was defined with dimensions as observables in empirical domain. The dimensions would then be measured one by one in order to measure co-creation as a whole.

*Sub-question 4: What indicators can be used to characterize co-creation process?*
In this research an effort to identify suggestive indicators was done. These suggestive indicators when put to use in practice have to take into consideration the context of the implementation of co-creation in innovation process. This is due to the fact that measurement indicators can be highly affected by the type of industry, the size of the firm, and location of the firm.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-Created Values</td>
<td>• Monetary value</td>
</tr>
<tr>
<td></td>
<td>• Use or experience value</td>
</tr>
<tr>
<td></td>
<td>• Social value</td>
</tr>
<tr>
<td>Collaboration Platform</td>
<td>• Company websites</td>
</tr>
<tr>
<td></td>
<td>• Websites dedicated for co-creation activities</td>
</tr>
<tr>
<td></td>
<td>• Living Lab</td>
</tr>
<tr>
<td></td>
<td>• Customer community</td>
</tr>
<tr>
<td>Duration (Firm-Perspective)</td>
<td>• Type of task</td>
</tr>
<tr>
<td></td>
<td>• Activities in innovation process where customers were involved as co-creators</td>
</tr>
<tr>
<td>Firm's Internal Support System</td>
<td>• Reporting system</td>
</tr>
<tr>
<td></td>
<td>• Knowledge management system</td>
</tr>
<tr>
<td></td>
<td>• Customer management system</td>
</tr>
<tr>
<td>Governance</td>
<td>• Transparency</td>
</tr>
<tr>
<td></td>
<td>• Authority</td>
</tr>
<tr>
<td></td>
<td>• Accountability</td>
</tr>
<tr>
<td></td>
<td>• Responsibility of each party</td>
</tr>
<tr>
<td></td>
<td>• Rights of each party</td>
</tr>
<tr>
<td>Impediments of Co-creation</td>
<td>• Concerns about secrecy</td>
</tr>
<tr>
<td></td>
<td>• Information overload</td>
</tr>
<tr>
<td></td>
<td>• Production infeasibility</td>
</tr>
<tr>
<td></td>
<td>• Ownership of intellectual property</td>
</tr>
<tr>
<td></td>
<td>• Lack of innovation culture</td>
</tr>
<tr>
<td>Initiator</td>
<td>• Purpose of firm</td>
</tr>
<tr>
<td></td>
<td>• Motivation of customers</td>
</tr>
<tr>
<td></td>
<td>• Collaboration platform</td>
</tr>
<tr>
<td>Level of Intimacy</td>
<td>• Type of activities</td>
</tr>
<tr>
<td></td>
<td>• Collaboration platform</td>
</tr>
<tr>
<td></td>
<td>• Customer empowerment</td>
</tr>
<tr>
<td>Locus of Interaction</td>
<td>• Type of task</td>
</tr>
<tr>
<td></td>
<td>• Product or service maturity (related to its lifecycle)</td>
</tr>
<tr>
<td>Motivation (Customer Perspective)</td>
<td>• Financial factors</td>
</tr>
<tr>
<td></td>
<td>• Psychological factors</td>
</tr>
<tr>
<td></td>
<td>• Social factors</td>
</tr>
<tr>
<td></td>
<td>• Technological factors</td>
</tr>
<tr>
<td>Purpose</td>
<td>• Company mission</td>
</tr>
<tr>
<td></td>
<td>• Vision for growth</td>
</tr>
<tr>
<td></td>
<td>• Industry trend</td>
</tr>
</tbody>
</table>
### Size of Co-creating Groups
- Ratio of participating co-creators to firm’s employee
- Ratio of participating co-creators to firm’s project team
- Ratio of participating co-creators to customers segment

### Stimulators (Firm-Level)
- Time
- Effort
- Opportunity cost
- Financial factors
- Psychological factors
- Social factors
- Technological factors

### Type of Co-Creators
- Technical skills
- Non-technical skills
- Soft skills
- Hard skills
- Demographic data
- Customer value during lifecycle
- Customer who are leading industry trend
- Customer who benefit from adoption of trend-related solution

### Use of Mediator
- Participation of innovation intermediaries
- Participation of consulting firms

**Main research question:** How to operationalize customer co-creation so that further research on customer co-creation can be done and the implementation of customer co-creation in innovation process can be facilitated?

After defining the construct of co-creation, it is operationalized. Defining the construct is necessary since there is no consensus on the definition of co-creation. By developing the construct of customer co-creation, a link between theoretical domain and empirical domain can be established. In building the construct this research employs the dimensions of customer co-creation as building blocks. Once the link between theoretical and empirical domains was established in this research, it was possible to further operationalize co-creation by defining the methodology and indicators.

The results achieved in this research are relevant for both researcher and firm. This research serves as a starting point for researcher who aspires to enrich the body of knowledge on customer co-creation measurement. As for firm, the insights from this research can be used in different ways, as a base to decide on co-creation implementation, to measure performance, or to evaluate previous co-creation activities, depending on the stage of co-creation implementation the firm is in.
6.2 Reflections and Research Limitations

6.2.1 Reflections

In this sub-section, reflections on the research process are presented from the researcher’s personal experience in conducting the research. This includes steps that would have been changed or conducted differently if the researcher had more resources, i.e. time, access to experts, and funds. A discussion of the complexity of the problem that was encountered will also be given.

Co-creation is a phenomenon which is relevant for different fields of research. Since different fields focus on different aspect of co-creation, there are different terminologies and ways of describing co-creation. Moreover there is no consensus in what co-creation is from one field to the other. Boundaries on what constitutes co-creation are also unclear. Depending on the stance of the researcher and the interviewee their answers differ. Experts feel that this lack of consensus is one of the reasons why research in measuring co-creation is still underdeveloped. Besides that, previous researches of co-creation are fragmented. During the literature review researcher found many models and framework. Nevertheless they adopt a certain point of view or focus on a narrow aspect that in researcher opinion limits the comprehensiveness of the model in describing co-creation.

During the expert interviews, the list of co-creation dimensions were not shared until it was time to fill up the questionnaire. This might affect the capability of the experts to add, modify, or delete the dimensions of co-creation because the complexity of describing co-creation through its 15 dimensions could be overwhelming. Experts told that the suggestions that they gave were something that came from ‘off the top of my head’. Therefore more insights might be gained if the experts were informed about the 15 dimensions beforehand.

The choice to use nomological network in defining the construct of co-creation was because it will help to draw the link between a construct to observable measurement. Besides that there is no previous research that used this approach to examine co-creation. Therefore, researcher feels that the use of nomological network can shed some light and enrich the perspectives in examining co-creation.

The dimensions presented here to some extent are simplification of reality. One dimension could be divided into sub-dimensions in different ways. The same applies for the categorization of dimensions. During the interview experts pointed out that a categorization should be done but there is no consensus on what the basis of the categorization should be.

In analyzing suggestive indicators and methodologies, the researcher observes that different research context might impact the selection of indicators and methodologies. Factors such as type of industry, the size of the firm and firm’s geographical location affects the suitability of sets of indicators and methodologies.

The researcher observed that there are interdependencies and relations among the dimensions. Relationships between dimensions to innovation process were also observed. The possibility of relationships are numerous and also highly contextual depending, for example, the implementation
stage of co-creation in a firm. If the researcher had more time, exploring the numerous possible relations could have bring more insights to this research.

Finding practitioners who were willing to participate posed a challenge for this research because of the limited personal contacts the researcher has in the Netherlands. Effort such as cold-calling and cold-emailing were done with little amount of success, despite the extra preparation done to increase the likelihood of participation. Personal contacts of supervisor and personal contacts of another interviewee are the main source of practitioner participants. Moreover, this limited access to practitioners also limits the amount of information they could give to the researcher. If the research had been done in a specific company, researcher would have gained access to more data on the implementation of co-creation. Additionally researcher would have liked to interview more academicians and practitioners to further enrich the gained insights.

There is limited amount of research on measuring co-creation. Furthermore, the available researches are fragmented and most of the time has narrow focus of research. On the other hand, the current practice of co-creation in firms does not put significant effort in measuring co-creation. Most of the measurements done are limited to result of co-creation and not the process. Additionally, firm managers rely on existing measurement criteria and instrument, with no adjustment to cater specific aspects of co-creation.

**6.2.2 Research Limitations**

This research has some limitations which should be taken into consideration when adopting the conclusions presented in this thesis. In this sub-section the limitations will be explained.

First, there are no validation done for both the indicators and methodologies for each dimension in this research. This research is not trying to find out the best indicators and methodologies in measuring co-creation. Therefore, the indicators and methodologies presented here are suggestive in nature. This is due to the fact that trying to identify the best indicators or methodologies is in itself another research.

Second, there is no specific industry context adopted in this research. Although it means that the results of this research are to some extent generalizable but it also means that this research does not capture factors that might be prominent in an industry. There might be indicators of dimensions of co-creation that are industry-specific. These factors are considered out of scope of this research.

Third, since the researcher did not have the opportunity to go through and discuss all the dimensions with practitioners, no analysis is done on how the dimensions are being implemented in firm setting. The interviews done with practitioners are limited to identifying critical dimensions and existing measurement process of co-creation. Moreover, this research does not provide comparison on the implementation of co-creation in different firms.

Fourth, although the relationship between innovation process and co-creation is acknowledged in this research but there is no analysis made on the relationship of each dimension to innovation process due to time constraint. Nevertheless, during the research relationships between dimensions and innovation process were found.
Fifth, no quantification of relationship or interdependency is provided in the nomological network. This was not possible because the number of experts participating in the research is limited and researcher had limited access to them. Due to previous reason, there was no empirical data obtained in this research.

Sixth, the dimension of unit of analysis is left out in this research. To be able to draw the research scope, a decision on the unit of analysis had to be made. This research focuses on project as the unit of analysis. Therefore, other dimensions, and indicators that are relevant in measuring co-creation in a firm level unit are not explored and discussed.

Seventh, the categorization of the dimensions done in this research only illustrates one way to do the categorization. The categorization itself is not limited to this current approach. Different ways and criteria could be used in making the categorization.

Eighth, much of the information can be considered a matter of opinion because of the limited number of experts being interviewed for this research. Moreover, in some cases a category of the expert (i.e. view on co-creation, field of study, and stage of co-creation implementation) are represented with one expert only due to resources constraint.

6.3 Recommendations
The findings of this research are relevant for researcher and firm managers. Therefore, recommendations on further research and the application of findings in business setting are given here.

Validation of Measures
As explained in section 5.3 further research can take different direction depending on the scope and the objective of the research. Ideally, these researches should be done in parallel to establish a mature body of knowledge on measuring co-creation. However, based on current situation a certain type of research might have higher priority compared to others. In the scenario of researcher continuing this study, research will put refinement or theory testing research of the whole construct as a top priority.

Since the indicators given in this research are suggestive, further steps need to be taken to test and to ensure the reliability and validity of the measurement. Researcher will seek to validate the measures by collecting empirical data of customer co-creation projects done in companies and analyze them using the 15 dimensions mentioned here. By doing so, researcher can purify the measures then improve the reliability and validity of the measures. In the end norms in measuring co-creation will be developed.

Develop measures for certain context
This research does not take any specific industry context. Therefore industry specific factors that might affect the measurement are ignored. Assuming different industry might have existing practice in measuring indicators, and assuming prevalent factors might differ from one industry to the other. It will be beneficial if the current measures are evaluated and implemented in a certain context. This recommendation can be carried out either by researcher or firm. Upon developing measures for certain context, industry specific factors, indicators or measurement methodology can be identified.
**Relationship testing of nomological network**

The nomological network presented in this research is still a preliminary version. Additionally, nomological network implies on the existence of relationship 1) between constructs or concepts; 2) among the observable variables; and 3) between constructs and the observable variables. It is necessary to further test these propositions of relationship using empirical data. Further testing and validation of the relationship within the nomological network will increase the trustworthiness of the construct. An example of this research is the identification and testing of interdependencies that exist between dimensions or observable variables.

**Using measure to prove relation between customer co-creation and performance**

The developed measures of customer co-creation will enable researchers to prove relation or causality between customer co-creation and other concepts, such as performance. This research was done with the ambition that the result would lay the foundation for measuring the relation between customer co-creation and performance related concepts such as sustainable competitive advantage.

Researcher should do this by looking into companies in the same industry, so that the in between difference found in samples coming from different type of industries can be minimized. Moreover, variation in other factors which are not considered here such as firm innovation strategy need to be controlled as well.

**Customer Co-creation Research with Different Unit of Analysis**

This research adopt project as a unit of analysis. Therefore, the same type of research should be done for different unit of analysis. For example, a firm-level research can be done.
Bibliography


doi: 10.1136/bmj.322.7294.1115


doi: 10.1016/0737-6782(94)90115-5


Gustafsson, A., & Johnson, M. D. (2003). Competing in a service economy: How to create a competitive advantage through service development and innovation


Appendices

Appendix A

Theoretical Framework : Innovation Process

To start off, aligned with the working definition customer co-creation is a process where firm and its customers jointly create value. It implies that it has to be applied in a certain context. Since innovation has been the machine of growth of last decades, we would study the innovation process in which co-creation could be used as a mean to expand firm’s innovation capability.

Innovation can be defined as the calculated introduction and adoption of new relevant ideas, processes, products or procedures within a role, group or organization, which are designed to give benefit to individual, group, organization and society as a whole (West, 1990). Within the same stream of knowledge the Oslo Manual of OECD (2005) stated that “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations.” Likewise, the innovation process discussed in this research will be of relevancy to a firm-level analysis.

In attempt to explain the innovation process, writer will start by explicating innovation typologies in order to describe the characteristic of the end result of innovation. Upon it, an elaboration on innovation process would be done, touching upon the available generations of innovation model and process. In continuation, a Stage-Gate® process would be described, explaining its relationship with innovation process and illustrating the adaptation done in the next generation of Stage-Gate®

Innovation Typologies

There are varied innovation typologies depending on the key underlying dimensions of the innovation types. A research employing literature review strategy (Garcia & Calantone, 2002) reveals that the innovation categorization ranges from an eight-categories typology to a simple dichotomous categorization.

In the attempt of creating a comprehensive typology, Chandy & Prabhu tried to cover all the available types of innovation based on two dimensions were proposed (Chandy & Prabhu, 2010) :

1. The concept underlying the innovation and the user of innovation. So be it customers who might buy the innovation, or the company that implements the innovation.
2. The features or the effects innovation has on the status quo.

Another typology was created by OECD elaborated in its Oslo Manual (2005). Here it is based on the end results, narrowly categorized to the implementation of one or more types of innovations which encompass the wide range of changes in firms’ innovation activities. The types of innovation mentioned in the Oslo Manual are as follow :
2. A **product innovation** is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.

3. A **process innovation** is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

4. A **marketing innovation** is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

5. An **organisational innovation** is the implementation of a new organizational method in the firm’s business practices, workplace organisation or external relations.

Instead of using the tangibility of the innovation as seen in previous typology, another typology uses the degree of novelty of the innovation as the underlying dimensions. Using this typology, innovations are breakdown into 2 categories (Song & Montoya-Weiss, 1998)

1. An **incremental innovation** is when the innovation process involves the adaptation, refinement, and enhancement of existing products and/or production or delivery systems

2. A **really new/ radical innovation** is one that relies on novel technology which has not been used in the industry before or has a significant impact in the whole industry or is the first of its kind and totally new to the market.

A recent differing proposition of innovation type came from Prahalad and Ramaswamy (2003), instead of tying innovation to a certain product or service. They propose a new type of innovation, **experience innovation**. The intent of such innovation is not to improve a product or service, but to enable the co-creation of experience innovation occupied by firms, customer and their networks. Moreover, the end goal is to create a personalised, evolvable experience with the help of evolving products and services as a means (Prahalad & Ramaswamy, 2003). This implies that a new technological capability would only be meaningful when it is focused on the effort of improving the customer experience.

Knowing the objective i.e. the characteristics or the form of end result of innovation, we should turn into our attention to the process of making the innovation and bringing it to the market. By doing so, we would gain information on how and what are the efforts needed in bringing innovation to the customer.

**Innovation Process Generation**

The development of innovation models affects the innovation process, this is summarized in table 2. In order to accommodate the different nature or driving forces of the innovation models, the innovation process will be shaped or formed accordingly (Kotsemir & Meissner, 2013).

Table 14. Innovation models evolution
There is a significant number of innovation management literature focusing on innovation process which describe it as a linear process, including linear innovation diffusion. This kind of representation of innovation process can be found in both early works (Usher, 1954, 1955) and recent papers (Kamal, 2008; Baregheh, Rowley and Sambrook, 2009). Typically, firms recognize between four and eight phases of innovation process from idea generation to the launch. Here, we identified six phases of innovation process (Song & Montoya-Weiss, 1998). A little reminder, here ‘product’ depicts the result of innovation process hence be it a tangible product, service, marketing tool or business model:

1. Strategic Planning: Preliminary assessment and integration of a project’s resource requirements, market opportunities, and strategic directives.
2. Idea development and screening: Generation, elaboration, and evaluation of potential solutions to the identified strategic opportunities.
3. Business and market opportunity analysis: Execution of the marketing tasks required for converting new product ideas into well-defined sets of attributes that fulfil customers’ needs and desires.
4. Technical development: Designing, engineering, testing, and building the desired product entity.
5. Testing & validation: Testing the product itself, as well as individual and integrated components of the marketing and advertising programs.
6. Commercialisation: Coordinating, implementing, and monitoring the new product launch.

Within the elaborated stages of innovation process a series of decisions need to be taken. Decisions within the new product development process was collected in a research using information from available literature (Krishnan & Ulrich, 2001). In their study, Krishnan and Ulrich divide the decisions into four categories, 1) concept development; 2) supply-chain design; 3) product design; 4) production ramp-up and launch.

Table 15. Product Development Decisions within a Project
In relation from one phase of innovation process to the other, in her book, Strategic Management of Technological Innovation, Schilling (2009) illustrated the innovation process as a funnel. Since most innovative ideas did not become successful new product due to technically unfeasible product, and those that do, fail to reap commercial return. Due to resource limitation a firm has, a method to increase the efficiency of the innovation process should be implemented, so that the resources are used in activities with the highest additional value (R. G. E. Cooper, S.J.; Kleinschmidt, E.J., 2002). A Stage-Gate® process aiming in improving effectiveness and efficiency (R. G. Cooper, 2008), demonstrated the conceptual and operational map for moving new product projects from idea to launch and beyond which serves as a blueprint for managing the new product development (NPD) process.

### Stage-Gate® System

Stage-Gate® is famously known as a guideline for driving new product projects from idea generation until the product launch. Its implementation is supported by the proven strong and positive impacts on firms’ new product process (R. Cooper, 1994). Although it focuses on the New Product Development
(NPD) process, the application of an adapted model of it can be found in New Service Development as well (Gustafsson & Johnson, 2003).

The purpose of elaborating the Stage-Gate System in this research is to gain an understanding on the mechanism and process in each phase and how the evolution of innovation models affect the Stage-Gate process. Researcher is particularly interested in grasping the dynamic of decision making in a Stage-Gate process.

**Traditional Stage-Gate® System**

In Stage-Gate, there is a series of stages in which project team carries out the needed task by obtaining the needed information, integrating the available information before proceeding with analysis which leads to a go/kill decisions for the project in question in the end of each stage (R. G. Cooper, 2008).

![Stage-Gate System Diagram](image_url)

**Figure 54. Stage-Gate Consists of a Set of Information-Gathering Stages Followed by Go/Kill Decision Gates (Source: Cooper, 2008)**

In Stage-Gate system, a decision making process regarding the project continuity happens in each gate, separating two phases. In the gate, the gatekeeper is the actor who is in charge in taking the ‘Go/Kill’ decision. A ‘Go’ decision would mean that resources to continue to the next stage would be allocated by the gatekeeper. While a ‘Kill’ means that under current conditions, the project will be discontinued and no resources will be allocated to proceed to the next phase.

At gates, the rule is simple: The gatekeepers are the senior people in the business who own the resources required by the project leader and team to move forward. For major new product projects, the gatekeepers should be a cross-functional senior group—the heads of marketing, sales, technical, operations, and finance (as opposed to just one function, such as marketing or R&D making the call). This makes sense, since resources from many departments are required, so the gatekeeper group must involve executives from these resource-providing areas to ensure alignment and resource availability. Moreover, a multi-perspective view of the project leads to better decisions than a single-functional view due to broad assessment criteria (i.e. a product should not only be technologically feasible but there should also be a market need).
When defining gatekeepers, firms are advised to keep the number small—only the key resource owners—and try to keep ‘gatecrashers’ out of the decision meeting. To be able to function effectively, the gatekeepers should be able to differentiate the role as a functional boss and as a member of a decision-making team for an innovation project. Therefore, decision teams need rules of engagement or governance rules as illustrated below.

The current widely used Stage-Gate is actually the third-generation of the Stage-Gate System. Compared to its predecessor, the third-generation Stage-Gate is designed to balance between the need for meticulous action and complete information versus the need to act swiftly (R. Cooper, 1994). These traits are captured in its four fundamental Fs (R. Cooper, 1994):

1. Fluidity: A Stage-Gate process is fluid and adaptable, with overlapping and fluid stages to allow for greater speed.
2. Fuzzy gates: A Stage-Gate is equipped with conditional Go decisions (rather than absolute ones), which are dependent on the situation.
3. Focused: It builds in prioritization methods that look at the entire portfolio of projects (rather than one project at a time) and focuses resources on the “best bets.”
4. Flexible: It is not a rigid stage-and-gate system. Each project is unique and has its own routing the process.
From the illustration above, it could be seen that a typical Stage-Gate consists of five stages: 1) scooping; 2) build business case; 3) development; 4) testing & validation; 5) launch. Moreover, it is accompanied with a discovery pre-phase and post-launch review (Robert G. Cooper, 2001). This illustration almost fits perfectly to the elaboration of innovation process as a six phases process as seen in Section 2.2.2, with an addition of a post-launch review which gives firms feedback on the customers review.

Due to its linear illustration (see Figure 3), it is a popular misconception that Stage-Gate in nature is linear. This is not true since the activities within stages are done in parallel manner (R. G. Cooper, 2008). Moreover, the activities are carried out by a cross-functional team to support the concurrent tasks (R. G. Cooper, 2008).

In comparison, Gustafsson and Johnson (2003) reduced the total number of stage-gates, and added two new parallel gates for culture and organizational change fit. This step is to adapt the Stage-Gate for the context of New Service Development process. These two additional criteria are deemed necessary since new services, unlike new products, will likely entail change in culture and organization (Gustafsson & Johnson, 2003).

As mentioned in the previous section, one of the pillars of its four fundamental Fs is Flexibility. During the years, leading firms in innovation practices have modified, adjusted, and adopted the Stage-Gate system which leads to the evolution of the stage-and-gate process. In the next-generation process steps are taken to accelerate the process without making significant changes in the quality of the result. The techniques could be found below (R. G. Cooper, 2008):
Scaled to Suit Different Risk-Level Projects

The next-generation process is scalable, depending on the different types and risk levels of projects. This evolution is perhaps the most significant change in Stage-Gate. In this system variant, different projects ranging from very risky and complex (e.g. platform development) to lower-risk modifications and simple sales force requests would be treated differently by going through different channel – based on its stage length (Cooper, 2006; Cooper and Edgett, 2005).

A Flexible Process

As opposed to a rigid procedure, Stage-Gate is flexible. The flexibility materialises in the sense that there is no mandatory activity or mandatory, since it is a guide which recommends best-practice activities and likely deliverables. The unique nature of each project grants the project team a degree of discretion of the proposed “go-forward” plan. This plan would then be assessed in the gate by gatekeepers, upon its approval will be allocated with resources and may go through to the next stage.

The simultaneous execution of the activities also embodies the flexibility of the process. Key activities or even entire stages could overlap, not waiting for perfect information before moving forward. The implication of this is the increased risks of the project. Since a taken step might not be recommended as more information are gained about the situation. Therefore, it is important to calculate the risk by comparing the cost of delay from waiting for more information against the cost of taking the wrong step.

An Adaptable Process
Stage-Gate has also become a much more adaptable innovation process, one that adjusts to changing conditions and fluid, unstable information. By using the built-in concept of spiral development, project teams are able to move rapidly to finalize product design through a series of “build-test-feedback-and-revise” iterations (Cooper and Edgett, 2005). The spiral development bridges the gap between need for early, and fact-based product definition before development begins versus the need to be flexible and to adjust the product’s design to new information and fluid market conditions as development proceeds. Spiral development allows developers to continue to incorporate valuable customer feedback into the design even after the product definition is finalized before going into Stage 3, i.e. Development Stage. An illustration on how the spiral development work in practice can be seen in the following figure.

Numerous customer feedbacks and iterations in Stage 2, 3 and 4 constitutes the adaptation of the Stage-Gate System. They are deliberately built in from the front-end stages through the development stage and into the testing stage. By adding this loops, successive versions of the product are created one after another, getting closer to the final product and at the same time closer to the customers ideal

**An Efficient, Lean, and Rapid System**

In order to increase efficiency and remove wasteful activities from the process, leading edge companies adapted the Stage-Gate by borrowing the concept of value stream analysis from lean manufacturing. A value stream is simply the connection of all the process steps with the objective of maximizing customer value (Fiore, 2005). A value stream map is used to identify and document all the value streams in the innovation product, which furthermore will be used to identify both value-added and non-value-added activities making it an important tool to improve the innovation process (Gloor & Cooper, 2006).

In employing value stream analysis, a task force creates a map of the value stream—your current idea to-launch process—for typical development projects in your business (an example is shown in Figure 6).
All the stages, decision points, and key activities in a typical project are mapped out, with typical times for each activity and decision indicated. In undertaking this mapping, it becomes clear that there is often a difference between the way the process is supposed to work and the way it works in reality. Once the value stream is mapped out, the task force lowers the microscope on the process and dissects it. They critically assess each step and activity in the process.

**Accelerating the Gates**

The need for fast go/kill decisions combined with global and diverse development teams means that effective and timely gatekeeping has become a major challenge. Here is what leading firms are doing to accelerate the gates.

1. Leaner and simpler gates
2. Distinguishing between work done in the stages and deliverables to the gates
3. Self-managed gates
4. Electronic and virtual gates

**Accountability, the Postlaunch Review, and Continuous Improvement**

In attempt not only to instill accountability for results but also to foster a culture of continuous improvement, firms add a tough post-launch review. Continuous improvement in NPD has three major elements (Cooper and Edgett, 2005; Cooper, 2006a):

1. Having performance metrics in place
2. Establishing team accountability for results
3. Building in learning and improvement

The actual figures obtained from post-launch review will be compared with the projections, to measure the success of the project.

**An Open System**

Stage-Gate has also been modified to accommodate open innovation. Best performers have reinvented their NPD process to handle the flow of ideas, intellectual property (von Hippel), technology, and even totally developed products into the company from external sources and also the flow outward (Chesbrough, 2003). Firms who have adopted the open innovation model, modified their Stage-Gate process—built in the necessary flexibility, capability, and systems—to enable this network of partners, alliances, and outsourced-vendors from idea generation right through to launch. For example, some progressive firms’ latest versions of their Stage-Gate systems are now designed to handle externally derived ideas, IP, technologies, and even fully developed products (Cooper and Edgett, 2007).
**Appendix B**

**Interview Guideline**

**General Information**

<table>
<thead>
<tr>
<th>Focus</th>
<th>Dimensions of Co-Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>Academia, expert with research interest on co-creation</td>
</tr>
<tr>
<td>Purpose</td>
<td>Validation of co-creation dimensions</td>
</tr>
<tr>
<td></td>
<td>Exploration on measuring co-creation dimensions</td>
</tr>
<tr>
<td></td>
<td>Exploration on the risks of co-creation</td>
</tr>
</tbody>
</table>

- The interview is done as a part of Master Thesis Project in TU Delft, with a research objective: To facilitate co-creation implementation by operationalising the dimensions of co-creation
- The interview will be divided into three parts:
  1. General questions
  2. Filling up the questionnaire
  3. Follow up discussion for the questionnaire
- The questionnaire will be given on the spot, during the interview. In the case of interview via Skype, the questionnaire will be sent to interviewee’s email 15 minutes before the start of the interview.
- The whole interview session will take around thirty minutes to one hour.
- The interview session will be recorded using a voice recorder.
- Interview transcript will be made available to the interviewee upon request.
Appendix C

List of Questions for Expert (Academia) Interview

<table>
<thead>
<tr>
<th>Focus</th>
<th>Dimensions of Co-Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>Academia, experts or having interest in co-creation</td>
</tr>
</tbody>
</table>
| Purpose        | • Validation of co-creation dimensions  
|                | • Exploration on measuring co-creation dimensions  
|                | • Exploration on the risks of co-creation |

**Interview Questions**

1. What is co-creation?
2. What are the risks of implementing co-creation?
3. How should co-creation be measured?
4. What critical decisions need to be taken in implementing co-creation?
5. Questions about the 15 dimensions:
   a. Any overlapping dimensions (to be merged)?
   b. Any missing dimension?
   c. Any irrelevant dimension?
   d. Identify critical dimensions
   e. Comments on the components of each dimension?
Appendix D

List of Questions for Expert (Practitioners) Interview

<table>
<thead>
<tr>
<th>Focus</th>
<th>Co-Creation Implementation &amp; Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>Co-Creation Practitioners</td>
</tr>
<tr>
<td>Purpose</td>
<td>• Validation on how co-creation is being implemented</td>
</tr>
<tr>
<td></td>
<td>• Identify the critical choices &amp; measurement instrument of co-creation</td>
</tr>
<tr>
<td></td>
<td>• Exploration on the challenges of implementing co-creation</td>
</tr>
</tbody>
</table>

1. Could you briefly explain your involvement with co-creation?
   a. What projects have you been involved in and the industry you have worked on?
   b. What role did you personally have in these co-creation projects?
2. What was the reason behind co-creation implementation in your firm/project?
3. How did your company decide on doing (a certain) co-creation activity that was done?
4. What are the challenges in implementing co-creation?
5. How do you provide justification to top management in doing co-creation, since it requires the assignment of firm’s resources?
6. Do you have a measurement mechanism in your firm to measure co-creation effort?
   a. If yes, how do you do it?
   b. If not, do you think it is necessary to have such mechanism? And, how do you think it should be done?
7. Do you have a mechanism to measure the result of co-creation?
### Appendix E

#### Questionnaire (1/3)

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects</th>
<th>Explanation</th>
<th>Examples</th>
<th>Is it a dimension of co-creation?</th>
<th>Is it a critical dimension of co-creation?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
| 1  | Co-Created Values             | Co-created values refer to the realized values from the co-creation process. It could be the result of co-creation or emerges during the process itself. | - Values for Customers  
- Values for Firms                                                   | ☐ | ☐ | ☐ | ☐ |
| 2  | Collaboration Platform        | Physical or virtual space where co-creation process takes place.             | - Company websites  
- Customer Community  
- Dedicated physical collaboration spaces  
- Websites dedicated to co-creation activities                      | ☐ | ☐ | ☐ | ☐ |
| 3  | Duration (Firm-Perspective)   | Duration reflects how long the collaboration between firms and co-creators should be. | - From days...  
- ...to years                                                           | ☐ | ☐ | ☐ | ☐ |
| 4  | Firm’s Internal Support System| Firm’s internal system that supports co-creation by processing customers’ input into actionable information for firms. | - Customer Management System  
- Knowledge Management System  
- Reporting System                                                      | ☐ | ☐ | ☐ | ☐ |
| 5  | Governance                    | Governance refers to both formal and informal rules of exchange and the initiation, maintenance, and termination of relational between firm and customers. | - Hierarchical structure  
- Market-based governance  
- Relational governance                                                  | ☐ | ☐ | ☐ | ☐ |
| 6  | Impediments of Co-Creation    | Firm-level factors that may halt or hold back co-creation process.          | - Concerns about secrecy  
- Information overload  
- Production infeasibility  
- Ownership of intellectual                                              | ☐ | ☐ | ☐ | ☐ |
### Appendix E

**Questionnaire (2/3)**

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects</th>
<th>Explanation</th>
<th>Examples</th>
<th>Is it a dimension of co-creation?</th>
<th>Is it a critical dimension of co-creation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Initiator</td>
<td>Initiator specifies which party initiates the activities, where the strategic intent of co-creation originated.</td>
<td>- Customers</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Firm</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8</td>
<td>Level of Intimacy</td>
<td>Level of intimacy explains the level of firms-customers involvement in the co-creation process.</td>
<td>- Light (Listen)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Moderate (Listen+Engage)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- High (Listen+Engage+Respond)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9</td>
<td>Locus of Interaction</td>
<td>Locus of interaction refers to where co-creation should take place in innovation process. It relates to specific phase of innovation process.</td>
<td>- Ideation</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Product Development</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Commercialization</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Post-Launch</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10</td>
<td>Motivation (Customer-Perspective)</td>
<td>Motivation refers to the reason for co-creators (i.e. customers) to articulate themselves and to participate in co-creation activities. Motivation can have both extrinsic (e.g. financial reward) and intrinsic elements.</td>
<td>- Financial factors</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Psychological factors</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Social factors</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Technological factors</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11</td>
<td>Nature of Business Relationship</td>
<td>The nature of business relationship addresses the nature of relationship between participating actors of co-creation.</td>
<td>- B2B</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- B2C (Although it is divided into B2B and B2C, the term is not to address a specific type of industry.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12</td>
<td>Number of Participating Co-Creators</td>
<td>It explains the scale of co-creation activity, based on how many co-creators are involved in the process.</td>
<td>- Crowd-sourced</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Non-crowd-sourced</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### Appendix E

#### Questionnaire (3/3)

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects</th>
<th>Explanation</th>
<th>Examples</th>
<th>Is it a dimension of co-creation?</th>
<th>Is it a critical dimension of co-creation?</th>
</tr>
</thead>
</table>
| 13 | Purpose (Firm-Perspective) | Purpose is the reason why firm embarks on the journey of implementing co-creation. It could be delineated based on different aspect, one example is to categorized it into the exploration or exploitation of innovation opportunities. | - Co-innovation  
- Problem solving  
- Search, develop, buy & buzz  
- Validate & improve products or services | ☐ | ☐ |
| 14 | Stimulators (Firm-Level) | Efforts done by firms to stimulate customer co-creation | - Decreased customer costs  
- Increased customer benefits | ☐ | ☐ |
| 15 | Type of Co-Creators      | Co-creators are actors (i.e. mostly customers) who are involved in co-creation process with firm. Moreover, the categorization varies depending on the skills and profile of co-creators. | - Existing Customer  
- Potential Customer  
- Skilled contributors  
- The rest of the world | ☐ | ☐ |
**Appendix F**

**Questionnaire Result**

Target participant: Academicians with co-creation as research interest

Number of participant: 5

<table>
<thead>
<tr>
<th>Name</th>
<th>Field of Specialty</th>
<th>Stance toward co-creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilde Bekker</td>
<td>Design</td>
<td>Believer</td>
</tr>
<tr>
<td>Prof.dr.ir. J.A. Buijs</td>
<td>Product Innovation Management</td>
<td>Non-believer</td>
</tr>
<tr>
<td>J.W. Hoftijzer, MSc</td>
<td>Design</td>
<td>Believer</td>
</tr>
<tr>
<td>Frank Piller</td>
<td>Innovation Management</td>
<td>Believer</td>
</tr>
<tr>
<td>Wina Smeenk</td>
<td>Design</td>
<td>Believer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Dimension Validity (out of 5)</th>
<th>Critical Dimension (out of [dimension validity])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-Created Values</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Collaboration Platform</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Duration</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Firm’s Internal Support System</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Governance</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Impediments of Co-Creation</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Initiator</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Level of Intimacy</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Locus of Interaction</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Motivation</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Nature of Business</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Number of Participating Co-Creators</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Purpose</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Stimulators</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Type of Co-Creators</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

**Suggested Dimensions**
- Generated Content
- Type of Product
- Company Vision
- Level of Control over Result
- Information Transfer Process
- Company Innovation Strategy

**Dimensions Suggested for Reformulation**
- Nature of Business Relationship
- Duration
- Number of Participating Co-Creators