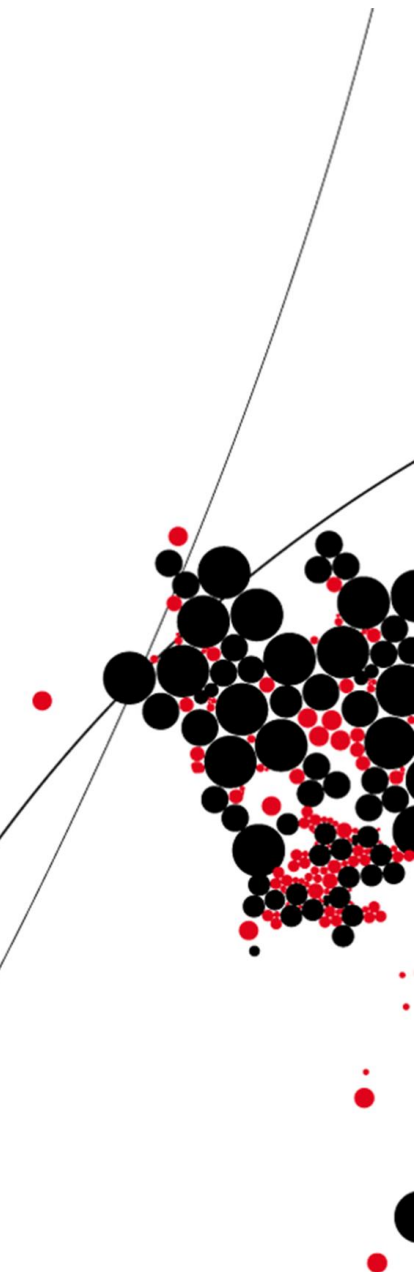




**UNIVERSITY OF TWENTE.**

Faculty of Behavioral, Management and Social Sciences

# **Using the scenario planning method in a systematic way to develop a new business model and reduce future uncertainty within the construction industry**



Rick Kamers  
M.Sc. Business Administration  
Entrepreneurship, Innovation & Strategy  
July 2018

---

First supervisor:  
Dr. K. (Kasia) Zalewska-Kurek.

Second supervisor:  
Dr. R.P.A. (Raymond) Loohuis MBA

University of Twente  
P.O. Box 217  
7500 AE Enschede  
The Netherlands

---

## Acknowledgements

In front of you is my thesis which is the final project of my M.Sc. Business Administration (specialization track: Entrepreneurship, Innovation & Strategy) at the University of Twente. I am proud and glad that my time as a student comes to an end with this final project. Altogether, it ends a period in which I've learned a lot and experienced personal growth. However, I could not have done this without the support of the people around me, therefore, I want to express my gratitude.

First, this thesis was written at a large construction company in the Dutch housing market. The company offered me the opportunity to design my own research and at the same time develop my skills in a personal and professional way. Therefore, I want to thank all my colleagues and especially my external supervisors: Klaartje Molthof & Joris-Jan Menken for their useful insights, feedback sessions, contributions and most of all for the nice period we had during my internship.

Furthermore, I want to thank Kasia Zalewska-Kurek from the University of Twente. Thank you for supervising me, your quick responses, valuable knowledge and helpful feedback, which helped me to shape and finalize my thesis. I also want to thank, my second supervisor, Raymond Loohuis for the valuable insights in the final phase of my thesis.

Lastly, I want to thank my family, girlfriend and friends for their support and fun during my educational years.

I hope you enjoy reading my thesis.

Rick Kamers  
Amsterdam, July 2018

## Management summary

Several large industries have been disrupted and revolutionized by multiple disruptive forces which have fundamentally changed how value is created and captured. Many of the large traditional organizations that had to deal with these forces are under remarkable pressure. However, the construction industry, one of the largest and most influential industries in the global economy has not changed that much over the last years. Even though, the results of this study indicate that a new era for main contractors in the construction industry is approaching. The expectation is that several disruptive forces will have a big impact on business models and existing structures in the construction industry. However, there is insufficient knowledge on the future business environment of the construction industry. Therefore, this thesis addresses the following research question: *“How can a large construction company in the Dutch housing market design a new business model to create and capture value in 2030 by using scenario planning”?*

In this regard, it is necessary to monitor change and proactively explore the future. Therefore, the scenario planning method is found as a suitable method in this thesis. This method allows to compensate for two common errors in decision making, overprediction and underprediction of change. Another important conclusion is that the reinvention, creation and innovation business models is regarded as necessary to survive and thrive in a business environment where the rules change quickly. It was also found that the business model concept is among the most cited and prominent topics in modern literature, but it is less discussed and researched in construction. There is a growing consensus among academics that the business model concept is associated with securing and expanding competitive advantage. However, literature that combines business models and scenario planning with a focus on construction did not exist.

Four scenarios are built for the 2030 Dutch construction industry to provide a strategically relevant industry structure forecast. A literature review and twelve semi-structured interviews with industry experts provide an overview of the (future) construction industry structure and revealed several factors (trends and developments), which could potentially influence the future business environment. Concerning the (future) industry structure, the interviewees indicated that the power of buyers and suppliers is hindering the profitability and this power is expected to rise in the future. It was found that the construction industry structure is characterized by a highly fragmented value chain, the market is highly competitive with low margins. Moreover, the interviewees expected new entrants with new innovative types of business models, which have the potential to shift value in the construction value chain. For the identification of two scenario dimensions a quantitative analysis is performed, in which the respondents indicated the potential impact and uncertainty of occurrence of each of the driving factors. The data is based on 71 respondents from a large main contractor. The scenario dimensions are: ‘development of the cyclical sensitivity’ and ‘the development of the technological environment’. For each scenario dimension two extreme values, positive and negative, are defined, resulting in the identification of four unique scenarios. This is confirmed by the constructed scenarios, which illustrated that the current business models of main contractors in construction will not be sufficient to create and capture value in the future. Based on the results from the interviews, one scenario is chosen as most likely to occur in the future and a new business model is proposed. However, all scenarios are likely to influence all interlocking elements of the current business model; a transformational change is necessary. Consequently, main contractors in the construction value chain need to prepare strategically to thrive in the face of anticipated disruption in the future.

## Contents

.....	i
Acknowledgements .....	1
Management summary .....	2
1. Introduction.....	5
1.1 Problem.....	5
1.2 Practical relevance.....	6
1.3 Theoretical relevance.....	7
1.4 Research question .....	7
1.4.1 Sub-questions .....	7
1.5 Outline of this thesis.....	7
2. Literature review .....	8
2.1 Business models.....	8
2.1.1 What is a business model? .....	8
2.1.2 Business model innovation and dynamics .....	10
2.1.3 Discovery Theory .....	11
2.1.4 Business Model Frameworks .....	11
2.2 Business model environment.....	13
2.2.1 Conceptualization of the business model environment.....	13
2.2.2 Scenario Planning .....	15
2.3 Summary.....	15
3. Methodology .....	16
3.1 (Future) industry structure.....	16
3.2 Perception analysis.....	16
3.2.1 Qualitative data collection & expert sample .....	17
3.2.2 Qualitative data analysis .....	18
3.3 Trend and uncertainty analysis .....	18
3.3.1 Quantitative data collection .....	19
3.3.2 Quantitative data analysis .....	19
3.4 Scenario building .....	20
3.5 Current business model .....	20
3.6 Implications for the current business model .....	20
4. Results.....	21
4.1 (Future) industry structure.....	21
4.2 Perception analysis.....	23

4.2.1 Qualitative data analysis .....	24
4.3 Trend and uncertainty analysis .....	24
4.3.1 Quantitative data analysis .....	24
4.4 Scenarios .....	25
4.4.1 Scenario identification .....	25
4.4.2 Scenario description.....	26
4.5 Current business model .....	30
4.5.1 Value proposition.....	31
4.5.2 Key resources .....	32
4.5.3 Key processes.....	33
4.5.4 Profit formula .....	34
4.6 Scenario choice .....	34
4.7 New business model.....	36
4.7.1 Value proposition.....	37
4.7.2 Key resources .....	38
4.7.3 Key processes.....	39
4.7.4 Profit formula .....	39
4.8 Implications of the other scenarios .....	40
5. Discussion .....	41
6. Conclusion.....	43
6.1 Main findings .....	43
6.2 Theoretical & practical contribution.....	44
6.3 Recommendations to Building Inc. ....	45
References .....	46
Appendix I.....	51
Appendix II.....	56
Appendix III.....	58

## 1. Introduction

Today's economies are rapidly changing driven by the rise of new technologies, innovations, digitization, demographic changes and new environmental policies. These disruptive forces challenge companies to adapt their operations and strategies. Industries such as telecommunications, the hospitality industry and the music industry have been disrupted and revolutionized by new technologies and innovations. Due to a combination of bad forecasting and multiple disruptive technologies many of the traditional large organizations in these industries are under remarkable pressure, some of the incumbent firms in these industries had to rethink their distribution strategies and even their whole business models (Teece, 2010).

However, where industries such as the music industry and the hospitality industry have been disrupted and revolutionized by new technologies, business models and innovations, the construction industry, one of the largest and most influential industries in the global economy has not changed that much over the last years (ING, 2016). The construction industry still relies heavily on manual labor, mechanical technology and established and operating business models. Therefore, productivity has stagnated and the sector became relatively expensive compared to other sectors. Even though, the expectation is that digitalization, technological innovations and demographic changes will have a big impact on the business models and existing structures in the construction industry (ING, 2016), these forces could fundamentally change how value is created and captured. Moreover, trends such as sustainability, robotics, 3D printing, Internet of Things, big data and demographic changes will inevitably force construction companies to rethink and innovate their current business models to achieve survival and growth. With high levels of exogenous change, firms need to show dynamic adaptability and innovate their business models to achieve growth and survival (Schneider, 2017).

As aforementioned, the changes in today's economies already had big consequences for companies in other industries. Because of disruptive forces large organizations in certain industries had to rethink their strategies and business models. A glance at the music industry, for example, shows the extent to which digitization is turning familiar and proven practices around. Digital offerings, for instance, already account for 46% of total sales in the music industry around the world (Roland Berger, 2016). Therefore, it is reasonable to say that digitization revolutionized the music industry. This disruptive force has devastated the traditional business models in the music industry. Moreover, it has fundamentally changed how value is captured and created.

The fourth industrial revolution known as 'Industry 4.0' which is often defined as the digitalization of the manufacturing sector (PWC, 2016; McKinsey, 2015) comes with new disruptive industry 4.0 technologies that have the potential to unlock new value through new types of business models (McKinsey, 2015). According to McKinsey (2015) these types of business models have the potential to shift value pools in value chains. These shifts will create opportunities for new players and alter the competitive landscape, both in terms of players that ensure access to new value pools as well as new entrants which are competing for existing value pools. The disruptive technologies provide opportunities for small, innovative companies to enter the competitive landscape. These companies are more flexible and agile than large established companies which is often recognized as a competitive advantage in times of high levels of exogenous change. Smaller companies are more flexible to implement new business models or to innovate their business models than large incumbent firms. Since especially small innovative companies can move into these new dimensions fast, incumbent manufacturers and suppliers need to react swiftly to the strategic implications of Industry 4.0 for their business models (McKinsey, 2015). According to Teece (2010) many large organizations that had to deal with disruptive forces are under remarkable pressure. Mainly because of multiple disruptive technologies and bad forecasting.

### 1.1 Problem

The focus of this paper is on the Dutch housing market, through the lens of a large contractor. Nowadays, large contractors for the Dutch housing market all use a highly traditional cost-plus pricing model (the price is defined as the cost of all input resources multiplied by a targeted margin level). These business models are too similar to enable value based competition. Therefore, most companies

in the extremely fragmented construction value chain compete on their overhead costs rather than their unique core processes (Nicolini, Holti & Smalley, 2001).

At the same time, the sector is experiencing significant growth (ABN, 2018), however, the growth in the construction industry is hindered due to a labor shortage and a large talent gap (World Economic Forum, 2018). Moreover, fossil fuels are running out and the construction sector became relatively expensive compared to other sectors, because the labor productivity hardly increased in the past decades (ABN, 2018). Therefore, the affordability of houses, the main contractors most important product, is under pressure. Another important development in the sector is the focus on sustainability. The construction industry has always had a significant negative impact on the surrounding environment. In recent years the demand by society and the government for sustainability increased significantly, this trend is expected to continue driven by new regulations and goals to combat global warming.

The fourth industrial revolution comes with opportunities which could solve these problems. According to a study in Germany by the association of German Chambers of Commerce and Industry, 93 percent of the companies in construction agree that industry 4.0 technologies will influence all their processes. However, as stated in a study performed by Roland Berger (2016) the construction industry still lags in benefiting from for example digitization, even though it could have the potential to improve productivity and costs.

Rutten (2013) states that the macro environmental developments reinforce each other and the construction industry is one the edge of radical disruptive changes. A glance at the other industries indicates that these disruptive forces can fundamentally change how business is done and how value is created and captured. The problem for the construction industry is that the implications of these various trends and uncertainties for the current business model are unknown. For example, futurist Van Hooijdonk forecasts that the construction industry of the future will be data driven and value will be created with a data driven business model (Ton, 2018). According to Van Hooijdonk it is even reasonable to question if traditional construction companies will survive (Ton, 2018). The environment is changing so fast, there is a possibility that tech-companies such as Google or Amazon replace the traditional contractors in the construction industry (Ton, 2018). However, the expectation is that they are not interested in building the physical house, but it could be that these tech companies will replace the traditional main contractors as the central coordinator of the building process. Altogether, main contractors can no longer afford to ignore fundamental changes. The threat of new entrants, disruptive technologies and trends such as climate change and labor shortages will affect everyone involved in the construction value chain. Moreover, massive investments must be made and these forces will break and reshape existing business models and reshape definitions of value in markets. To conclude, to survive, it is necessary to monitor change, proactively explore the future and seek for new opportunities to create and capture value.

## 1.2 Practical relevance

Driven by today's ever changing and increasingly complex economies, the big players of today are endangered to suffer from disruptive forces in the future. However, implications of these disruptive forces for the future business environment and current business models are unknown. Thus, the scientific problem is that there is insufficient knowledge on the future business environment of the construction industry. External changes could disrupt organization's usual functioning abruptly (Demil & Lecocq, 2010), these changes could force firms to transform the way how economic value is created (Bohnsack, Pinkse & Kolk, 2014). Therefore, it is important to develop capabilities to anticipate on trends, dynamics and future directions in their industry. By identifying trends and developments, I can construct scenario's that will possibly help to compensate for errors in decision making (Schoemaker, 1995). If I can identify and construct a wide range of possible futures, companies in the construction industry will be much better positioned to take advantage of possible unexpected opportunities that will come along. Companies are challenged to develop new or innovated business models to act on the changing market, changing competitive conditions and economic, social, technological, political and environmental changes (Johnson, Christensen & Kagermann, 2008; Wirtz et al., 2016).

### 1.3 Theoretical relevance

While the business model concept is among the most cited and prominent topics in modern literature, business models are a less discussed and researched topic in the field of building and construction (Aho, 2013; Abuzeinab & Arif, 2014; Pekuri, Pekuri, Haapasalo, 2013). Moreover, the literature that combines business models and scenario planning is very scarce and the knowledge that exists is scattered throughout a multitude of articles (Pateli & Giaglis, 2005). In their article Pateli & Giaglis (2005) hint at the idea there is ample space for studies that combine business model change with other scientific disciplines and they suggest to further elaborate the literature with studies that combine business models and scenario planning. The author of this research could not find a similar study performed for the construction industry. Therefore, this research tries to fill this gap in literature and contribute to the emergent literature on business models and scenario planning.

### 1.4 Research question

To cope with the changing dynamics and future trends, a general research question has been developed:

**“How can a large construction company in the Dutch housing market design a new business model to create and capture value in 2030 by using scenario planning”?**

#### 1.4.1 Sub-questions

To answer the general research question, I developed six sub-questions. First three questions which will be answered by a literature review:

1. What is a business model?
2. What is the relationship between the business model environment and the business model?
3. What is scenario planning?

The last three sub-questions will be answered by performing a case study:

1. What are the future trends and developments in the construction industry?
2. What are the scenarios for the future based on the trends and developments in the construction industry?
3. What is the current business model of a large company in the construction industry?

### 1.5 Outline of this thesis

To answer the general research question a holistic and in-depth investigation is required, since the boundaries between the researched phenomena and context are not clear. Therefore, a case study is performed. The case study will be exploratory, since it involves a specific case without much previous executed research in the field. The research is executed at a large publicly listed main contractor Building Inc., headquartered in the Netherlands. Building Inc. is the market leader in the Dutch residential market. The focus is on serial housing production, they offer a broad portfolio of products and services and have their own successful housing concepts for both new build and renovation.

The rest of this thesis is structured as follows. First, in chapter 2 the relevant theoretical constructs used in this research are explained and the first three sub-questions are answered with a literature review. This chapter provides insights in business models, business model innovation, business model frameworks, the macro environment and scenario planning as a tool. Next, chapter 3, outlines the used methodology for this research. Chapter 4 incorporates the findings from the desk research, the results from the interviews with industry experts followed by a quantitative analysis. Moreover, this chapter presents the scenarios which are derived from the interviews and a quantitative analysis. Lastly, a new business model is proposed based on the most probable scenario. Chapter 5 includes the discussion about the findings, limitations and recommendations for future research. Chapter 6 summarizes the conclusions drawn from this research, this chapter also lists the theoretical and practical implications, as well as recommendations for Building Inc.



## 2. Literature review

This chapter provides relevant concepts for the constructs used in this research. It explains the concepts of business models, business model innovation and business model frameworks, the macro environment and scenario planning. Section 2.1 covers the topics of business models, business model innovation and business model frameworks. Section 2.2 clarifies concepts of the business model environment and proposes a tool to explore the future. In section 2.3 the findings of this chapter are summarized and the interrelations between the obtained concepts are described.

### 2.1 Business models

#### 2.1.1 What is a business model?

The term business model has been present in scientific literature for over fifty years now (Wirtz et al., 2016). In earlier years, business models were mainly used as an operating activity for system modelling. The first sights of greater significance for business models came with advanced technological developments over time and especially with the launch of the Internet and e-commerce (Schneider, 2017; Wirtz et al., 2016; Zott, Amit & Massa, 2011). The concept of business models developed from an operating activity for system modelling to a concept that can be applied as a management tool, which can contribute to success in the decision-making process, because the concept gives an integrated presentation of the company's organization (Wirtz et al., 2016). Nowadays, the concept of business models is among the most cited and prominent topics in modern literature (Baden-Fuller & Haefliger, 2013). Particularly as business models are associated with expanding and securing competitive advantage, since its main purpose is to differentiate a company from others and therefore give it an advantage to its competitors (Johnson et al., 2008; Teece, 2010). Thus, a business model forces managers and employees to think about their business and how the business works.

The business model concept attracted a lot of attention during the Internet boom, when employees and firms realized that their current ways of earning profit could be disrupted due to technological developments. These new technologies contributed to the creation of new business opportunities and enabled new ways of earning profits (Massa & Tucci, 2013). At that time, the business model was a useful management tool to give an integrated presentation of the company's organization, which could be used to contribute to the success of the decision-making process (Wirtz et al., 2016). Nowadays, there is increasing consensus about the concept mainly because of increasing scientific literature with a strategy-oriented view. This stream of research adds relationships, market positioning and growth opportunities as essential elements of the business model, and is a tool to provide a picture of the company's competitive situation (Morris, Schindehutte & Allen, 2005; Wirtz et al., 2016). In this approach, value creation for the customer is central. Hence, a unique value proposition through business model innovation can lead to a competitive advantage (Casadesus-Masanell & Ricart, 2010; Massa & Tucci, 2013; Wirtz et al., 2016). In this thesis, the strategy-oriented view will be adopted, since the focus of this thesis is on value creation and capturing.

It must be noted that while business models and strategy are intertwined they are not the same, a business model is an outcome of the strategy, but a business model is not a strategy (Amit & Zott, 2001; Wirtz et al., 2016). Simply put, strategy involves a vision of which direction the company will go in the future (Porter, 1998). The business model concept promotes developing unique ways to create value for customers (Zott et al., 2011). Thus, the concept provides firms with opportunities to

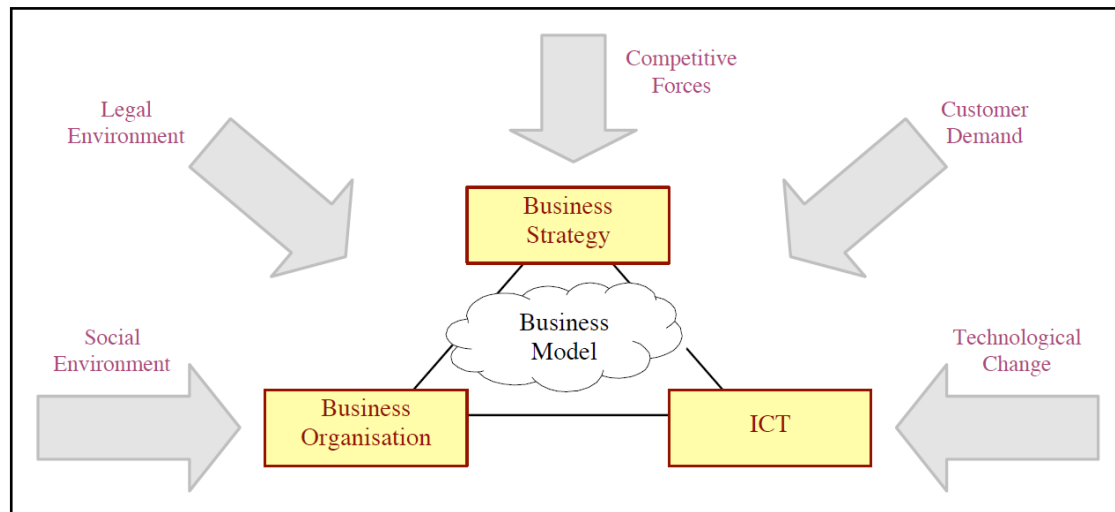


Figure 1: Business model in a business environment context (Osterwalder, 2004)

gain competitive advantage (Morris et al., 2005). According to Wirtz et al. (2016) the business model is understood as a link between the operative implementation, and the future strategy. Thus, the business model concept presents means for coherent implementation of a strategy. According to Osterwalder (2004) a business model builds a linkage between business strategy, information/communication technology (ICT) and business organization. In this thesis a business model will be conceptualized as the “money earning logic of a firm” which is exposed to several environmental factors such as technological change, legal environment, competitive forces and social environment (Figure 1). Moreover, a business model is an “abstraction that describes a business not at the operational level, but at the conceptual level” (Cavalcante, Kesting & Ulhoi, 2011, p. 1328). To conclude, a business model outlines the essential details one needs to know to understand how a firm can successfully create and deliver value to its customers.

Hence, there is a lack of consensus among research how a business model should be classified, defined or represented (Morris et al., 2005; Teece, 2010). This lack of consensus has been mainly attributed to the fact that business models as a concept draws from and integrates a wide range of practical and academic disciplines (Chesbrough & Rosenbloom, 2002). The lack of clarity could be a potential source of confusion. Therefore, it is important to select a definition that will be the foundation for this study.

Some authors define a business model simply by stating how a company makes money (Rappa, 2002). A more comprehensive view on business models was provided by Magretta (2002), who sees a business model as a story of how a company works. In contrary, some authors see business models as a logical tool that strategically helps firms to make important decisions. For example, Chesbrough and Rosenbloom (2002) perceive a business model as a device that mediates between technology development and economic value creation. These early definitions share a common understanding of business models. However, these early stages of business model research were especially concerned with the conceptualization and the various elements of a business model. On the contrary some authors describe business models as organizational activities (Magretta, 2002; Osterwalder et al., 2005), and other authors consider business models as an illustration of strategic decisions (Chesbrough & Rosenbloom, 2002). However, in recent literature the conceptualization of business models has unified the organizational design with a strategy perspective (Andreini & Bettinelli, 2017). As many authors have clarified the differences between strategy and business models and the business model

is considered as a mean for the coherent implementation of a strategy (Osterwalder et al. 2005; Wirtz et al., 2016).

Thus, although there are different ways of conceptualizing a business model and different definitions of a business model it is possible to identify similarities in most of them. Following the strategy-oriented stream, Wirtz et al. (2016) defines a business models as; “A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are taken into consideration, to achieve the superordinate goal of generating, or rather, securing the competitive advantage” (p.6). Likewise, Teece (2010) puts customer value in focus and defines a business model as: “the design or architecture of the value creation, delivery, and capture mechanisms of a firm” (p. 172). In contrast, Amit and Zott (2001) highlight the design of the firm's transactions for creating value as they define: “the content, structure and governance of transactions designed to create value through the exploitation of business opportunities” (P.511). One of the most cited works in the business model literature comes from Osterwalder, Pigneur & Tucci (2005), they argue that a business model consists of four elements which together create and deliver value. The four elements are product, customer interface, financial aspects and infrastructure management. In their definition, the customer perspective is the most important factor for value creation as they define a business model as: ““A business model is a conceptual tool that contains a set of elements and their relationship and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams” (p.17, 18)”. Recent reviews point out the definitional convergence of a business model (Foss & Saebi, 2017) and academics commonly agree that a business model describes how a focal firm creates and captures value (Badenfuller & Haeffliger, 2013; Johnson et al., 2008; Wirtz et al., 2016; Foss & Saebi, 2017; Schneider, 2017). Therefore, in this paper the following definition is adopted as the most suitable for this research “a business model describes the rationale of how an organization creates, delivers, and captures value” (Osterwalder & Pigneur, 2010, p.14).

### 2.1.2 Business model innovation and dynamics

There is an increasing consensus among scholars that the business model concept is a dynamic and flexible concept (Zott et al., 2011). Early research on business models were mainly concerned with the conceptualization of business models and its elements. (Osterwalder et al., 2005). However, this static view on business models does not meet the requirements of the current highly turbulent and dynamic business landscape. The dynamic perspective on the business model concept offers firms and strategists a new way to consider options in uncertain and unpredictable environments (McGrath, 2010). Business model innovation provides firms with opportunities to create a competitive advantage. The business model concept promotes unique ways to create value for customers (Bohnsack et al., 2014). Therefore, the potential of business model innovation lies in identifying new sources of value creation (Zott et al., 2011). Acknowledging the dynamic nature and the relatedness of its elements, the business model concept also provides a firm with a framework for discovering and innovating (new) business models as a response to environmental, technological, political, legal and social changes (Johnson et al., 2008).

According to Schneider (2017) business models are not stable over time, they become subject to innovation and adaption, which is challenging for both academics to study as for practitioners to execute. In this thesis, I will refer to business model innovation as “a firm's adoption of a new logic, paradigm or approach to create and capture value” (Schneider, 2017, p.3). Business model innovation enables organizations a more holistic form of organizational innovation, which affects its key business model element and linkages (Foss & Saebi, 2017). External disruptions are often recognized as major drivers of business model innovation. Given that these various exogenous changes lead to uncertainty

and there is no consensus how these forces might affect the future of a firm and their business models it is necessary to recognize the opportunities and threats early on. Exposed to high levels of exogenous change firms face the challenge to develop an innovated or (new) business model, which transforms opportunities into sources of economic value creation (Bohnsack et al., 2014). However, the right business model with high levels of exogenous change is often not yet apparent (Teece, 2010), business model innovation requires a process of experimentation, insights and evolutionary learning. The dynamic approach considers the business model concept as a tool to address change and focuses on innovation, either in the business model itself, or in the organization (Demil & Lococq, 2010). However, the concept considers that the consequences of a firm's strategic actions cannot be seen beforehand, because they are predicted on assumptions. Several studies have combined obtained knowledge from the dynamic business model approach and scenario planning to develop business model alternatives (Pateli & Giaglis, 2005; Chesbrough & Rosenbloom, 2002). Scenario planning is a tool that can be used to imagine possible futures (Schoemaker, 1995). By identifying trends and uncertainties, an analyst can construct a series of scenarios to gauge the potential effect of predicted environmental changes on the business model and business strategy. Great foresight and superior anticipation allow reforms of the business models to be undertaken just in time to maintain competitive advantage and value creation (Doz & Kosonen, 2010). Therefore, this tool (which will be further highlighted in chapter 2.2.2) is validated as a useful tool for business model innovation and strategy design in times of turbulent business environments (Pateli & Giaglis, 2005).

### 2.1.3 Discovery Theory

Today's companies are operating in a business environment in which firms are constantly subjected to complex changes (Voelpel, Leibold & Tekie, 2004). Recent business model literature emphasizes that adaptive and dynamic business modeling is essential for success (Mcgrath, 2010). Moreover, reinvention, creation and innovation of (new) business models is regarded as necessary to survive and thrive in a business environment where the rules change quickly, which is true for almost all companies and industries. (Voelpel et al., 2004). External discontinuities and disruptions are often regarded as major drivers of business model innovation (Teece, 2010; Schneider, 2017; Wirtz et al., 2016). Shane (2003) developed the discovery theory, a perspective how opportunities emerge and can be recognized. In discovery theory, developments in a firm's business environment provide opportunities due to competitive imperfections (Schneider, 2017). Opportunities exist based on exogenous developments and shocks (e.g. technological innovations, demographic changes, legal changes). The first step in discovery theory is to detect opportunities and to anticipate them (Schneider, 2017). In discovery theory, it is presupposed that opportunities exist and only need to be discovered to be exploited (Alvarez & Barney, 2007). The emphasis on exogenous shocks that form competitive imperfections (opportunities) suggests that discovery theory is mainly about search, systematically scanning the environment to discover opportunities. Discovery theory assumes that once an opportunity is recognized its exploitation is affected by risk (Alvarez & Barney, 2007). Knowledge about the market and industry structure developments supports opportunity discovery (Schneider, 2017). According to Alvarez and Barney (2007) one should first apply risk based data collection techniques, examples of these techniques are; expert interviews, information from the government, use of customer focus groups and so on. If this information is collected the next step to decide whether to exploit an opportunity should be based on risk-based decision-making tools, for example, scenario analysis (Schoemaker, 1995).

### 2.1.4 Business Model Frameworks

In recent years, scholars recognize the value of business model as a unit of analysis for strategizing and as a tool for controlling, innovation and planning (Osterwalder & Pigneur, 2010; Amitt & Zott, 2011). Based on a wide range of business model configurations Osterwalder and Pigneur (2010) developed the Business Model Canvas (Figure 2) which is a transparent and practical framework that equips firms/managers with a "shared language for describing business models" (Osterwalder & Pigneur,

2010, p.13). It helps managers to understand, communicate, capture, analyze, design and change the business logic of their firm (Osterwalder & Pigneur, 2010) and is used by millions worldwide. Their business model canvas is a widely accepted approach to describe business models by researchers and practitioners (Kaplan, 2012; Nordic innovation, 2012). They separated the business model into four areas and nine building blocks, based on research of Kaplan & Norton (1995). The framework consists of nine building blocks as parts to define the structure of a business. These nine building blocks are: key partners, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure, revenue streams. The definition of each building block can be found in the study of Osterwalder & Pigneur (2010). The choices made by a company in the construction industry on these building blocks practically reflect the strategy on competing in the construction industry.



Figure 2: Business Model Canvas (Osterwalder & Pigneur, 2010, p.44)

As aforementioned, the business model concept presents a mean for the coherent implementation of a strategy and as a tool for controlling, planning and managing innovation. The business model canvas and Osterwalder's theories on business model design provide managers and firms with a practical tool for supporting the strategy process of firms. However, the business model canvas has some limitations. First, the business model canvas ignores external factors such as market, competition and imitation. As aforementioned, these external factors are often recognized as major drivers of business model innovation, and need to be recognized to determine the attractiveness and potential of a business model. For this thesis, an assessment of the external environment is required to understand the future business model environment and especially how value is created and captured for the customer. Therefore, the next section will discuss tools to analyze the business environment. A second limitation of the business model canvas is that it describes the relevant elements of a business model in a simplified manner and the different elements are not interlocked. A more concise representation of the different elements is proposed by Johnson et al. (2008) (figure 3). This model has some similarities with the business model canvas. However, Osterwalder proposes a fixed architecture of nine elements, while Johnson only explains four components and shows they are linked. The four elements as proposed by Johnson et al. (2008) are: the value proposition, the profit formula, key resources and key processes (figure 3). The power of this framework lies in the complex interdependencies of its parts. Major changes to any of the components affects the others and the complete business model. Therefore, the tool as proposed by Johnson et al. (2008) will be used as a framework for visualizing the overall business model of a company in the construction industry.

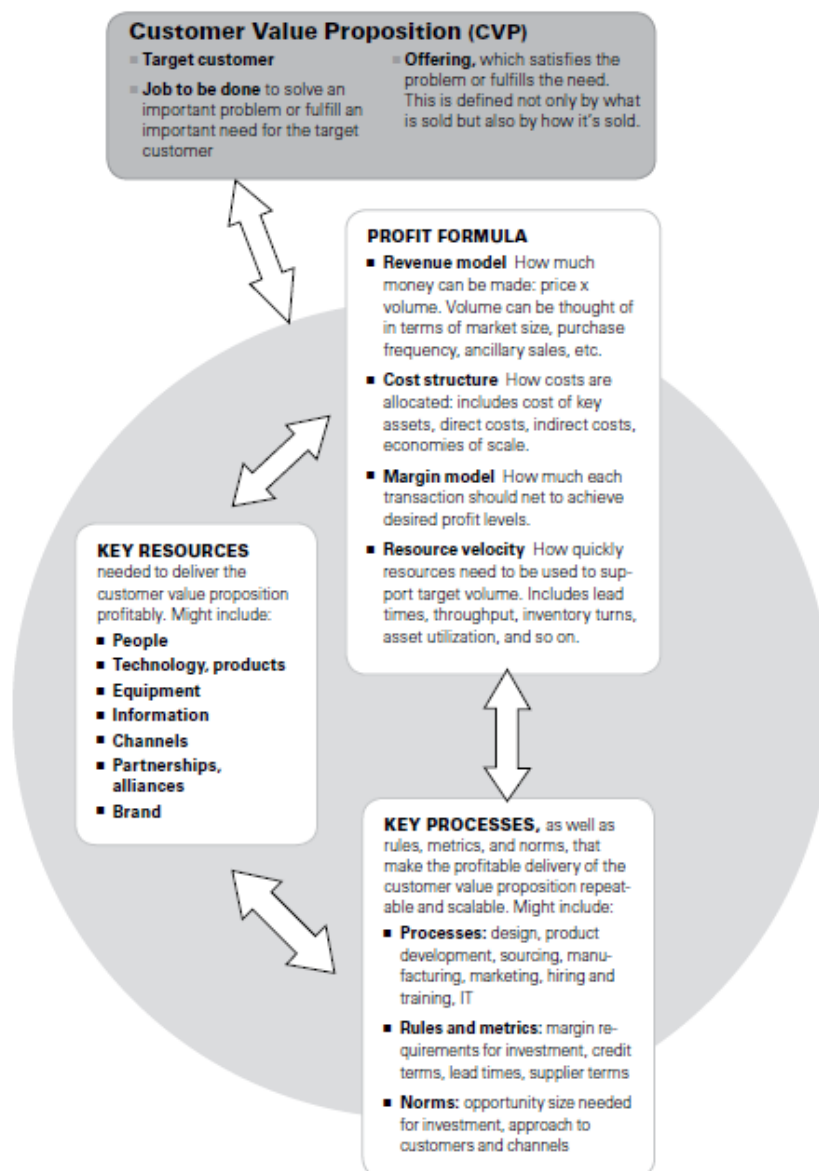


Figure 3: Four key elements of a business model (Johnson et al., 2008)

## 2.2 Business model environment

### 2.2.1 Conceptualization of the business model environment

Business models do not operate in a vacuum (Afuah & Tucci, 2001), they are built within a business model environment and are shaped by external forces. Hence, the business model is constantly subjected to external pressure, which forces a company to constantly adapt their business model (Osterwalder, 2004). Strategic management literature emphasizes that the external environment of a firm is the major source of uncertainty for decision makers to detect emerging threats and opportunities and to respond in time (Vecchiato & Roveda, 2010). According to Vecchiato & Roveda (2010) environmental uncertainty is “the lack of accurate information about organizations, activities and events in the external sectors of the business (micro and macro) environment of the firm, and as the difficulty to understand what the major changes are or will be” (P.1527). Future-oriented techniques and methods to search for information about emerging drivers in a firm’s outside environment have been developed to cope with environmental uncertainty such as scenario planning, roadmaps and Delphi (Vecchiato & Roveda, 2010).



In strategic management literature, the “environment” is often conceptualized with Porter’s five forces, that defines the broader microenvironment. The *five forces* framework (Porter, 1979) can be used to assess the implications of key environmental factors that could fuel changes in the business model environment of the construction industry. The five forces in Porter’s framework are; threat of substitutes, bargaining power of suppliers, bargaining power of buyers, rivalry among existing competitors and threat of new entrants (figure 4). Porter’s five forces is a widely adopted framework to analyze factors that affects firms on a micro level. Understanding the five competitive forces and their underlying causes, explains the current industry structure and profitability, while its also provides a framework for influencing and anticipating profitability and competition over time (Porter, 1980). Moreover, understanding the industry structure is crucial for companies to effective strategic positioning in the future. In general, industry structure has proved to be relatively stable, but, occasionally it can change abruptly (Porter, 1980).

However, in future-oriented studies the foresights may go beyond the microenvironment to investigate the general environment which surrounds it (macro environment). Following the strategic management literature, a company should match its strategy and the distinctive competences with the threats and opportunities it faces in the marketplace the company is operating in (Porter, 2004). Changes and trends in the macro environment often cause changes in the industry structure as well (Porter, 2008). According to strategic management literature, the environment of an organization is understood as “the pattern of all the external conditions and influences that affect its life and development” (Andrews, 1971, p. 49). The STEEP framework is one of the most used methods to frame the macro environmental factors. This framework divides the macro environment into political, economic, socio-cultural, technological, and ecological dimensions (Worthington & Britton, 2009). A STEEP analysis provides a view of what is happening in the external world. Moreover, the STEEP framework is very useful to gather the most important forces that will shape the future construction industry structure. The analysis of these dimensions serves as a basis for long-range planning and strategic foresight as it recognizes trends and uncertainties in the broader macro environment. However, the STEEP analysis does not cover a competition-or internal analysis (McDonald & Meldrum, 2013). Therefore, as an addition the five forces framework will be used for a internal analysis. Scenario planning is a tool that extends the STEEP framework. In the next section this method will be further highlighted.

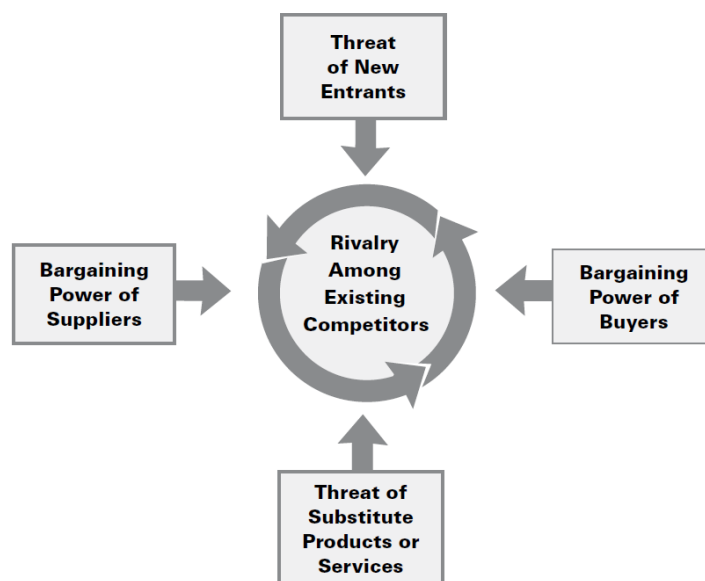


Figure 4: Five Forces that shape industry competition (Porter, 2008)

### 2.2.2 Scenario Planning

Scenario planning is a systematic method to prepare for the future and is mainly used by organizations for strategic planning. This method offers a framework to think creatively about complex and highly volatile environments by organizing and revealing the underlying uncertainties (Peterson, Cumming, Carpenter, 2003). Moreover, scenario planning as a tool helps managers to challenge their assumptions and to prepare better for possible future developments (Wulf, Meibner & Stubner, 2010). Scenarios are for example, defined as “stories about the way the future might turn out” (Schwartz, 1996, P.3-4) and as “a structured account of possible futures” (Peterson et al., 2003, P.360). The commonality in the definitions is that scenario building does not focus on making forecasts or predictions, but rather on describing images of the future that challenge assumptions and broaden perspectives (Duinker & Greig, 2007). Scenarios are constructed to provide insights into major drivers of change and to help managers to acknowledge the uncertainties and translate it into thinking in multiple options. Therefore, it is important to note that this technique will not accurately predict the future but rather help to develop strategies to overcome the usual errors in decision making and tunnel vision (Schoemaker, 1995). The scenario planning technique was developed in the 1970’s at Royal Dutch Shell as a planning technique for generating and evaluating its strategic options. Because of scenario planning, Royal Dutch Shell was consistently better in their oil forecasts than its competitors. Therefore, Royal Dutch Shell could react earlier and more successfully to changes than its competitors (Wack, 1985). Nowadays, scenario planning is widely used by many organizations as a tool for long range planning (Phadnis et al., 2015). This method stands out for its ability to capture a whole range of possibilities in detail (Schoemaker, 1995). Scenarios explore the shared impact of various uncertainties and therefore differ from other planning methods such as sensitivity analysis, contingency planning and computer simulations (Schoemaker, 1995). A scenario planning technique allows a company to compensate for two common errors in decision making, overprediction and underprediction of change. Today’s turbulent environment probably causes the construction industry to experience change with regards to how value is created. The main goal of scenario planning is to develop different views of the future and to think through their consequences for the organization (Wulf et al., 2010) and thus fits with the strategic relevance of this research. However, traditional scenario planning approaches are often criticized because of the high investments of resources and time because of their complexity (Wulf et al., 2010). According to Bradfield (2008) this weakness is a result of the lack of standardization of traditional approaches. A comparative analysis of these traditional approaches was done by Wulf et al. (2010). They developed a more standardized and tool based approach of scenario planning. With this approach, the process is less complex and more manageable. Three steps of this approach which are relevant for this thesis are adopted, these are perception analysis, trend and uncertainty analysis and scenario building. Afterwards the implications of the most probable scenario are assessed together with industry experts from Building inc for the current business model of main contractors.

### 2.3 Summary

To conclude, I will summarize the main findings of the theoretical concepts discussed in this chapter. In this thesis a strategy-oriented view on business models is adopted in which value creation for the customer is central (Wirtz et al., 2016). Moreover, a business model is an abstraction that describes a business not at the operational level but at the conceptual level (Calavante et al., 2011). To conclude, a business model “describes the rationale how an organization creates, delivers and captures value” (Osterwalder & Pigneur, 2010, P.14). The Business Model Canvas developed by Osterwalder & Pigneur (2010) is a good tool to visualize the business model of a large construction company active on the Dutch housing market. However, a business model is exposed to several environmental factors such as the legal environment, the social environment and technological change (Osterwalder, 2004). The business model canvas ignores these external factors. Another limitation is that the business model canvas often describes the relevant elements of a business model in a simplified manner and these elements are not interlocked. Therefore, the focus of this paper will be on the four key elements of a business model as proposed by Johnson et al. (2008). Because of today’s turbulent and dynamic



business landscape a dynamic perspective on the business model concept is adopted in this thesis. Business models are not stable over time and are subjected to innovation and adoption. The dynamic approach considers the business model concept as a tool to address change and focuses on innovation (Demil & Lococq, 2010). As aforementioned, external disruptions are often recognized as major drivers of business model innovation/change. These various exogenous changes lead to uncertainty and there is often no consensus how these forces might affect the future of a firm and their business models. Therefore, it is necessary to recognize the opportunities and threats early on. As a result, in this thesis the discovery theory is used. In discovery theory it is presupposed that opportunities exist and only need to be discovered to be exploited (Alvarez & Barney, 2007). The (future) business model environment will be conceptualized with Porter's five forces and the STEEP framework (Chapter 2.2.1).

Today's turbulent environment in the construction industry probably causes the construction industry to experience change how value is created. Therefore, to prepare for the future, scenario planning as a tool is adopted in this thesis. This technique will not accurately predict the future but rather helps to think creatively about complex and highly volatile environments by organizing and revealing the underlying assumptions (Peterson et al., 2003). The implications of the constructed scenarios for value creation in the future for a large construction company active in the Dutch housing market will be assessed with four key elements of a business model: the value proposition, the profit formula, key resources and the key processes (Figure 3).

### 3. Methodology

This chapter describes the research activities to answer the central research question of this thesis. The central research question, *"How can a large construction company in the Dutch housing market design a new business model to create and capture value in 2030 by using scenario planning?"*, required a forecasting method for the 2030 construction industry structure. A single accurate forecast of the construction industry was difficult given the uncertainty surrounding the industry. As aforementioned scenario planning was adopted as a method to cope with this problem, this technique allowed the author of this paper to develop different possible future scenarios for the construction industry. The adopted method for scenario planning in this thesis required four steps:

1. *(Future) industry structure*
2. *Perception analysis*
3. *Trend and uncertainty analysis*
4. *Scenario building*

#### 3.1 (Future) industry structure

Building Inc. is a large publicly listed main contractor and is a premium supplier of living areas, houses, and housing related products and services. The focus is on serial housing production or renovation projects such as new residential buildings, conceptual new residential buildings, renovations and transformations. Building Inc. has two main groups of customers, the residentials as end users (B2C), and consortiums, real estate developers and groups of investors (B2B). However, the role of the main contractor has changed in recent years and this trend is expected to continue. In this step, Porter's forces framework (1980) was used to conceptualize the (future) construction industry structure. The findings from Building Inc. SharePoint environment, web research and information from the interviews in were linked to define the (future) construction industry structure.

#### 3.2 Perception analysis

The goal of this step was to establish a comprehensive list of factors that were likely to shape the future construction industry structure. First, to identify the factors a desk research was conducted. Next, the qualitative data was obtained through interviews with industry experts followed by an analysis. Section 3.2.1 explains how the qualitative data was collected and how the expert sample was obtained. Section 3.2.2 describes how the qualitative data was analyzed.

### 3.2.1 Qualitative data collection & expert sample

Researching what the most important aspects are could be done through a quantitative method, but qualitative research methods are more useful for researching unexplored topics (Britten, Jones, Murphy & Stacy, 1995). Qualitative methods provide more in-depth information, which is important to understand the implications of the different factors. One of the most used qualitative methods is conducting interviews. Interviews can be used to collect information from individuals about their beliefs, attitudes, opinions or own practices (Harrell & Bradley, 2009). Interviews can be used to gather information about past or present experiences or behaviors and to explore the perspectives and perceptions individuals have about the future. There are three types of interview structures; unstructured, semi-structured and structured. The author in this research has used semi-structured interviews with open-ended questions. The semi-structured interviews gave the interviewer the opportunity to probe answers and have participants elaborate or explain on their responses (Harrell & Bradley, 2009). In that case, the researcher can expect to collect a detailed and comprehensive data set that could compromise themes that he had not previously thought of but that could enhance the understanding of a certain phenomenon (Saunders et al., 2009). For a semi-structured interview, a guide is used with a list of topics/questions that need to be covered. In this thesis the interviews were structured with 5 STEEP dimensions; political-legal, economic, social-demographic, technological, ecological (Schwartz, 1991) (Appendix 1).

Qualitative research necessitates having a small sample because of the intensive and detailed work required for the study (Anderson, 2010). This thesis does not focus on generalizability but rather on the in-depth analysis of information-rich cases within the construction industry. Therefore, a non-probabilistic purposive approach to sampling was adopted. This method is common in qualitative research (Anderson, 2010). In contrast to probability sampling, non-probabilistic purposive samples do not need to be statistically representative; rather the researcher relies on his judgment to select individuals with characteristics relevant to this study (Saunders, Lewis & Thornhill, 2009). The snowballing technique, Building Inc's. network and the author's personal network were used to interview 12 industry experts face to face. To get the best view of the (future) industry structure and the macro environmental factors potentially influencing the construction industry, a wide range of industry experts from different backgrounds was required for the interviews. The interviewees had different functions within Building Inc., such as director, commercial manager, developer and sustainability expert (Table 1). The goal was to include external industry experts in the sample, however, the appointments made were delayed and therefore the external expert interviews were excluded from this research. However, the variety of functions from the industry experts and the focus of this thesis on in-depth analysis of information rich cases rather than generalizability within the construction industry made this sample reliable.

The interviews with the company and industry experts were conducted face to face. Probing was applied to let the interviewees explain their answers. The interviews took between fifty minutes and an hour and a half. All the interviewees approved audio recording. The interviews were transcribed and analyzed in detail.

Interviewee number	Function
Interviewee 1	Commercial manager
Interviewee 2	Sustainability expert
Interviewee 3	Commercial manager
Interviewee 4	Marketing & innovation advisor
Interviewee 5	Director
Interviewee 6	Senior project manager
Interviewee 7	Project leader design & engineering
Interviewee 8	Developer
Interviewee 9	BIM engineer
Interviewee 10	Commercial manager
Interviewee 11	Deputy director
Interviewee 12	Director

*Table 1: Expert sample for the interviews by interviewee number and function*

### 3.2.2 Qualitative data analysis

To cope with the huge volume of data collected from the desk research and the expert interviews, a structured and efficient process of data analysis was essential. The large list of identified trends needed to be abstracted into factors. Therefore, it was needed to differentiate between trends and driving factors to code the qualitative data into manageable information. A driving factor is a higher-level bundle of similar but sometimes differently directed trends that could have a decisive impact for the company. Therefore, each trend (e.g. healthy aging at home) is part of a driving factor (e.g. change in lifestyle/society). So, the first step was to identify the trends that have an impact on the future construction industry, secondly these trends were assigned to higher-level driving factors. The recorded audio was transcribed into twelve transcripts. The data in the transcripts was analyzed and reduced by coding and clustering the data with the qualitative data analysis software Atlas TI. The clustering of coded factors was performed based on the researcher's interpretation of common patterns and themes and supported by the cluster analysis function within Atlas TI. The resulting clustered list of factors was used in the next step as described in chapter 3.3.

### 3.3 Trend and uncertainty analysis

The goal of this step was to evaluate the impact of the obtained factors derived from the previous step. Wulf et al. (2010) developed a tool to facilitate this process, 'the Impact/Uncertainty Grid' (Figure 5). This tool helps to visualize and structure the comprehensive list of factors that have a potential influence on the future development of value creation in the construction industry. The proposed matrix allows a positioning of all identified factors according to their potential impact and uncertainty for the future. Section 3.3.1 describes shortly how the quantitative data was obtained. Section 3.3.2 explains the quantitative data analysis.

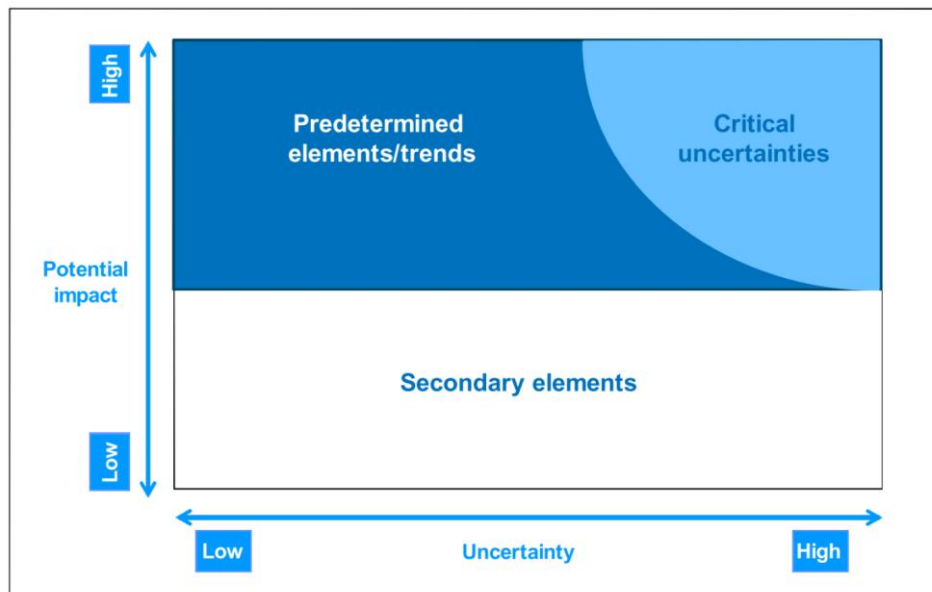


Figure 5: Impact/Uncertainty Grid (Wulf et al., 2010)

### 3.3.1 Quantitative data collection

To determine the critical uncertainties, trends and secondary elements, which formed the foundation for scenario development, a questionnaire was developed with the results from the qualitative data. This questionnaire was developed with Google forms. The respondents were asked to assess on a one to ten Likert scale the potential impact and uncertainty of each individual factor that was recognized from the qualitative data. This questionnaire was sent to 625 employees of a construction company. The questionnaire was sent to 625 employees to prevent a sampling error, because a construction company has many different people with different expertise's in house. For example, there was a possibility that someone working on site could think radically different about the potential impact and uncertainty of an individual factor than someone working off site. Moreover, by sending the questionnaire to 625 employees the author of this paper could analyze if there were large differences between responses of different expertise's. By excluding certain expertise's from the sampling group, the quantitative results could potentially be biased. After closing the questionnaire quantitative data on the potential impact and uncertainty of the thirteen factors was obtained from 71 employees with different expertise's in the construction industry. Details of sample population can be found in appendix 3.

### 3.3.2 Quantitative data analysis

The obtained quantitative data from the online questionnaire was analyzed with Google forms and excel, to measure the internal consistency Cronbach's alpha coefficient was calculated in Excel. The average impact and uncertainty of each factor was plotted in the Impact/Uncertainty Grid. This grid is divided into three sections. The bottom section of the Impact/Uncertainty Grid, secondary elements, contains the factors that have a relative low performance impact and will not be further considered for the scenario building process. The trends which are in the upper left side of the grid have a strong impact but are simultaneously relatively predictable, the identified trends became important for the description of scenarios in the following step (Wulf et al., 2010). The critical uncertainties are in the upper right corner of the Impact/Uncertainty Grid, these are the major outcomes for this step. These factors have a high-performance impact and the future development of these factors is rather uncertain (and therefore can develop into different directions: positive/negative). These critical uncertainties were clustered into closely related critical uncertainties (Wulf et al., 2010) and are key for the scenario building process. Since they served as the basis for the identification of the two key

uncertainties, which formed the basis for the development of scenarios in the following step (Van der Heijden, 2011).

### 3.4 Scenario building

The objective of this step was the development of four specific scenarios for a company in the construction industry. The scenario matrix was used as a tool to guide the scenario identification process. The tool proposed for this step by Wulf et al. (2010) and first developed by Kees van der Heijden in the 1970s at Royal Dutch Shell was used as a visual framework for deriving scenarios (Figure 6). The two key uncertainties as identified in the previous step served as the dimensions which span the matrix and are called scenario dimensions (Van Der Heijden, 2011). As can be seen in figure 6 for each scenario dimension two extreme values, positive and negative, should be defined. This results in four distinct future scenarios. The next step was to describe the four scenarios in more detail. Following Wulf et al. (2010) this happens in three steps. First a cause and effect diagram was developed in which the trends and the critical uncertainties identified in the previous step, served as causes and effects in this diagram. Following the influence diagram, a storyline for each scenario was developed. Lastly, the scenarios were described in full detail.

### 3.5 Current business model

A desk research was performed to elaborate the current business model from Building Inc. Moreover, information was extracted from the company's SharePoint environment and the annual report. The main findings were summarized in a model with the four key elements of a business model: value proposition, key resources, key processes and the profit formula (Johnson et al., 2008). The findings were presented and the business model was further elaborated in cooperation with employees from Building Inc.

### 3.6 Implications for the current business model

After the development of the four scenarios, an assessment was done which scenario was most likely to occur in the future. This assessment was done by the author, by discussions with industry experts from Building Inc. and with the interview insights. This scenario was comprehensively discussed and a new business model was proposed for the most probable scenario for 2030. Lastly, a short discussion followed what kind of changes the other scenarios would require.

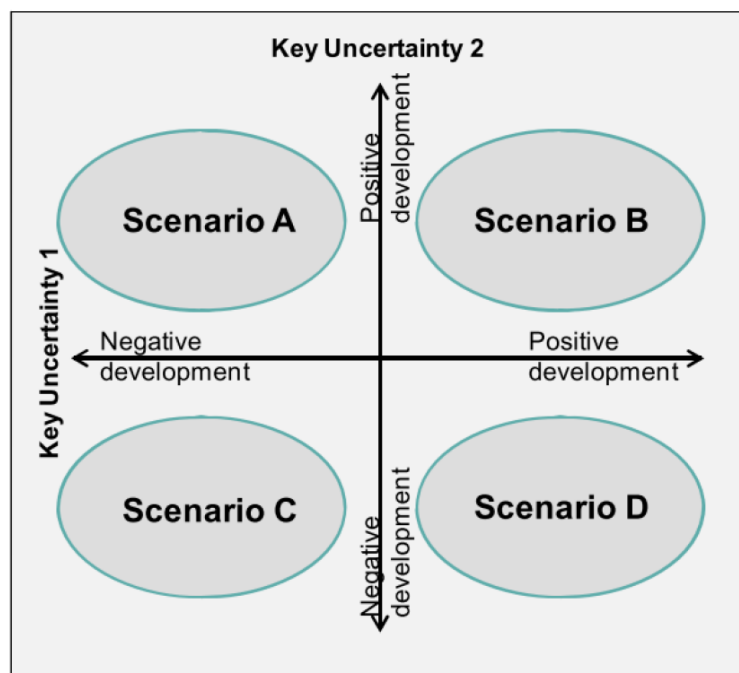


Figure 6: The Scenario Matrix (Wulf et al., 2010)

## 4. Results

### 4.1 (Future) industry structure

The scope of this research is conceptualized with Porter's five forces framework (1980) concerning the (future) construction industry structure and is based on a large publicly listed construction company as the main contractor in the housing market in The Netherlands.

The construction industry is dependent on the economic business cycle. During the financial crisis (2008) and in the aftermath, most of the heavy materials were sold or dispersed and many of the building professionals were fired. To maintain a certain flexibility the builder becomes more than now the central director of the construction process (Achmea, 2018) which means that they hire specialist and outsource most of the activities necessary to build or renovate houses to sub-contractors. This seems logical given the experience that these large builders have in connecting, for example installers, carpenters and subcontractors. Thus, the main contractor only executes a small part of the projects with their own personnel and capacity. However, main contractors maintain the overall responsibility of the delivery of value through projects and products, irrespective of which organization/person is responsible for it, the main contractor is the one who must guarantee value delivery. Therefore, main contractors are highly dependent on material suppliers and sub-contractors involved. Moreover, due to technologies and other trends the industry characteristics are changing from just build (B), to build, design, finance, maintain, operate (BDFMO) with a minimal total cost of ownership (TCO) (Achmea, 2018; BAM annual report, 2018). Therefore, a shift is expected from the realization of objects to the performance of objects and surroundings. So, this could for example mean that a large building company tries to create additional value by not only building the object but also by providing guarantees for management and maintenance of these object in the first ten or twenty years.

According to the interviewees, the market is very fragmented, competitive, with high risks and low margins. First, new entrants are not common in the construction industry. Profit margins are low and therefore, profitability in the construction industry heavily relies on scale. At the same time, the construction industry is not very capital expensive for main contractors. Moreover, main contractors in The Netherlands use a highly traditional cost-plus pricing model, this in combination with economic pressures on tenders forces main contractors to compete on price rather than value based competition. Therefore, large incumbent firms have advantages because of their scale, network and references. Thus, one could conclude that the threat of new entrants is low. However, according to a report of the ING (2016) and almost all the interviewees a new era for the construction industry is approaching because of new cutting-edge technologies such as robotics and big data. These technological developments have the potential to disrupt the construction industry. Moreover, these technologies could attract new entrants diversifying from other sectors / markets to the construction industry. These new entrants have the potential to bring new capacity and have a desire to gain a market share. Particularly, when these new entrants leverage cash flow and existing capabilities to shake up competition (Porter, 2008). As illustrated by a statement from an interviewee (11) below, Google could be a potential new entrant in the construction industry diversifying from another sector, because houses can yield a lot of data. Google, is a company that has a lot of data available about individual potential customers and knows how to use data. This, reinforced by the digitalization of the construction industry could potentially attract Google to the construction industry. Referring to the interviews, almost all the interviewees expect the changing construction industry will attract new entrants from different sectors. According to most of the interviewees especially tech driven companies and large companies that have experience with selling ready to assemble product such as IKEA will potentially enter the construction industry. Thus, according to the major sources of the five forces model of porter (1980) the threat of new entrants is low. However, the industry structure is changing rapidly and the industry experts (interviewees) assess the threat of new entrants as high. However, there are severe barriers to entry so the threat of new entrants will be judged as medium by the author of this paper.

*"I do expect new entrants in the construction industry for sure. IKEA is going to build houses in The Netherlands, like they already do in England. This company has a lot of capital to invest and experience with selling ready to assemble products and able to apply series based housing production. Moreover, future houses will yield a lot of interesting big data. Therefore, I expect that the digitization of the construction industry will attract tech driven companies to the industry. For example, Google, a company that is very good in data analytics and knows a lot about individual customers around the world (interviewee 11)."*

*"For sure, I do expect new entrants in the construction industry, parties with a lot of capital to invest. However, I am not sure in what role, maybe they are going to build houses, maybe as new clients or there will be new partnership between contractors and tech driven companies. But that eventually new parties will join the sector is indisputable (interviewee 8)."*

Second, the threat of substitutes is low. A substitute has the same or similar function as an industry product by a different means (Porter, 1980). For years experts are talking about substitutes for houses. Of course, there will be incremental changes to houses, they will become smarter, the production will probably be different and processes will be changed. Moreover, because of technological changes a house could radically change. However, for radical changes, the general image of what a house looks like should change, a newly built house does not differ much from a house that was built in the 1950s. A possible explanation for this is that almost everybody in The Netherlands has an image how a house should look like, namely; a house made of concrete, bricks and rooftiles. According to the industry experts the threat of substitutes is low, eleven of the twelve interviewees considered the threat of substitutes as low.

*"I do not expect radically different living concepts or forms. Experts are talking about substitutes for houses for years now. But how much has changed to houses or living forms in the past 50 years? New technologies or entrants from other industries could lead to substitutes for houses. However, the general image of what a house looks like also should change then. Therefore, I do not expect substitutes in the coming twelve years (interviewee 9)."*

Third, a main contractor in the construction industry operates in a decentralized network of customers and suppliers in which they obtain most production capacity from external suppliers. Contractors spent up to 90 % of their project turnover on buying services and goods (Vrijhoef & Koskela, 2000). As aforementioned, the main contractor always maintains the overall responsibility and must guarantee value delivery, irrespective of which organization/person involved. Therefore, the main contractor is highly dependent on materials supplier and sub-contractors involved in the building process.

Projects in construction can even be viewed as a temporary organization among many firms in which the main contractor is the central director of the construction process. However, for main contractors the establishment of long-term buyer-supplier relationships is difficult, as the project teams, clients and sub-contractors differ from project to project. The bargaining power of suppliers is high given the constantly rising prices of inputs and shortages of labor. Raw materials are scarce and the group of suppliers for raw materials is concentrated. Moreover, the concentrated supplier group does not heavily depend on the civil building sector. At the same time, there are low switching cost for main contractors in changing suppliers, but there is often no substitute for these raw materials available. Thus, the bargaining power of these suppliers is high. On the other hand, there are many sub-contractors who all have their own specialism. The bargaining power of these suppliers is dependent on the economic cycle. In the upswing of the economic cycle, these suppliers have a lot of power. However, in the downswing of the economic cycle this power is reduced. Even though, there is an increasing labor shortage especially for specialized professions such as: masons, plasterers, installers. Therefore, they can capture more value for themselves by charging high prices. It is expected that even in the downswing of the economic cycle these prices remain reasonably high. At the same time, most of the interviewees expect that new entrants, mainly tech companies will obtain a lot of



power in the future by taking a significant share of the construction value chain. To conclude, the bargaining power of suppliers is high and expected to remain high. Moreover, it limits the profitability for the main contractor.

Furthermore, the buyers are end users and clients in the construction industry. These clients (B2B) can be groups of investors, corporations and developers. The B2C customers are the end users of the buildings (residential). As most projects are won through a bid process/ tenders, the clients (B2B) have a fair amount of power here as the clients have a say in who they would like to do their project. The main contractors are selected first and mostly on best price for quality, but also by portfolio, sustainability and knowledge of brand. While the power of end users is limited in the economic upswing, they do have a lot of power in the economic downswing. Referring to the interviews, the interviewees expect the bargaining power of end users to grow supported by new technologies. These new technologies ensure that the market becomes even more transparent for the customers and the clients. Therefore, as data shows the power of buyers is classified as high and is expected to become even higher.

*“The clients (B2B) always have a fair amount of power, as they decide which contractor is selected for a project. While their power is reduced in the upswing of the economic cycle, these clients still have a fair amount of power (interviewee 4).”*

*“The residential do not have any power in an overstrained market. However, in the downswing of the economic cycle the residents have a lot of power. In recent years, residents increasingly want to have more input into the design and layout of the building. We try to take as many purchase trends as possible into our product, so I think the bargaining power of the end users is increasing. For the next twelve years I expect this trend to continue. In my opinion data analytics will help to perfectly match our product with the demand from a customer (Interviewee 11).”*

According to Porter (1980) rivalry competition is high when there are businesses equally selling a service or product, which is the case for the large publicly listed Building Inc. as the main contractor. There are many different competitors, both SME companies and large companies. These SME companies can compete on price because of their lower overhead costs. In addition, the construction industry is a notoriously cyclical sector of the economy. Moreover, it is easy for customers to switch to a competitor.

To conclude, the forces surrounding Building Inc. and their competitors are strong/high. This is confirmed by the interviewees who state that the competitive rivalry is high for Building Inc. Therefore, the competitive rivalry is high. Especially, the power of buyers and suppliers is hindering the profitability for main contractors. According to Porter (1980) a common mistake is to assume that fast-growing industries are always attractive. Because an expanding pie offers opportunities for all the businesses in the industry. Fast growth can also lead to a powerful position of suppliers. This is exactly the case for Building Inc. and other main contractors in the industry as summarized in the statement below. So, despite a large expected industry growth for the coming years, the industry is not attractive.

*“If you look at the sector positively, it runs at full speed. However, wage development is unhealthy, the prices of materials and subcontractors (labor) are growing so significantly that budgets of clients have become inadequate again and it undermines the industries profitability (van Belzen, 2018).”*

## 4.2 Perception analysis

In this step a comprehensive list on macro-environmental factors impacting the construction industry is presented based on desk research and twelve semi-structured expert interviews. Section 4.2.1 describes how the factors impacting the construction industry were summarized and clustered into 13 superior driving factors.



#### 4.2.1 Qualitative data analysis

The sequent coding yielded 85 factors (trends/developments) impacting the construction industry (appendix III). Based on the company supervisors' and the researcher's interpretations of common themes and patterns the 85 factors were summarized and clustered into 13 superior driving factors (table 2). For example, the political factor *"stricter requirements regarding sustainability and environmental friend constructions"* consists of the following trends and developments mentioned by the interviewees:

- Circular economy in 2050
- New taxes on energy
- Taxation on polluting materials
- Climate agreement (Paris) of 200 countries to do something about CO2 emissions
- New legislations to reduce emissions during the production process, nowadays most laws are mainly for the user's phase
- New legislations for lifetime costs of a home instead of the one-off construction costs

Driving factors impacting the construction industry
Stricter requirements regarding sustainability and environmental friendly constructions (political)
Withdrawing government, less bureaucracy (political)
Stronger economic & financial integration of the European Union (political)
Fluctuating prices of (raw) materials and labor (economic)
Globalization (economic)
Price development of houses (economic)
Sharing economy: from possession to use (social)
Demand for a different type of home (social)
Robotization (technological)
Change in generation and storage of energy (technological)
Digitalization (technological)
Prefab (technological)
Climate change (ecological)

Table 2: Driving factors impacting the construction industry, framed by the STEEP framework

#### 4.3 Trend and uncertainty analysis

The ranking of factors into secondary elements, critical uncertainties and trends is presented in this section. Section 4.3.1 shows the quantitative data analysis and the subsequent ranking of factors into secondary elements, trends and critical uncertainties.

##### 4.3.1 Quantitative data analysis

The average values of 13 factors (table 2) varied from 5.97 to 8.47 for the potential impact, and 6.34 to 8.40 for the uncertainty. However, many industry experts indicated that the uncertainty of the factors was difficult to quantify. The Cronbach alpha coefficient of 0.70 for the impact and 0.85 for the uncertainty however indicated that the reliability of the questionnaire is acceptable. The plotted average values for impact and uncertainty for each factor can be seen in figure 7 below. The dispersion of the Impact/Uncertainty grid yields four critical uncertainties, five trends and four secondary elements. As shown in figure 7, I identified factors such as 'globalization' and a 'stronger economic & financial integration of the EU' as secondary elements, which have a relatively low impact on the company. These results were a bit surprising as globalization and a stronger economic and financial integration of the EU could open new markets. Expanding their markets could boost innovation and contribute to the company's goals. Especially given the low profit margins, the goal of mass customization and the fact that the housing division of Building Inc. is mostly limited to the Dutch market. Moreover, aspects as 'climate change' and 'new legislation for sustainability' were defined as

trends. A surprising result is that robotization was defined as a trend but has a relatively low impact according to the industry experts. While robotization is a ‘hot item’ in the construction industry given the rising prices and shortage of labor. A possible explanation for this relatively low impact of robotization could be that the experts expect that prefabricates will have a high impact on Building Inc. If most of the products will be prefabricates there is less labor necessary for the production on site and therefore robotization will have a lower potential impact on Building Inc. Finally, ‘price development of houses’, ‘digitalization’, ‘prefabricates’ and ‘fluctuating prices of (raw) materials and labor’ were identified as critical uncertainties and clustered to two key uncertainties. The economic uncertainties ‘fluctuating prices of (raw) materials and labor’ and ‘price development of houses’ formed the key uncertainty ‘development of cyclical sensitivity’. The second key uncertainty ‘Development of technological environment’ resulted from the two technological uncertainties ‘digitalization’ and ‘prefabricates’. These two key uncertainties were used as axes in the following step of scenario building.

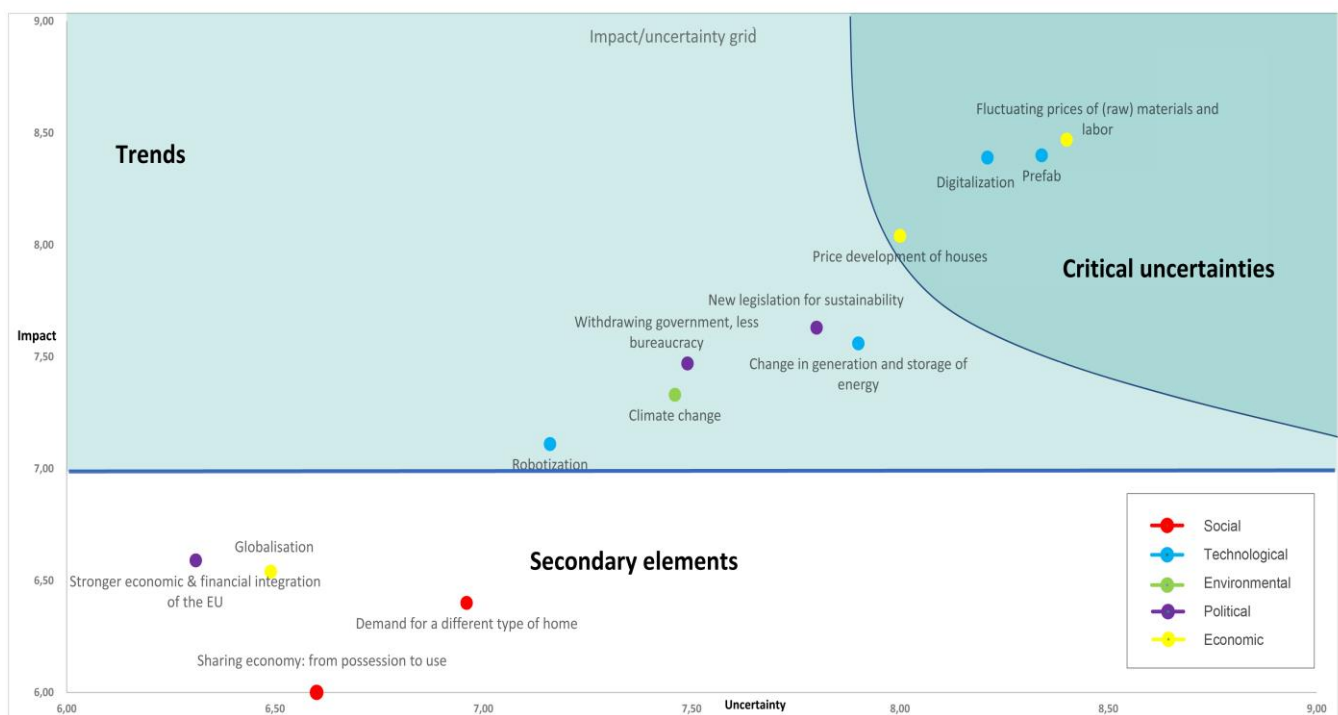


Figure 7: Impact/ Uncertainty grid

## 4.4 Scenarios

### 4.4.1 Scenario identification

As aforementioned the two key uncertainties served as axes of the scenario matrix. Two extreme values were defined for the two key uncertainties, solitary/collaborative for the ‘development of technological environment’ and extreme/flattened for the ‘development of cyclical sensitivity’. Therefore, four scenarios were derived from the two scenario dimensions as can be seen in figure 8. These scenarios were called ‘We are the champions’, ‘Let’s go digital’, ‘Crash test dummy’ and ‘Survival of the fittest’. In the next section these scenarios will be further elaborated into consistent stories.



Figure 8: Scenario matrix

#### 4.4.2 Scenario description

After defining the four scenarios on basis of the two scenario dimensions “development of the cyclical sensitivity” and “development of the technological environment”, these scenarios must be described more in detail. To further develop these scenarios into full consistent stories, the recognized trends and critical uncertainties, as derived from the previous step are visualized in the influence diagram in figure 9. The critical uncertainties and the trends serve as cause and effects in the influence diagram. The arrows show the interrelations between the critical uncertainties, trends and scenario dimensions.

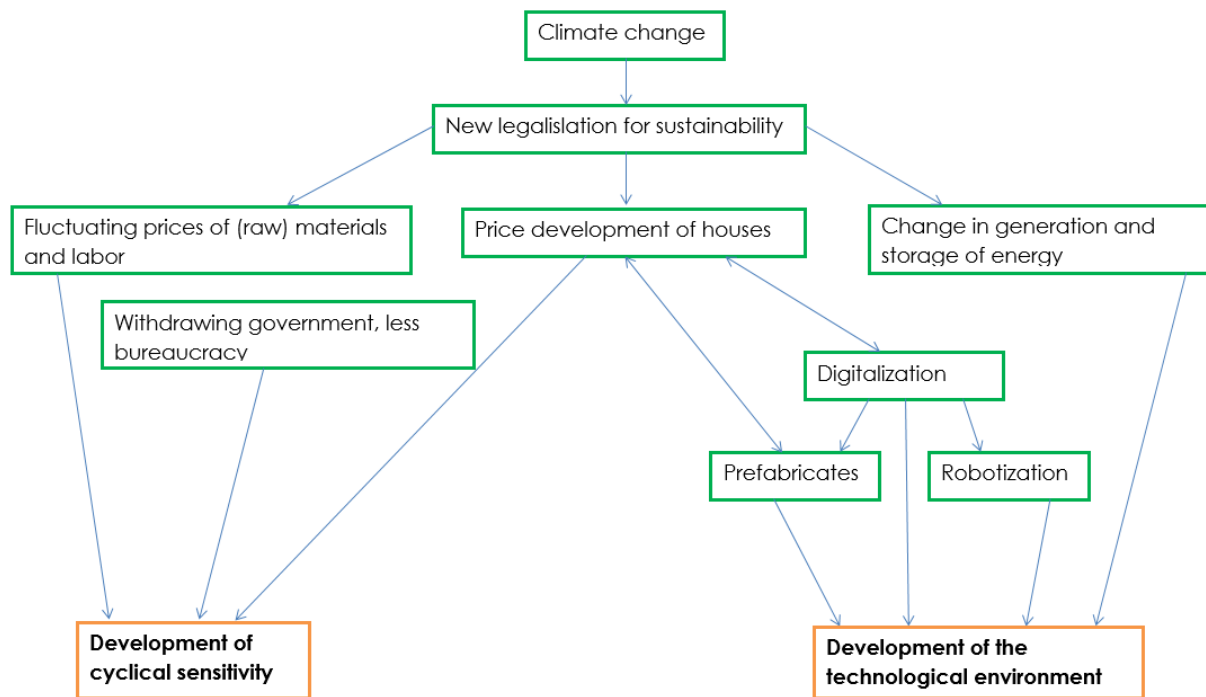


Figure 9: Influence diagram

- We are the champions is a world in which the main contractor dominates the construction housing industry. Digital technologies have entered the construction industry, changing how the houses are financed, designed, constructed, renovated, operated and maintained. To realize the full potential of digital technologies, the Dutch government created a fruitful environment for digitalization of the construction sector. Moreover, to meet tough environmental regulations set by the government and the finiteness of fossil fuels the construction industry adopted new sustainable technologies and circular building techniques. These drivers proved to be the perfect incubator for progressive new technologies in the construction industry. As a result, the Dutch construction industry for housing has overcome challenges of the new digital era and is flourishing on technological opportunities; the construction industry became a highly innovative industry. Thus, innovations improved the main contractors' productivity and reshaped competencies and skills needed to thrive. Moreover, a full-scale digitalization helped the construction industry to save significant amounts of costs. Furthermore, digital construction technologies turned out to be a critical competitive advantage in this 2030 scenario and are even seen as a prerequisite for the government, buyers and suppliers. For example, the digital customer journey will become more and more important, customers will be more demanding; everyone wants his house to be unique. The digital customer journey will take potential buyers to a journey from the moment of orientation to their new home. Therefore, mass customization will be the new standard in this new 2030 world. Houses will be characterized by standardization, meaning a standardized shell, which can be expanded with thousands of options based on the customers'

individual preferences. The construction industry will be characterized by connected systems such as intelligent machines, sensors and software applications integrated on a central platform such as BIM. These digital technologies enable the main contractor to manage complexity, reduce failure cost and project delays, boost productivity and safety. In this scenario factories are running the world, the construction industry is less fragmented, the uniqueness of each project is reduced due to standardization of for example the shell of a house and multiple buyers' options, there are fewer suppliers and more similarity at a process level is achieved. Thus, the construction industry is more comparable to the manufacturing industry. The industry value chain is characterized by collaboration and integration. Data flows and integrated systems such as BIM and Blockchain will lead to a fraud-less transparent market. Moreover, data and algorithms will be used to predict economic up/down swings. Therefore, price agreements with co-makers and long-term relationships with partners will be much more much more established than they now are. For these reasons, the construction industry will be less sensitive to cyclical movements of the economy and is also able to lower the prices of their products. However, in this scenario many jobs will become obsolete, therefore leading to unemployment, mainly for low-skilled employees. But also for higher educated employees, because, in this new world a completely different skill set is needed than nowadays. Therefore, many highly educated employees must be retrained or will be fired. The question is, is this scenario an economic fairy tale or a doom scenario, as high numbers of unemployment will lead to polarization.

- Let's go digital is a world in which the main contractor has become a digital leader in the construction value chain. The Dutch government created a fertile environment for digitalization with competitive rules on data and privacy. At the same time, the continuously rising costs of materials and labor and tough environmental regulations set by the Dutch government were incubators for progressive new technologies used by main contractors. Reinforced by strong customer demands for new smart sustainable houses made the construction industry an innovative sector. The housing shortage reached its peak in 2018, construction production levels were insufficient to close the gap between supply and demand. From 2019, the housing shortage finally declined, when the number of houses built finally outstripped the number of additional households. Thus, main contractors have overcome their traditional conservative way of thinking and barriers such as massive investments costs. Creating a flourishing digital ecosystem. In this scenario factories are running the world; main contractors will use prefabrication techniques with sustainable materials which are later assembled on the construction site, mainly by robots. So, houses are built in controlled environments and employees are safer and the quality of the products is high. Modular construction with new sustainability levels made the construction industry less dependent on unsustainable raw materials. At the same time, the construction time is shortened, more flexible, cheaper and less labor is required on the construction site. However, massive investments have been made while the profit margins for main contractors slightly increased, but remained relatively low. Therefore, scale is very important in this scenario to achieve a proper return of investment. Therefore, for main contractors to earn a decent return of investment a constant production is needed. With new techniques such as prefabrication and 3D printers' main contractors can produce 24 hours a day. However, in the economic downswing there will be overproduction due to a lower demand. Consequently, the main contractor will probably not be able to reach a satisfying return of investment in the economic

downswing. Thus, although the technological environment developed positively the construction industry is still very sensitive to cyclical up/down swings. Therefore, to reduce the cyclical sensitivity in this 2030 world main contractors should make price agreements and collaborate with their co-makers. At the same time, agreements must be made about shared innovations as everyone involved in the construction value chain must have a certain degree of innovativeness to keep up with new technologies.

- Survival of the fittest is a highly competitive world in which Dutch main contractors have lost ground to new technology entrants in the construction value chain. Tenders are in this scenario still won on price, leaving little room for innovation for main contractors. The future will be driven by money. Thus, price will be the major factor considered by construction businesses. Therefore, the focus in this scenario is on survival, and the future will only leave room for big scale companies. Due to climate change and the following new legalization for sustainability heavy investments had to be made in sustainability. However, main contractors considered this focus on sustainability not as a differentiator but as a requirement, and therefore did not consider sustainability as an effective way to increase profits. Even though, heavy investments in sustainability were made and environmental issues were reduced, however a net positive impact on the environment is not reached yet. The focus of main contractors was on cost cutting process innovations rather than new to the world products and services. The profit margins of main contractors were too small for large R&D investments. Moreover, the construction industry in The Netherlands and Europe have lost ground to other regions such as Asia and America regarding opportunities offered by digitalization. Dutch and European regulations on privacy and data laws were proved to be uncompetitive in this new 2030 world. So, new entrants from all over the world such as Google, Toyota, IKEA have entered the Dutch construction industry and took a significant market share of the construction value chain. While digitalization was changing the world, disruptions came from companies from other sectors. These new entrants have revolutionized the industry as technology suppliers invested large amounts of money in R&D. These technology suppliers obtained a lot of power in the future construction industry, since they have ownership over the obtained data and technologies. Main contractors are forced to complement their digital capabilities through collaboration with third parties to compensate for internal lack of resources. Collaboration of main contractors with these technology companies ensures that construction work will be faster, less liable to rework, and less expensive due to lower failure cost. Moreover, the entire construction process has become more transparent with BIM and Blockchain. Furthermore, standardization and mass customization are the new standard in this 2030 world. An advantage of collaboration with technology suppliers is that it ensures that companies from different sectors complement each other with their core businesses. The cyclical sensitivity of companies in the construction industry is reduced due to reduced prices, reduced use of fossil fuels, new sustainable materials and collaboration with technology suppliers. Data and algorithms are used to predict economic up/down swings. Therefore, companies in the construction value chain are better prepared for changes in the business cycle. A big disadvantage of this scenario for main contractors is there is little room to develop distinctive capabilities. Another disadvantage is their dependency on technology suppliers. Scale will be very important in this scenario. Therefore, mergers and acquisitions took place and only a few big main contractors survived. As aforementioned a lot of bargaining power in this scenario will be with the new technology supplier entrants. Therefore, the profit margins of main

contractors are still low in this scenario. Despite the dependency on technology suppliers this 2030 world can be a safe scenario for the remaining main contractors. It combines the best of two worlds: main contractors use the R&D capacity of technology companies with a lot of money, and main contractors do what they do best, built and renovate houses, with progressive new technologies and low risks.

- Crash test dummy is a world in which the current main contractor has lost ground to other parties regarding opportunities the future has offered. While new technologies were changing the world, the less innovative construction industry has missed out. New entrants from other industries took a significant share of the Dutch housing market. The focus in this scenario for main contractors is purely on survival. Based on continuously economic growth, the cost of labor and environmental issues will be getting worse each year. Thus, main contractors are still using unsustainable raw materials and processes. The infiniteness of raw materials made these raw materials almost unaffordable. At the same time, productivity has stagnated and main contractors still heavily rely on their established business models and manual labor. As a result, price development of houses turned out to be very negative, thus sky-high. For this reason, there is almost no demand for products offered by main contractors, meaning that most main contractors went bankrupt in this 2030 world. The remaining main contractors are fully dependent on technology suppliers who obtained a lot of power in this scenario. Moreover, the construction value chain is literally upside down, the main contractors are not the central director of the building process but are dependent on parties in the construction value chain, who took their role as main contractors, mostly new entrants. Technology suppliers and sub-contractors have been able to establish an online platform in which they can coordinate the building process without a main contractor. Therefore, a lot of main contractors disappeared from the construction value chain due to acquisitions by other parties while many others went bankrupt.

#### **4.5 Current business model**

Based on documents extracted from the internal SharePoint environment of Building Inc. and in cooperation with colleagues from Building Inc., the four interlocking elements of a business model are set up (Johnson et al., 2008). In the next section each of the four major building blocks will be discussed, namely the customer value proposition, the profit formula, the key resources and the key processes (figure 10).

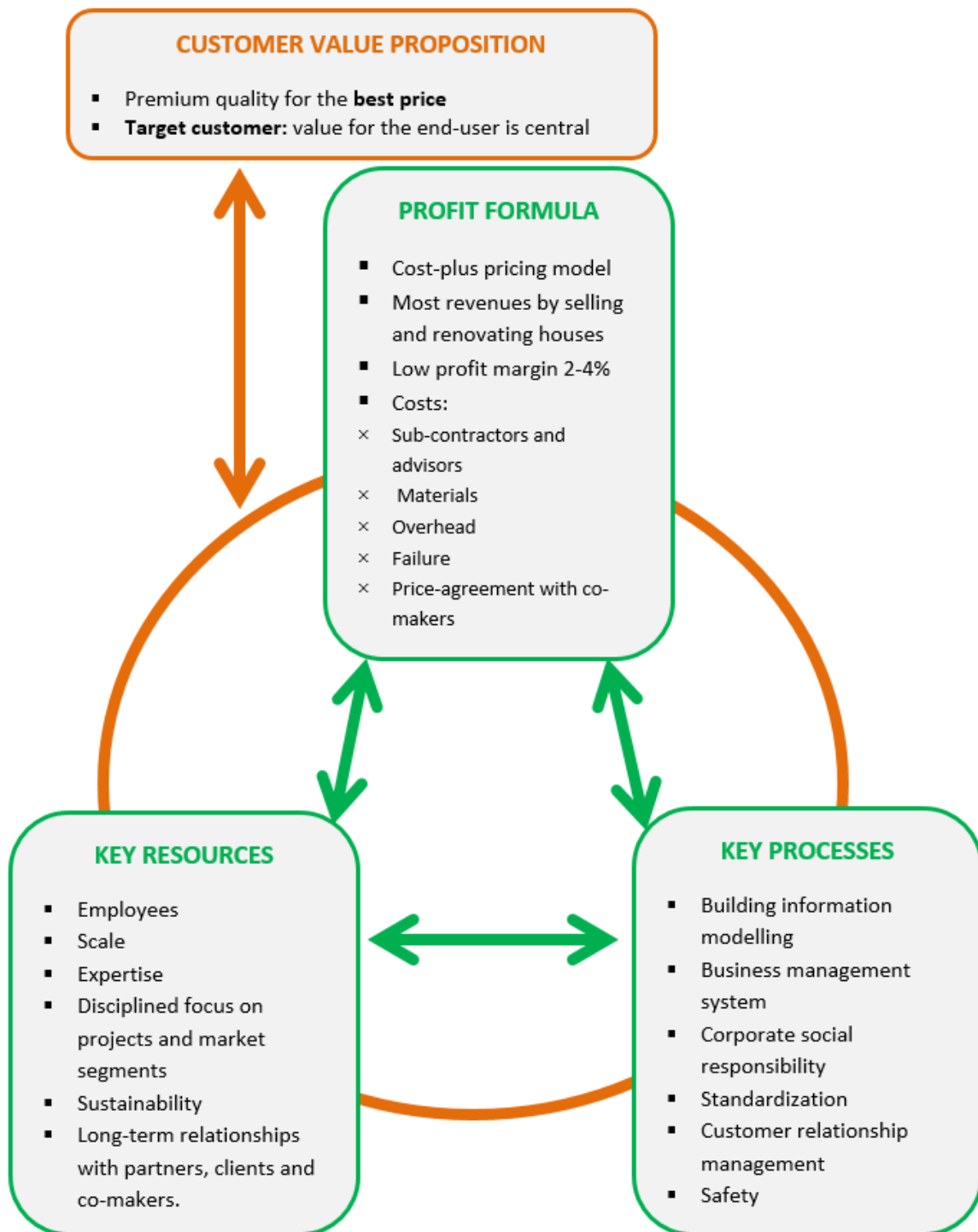


Figure 10: Business model of the internship company

#### 4.5.1 Value proposition

In recent years, the housing sector is facing a shift from a supply-driven market to a demand-driven market. In addition, new technologies offer access to new entrants in the value chain. These new technologies and social developments made today's customers more enlightened and empowered than ever. New technologies give customers access to huge amounts of information about builders and their offerings. Therefore, customers who buy a house are more demanding and everybody wants his house to be unique. Because of this, Building Inc. has put value for the residential central in their value proposition "delivering premium quality against the best price". With sustainability as guideline for all their actions. As a result, Building Inc. tries to create extra value by offering exactly what the



customers wants. Therefore, they created a 'residential collection' (i.e. 'wooncollectie') based on customer preferences. These customer preferences were found through a large-scale survey among Building Inc's. customers. In practice, this often means a standardized shell of a house which can be expanded with a few extra buyer's options. However, these options are still limited. For example, if you compare it to a car, if a customer buys a standard chassis of a car he/she can extend this product with thousands of options based on his/her individual preferences. Anyone who buys a home wants his home to be unique, so the more options a customer has, the better it meets the wishes of the customer. Therefore, to create extra added value and offer maximum experience for the customers and realize a higher profit margin, there should be more options for buyers, thus realizing mass customization.

Moreover, Building Inc's main objective is to let everyone benefit from premium living in an inspiring and sustainable living environment, as the premium provider in The Netherlands of residential areas, housing and residential products and services. Building Inc. tries to make pleasant living accessible to everyone through collaboration with partners, customers and other stakeholders throughout the whole process. In addition, they are using their experience, scale and integrated approach, to create sustainable added value for their customers. However, Building Inc. does not only create value for their customers through their core business of building and selling houses. By introducing their corporate strategy 2016-2020 'Building the present, creating the future', Building Inc. responded to climate change and the need for a sustainable world. By creating additional value for their customers in terms of sustainability and future needs. Therefore, not only focusing on their own direct impacts (such as the waste they produce and the carbon they emit), but also on the lifecycle impact of the services and product delivered. The ultimate goal of Building Inc. is to have a net positive impact on the environment, so that they are able to deliver more value for their clients and key stakeholders in the long term. Therefore, Building Inc's. strategy is aligned with the United Nations adopted sustainable development goals (United Nations, 2015), these goals serve as a road map for sustainable growth to 2030.

Furthermore, residents increasingly want a say in the design and layout of their houses and surroundings (Achmea, 2016). As a result, a shift is expected from a focus on the 'realization of objects' to the 'performance' of objects and its surroundings. This trend combined with the low profitability in the sector and new technologies ensure that Building Inc. wants to make a shift from the focus on build (B) to design, build, finance, maintain and operate (DBFMO) with a minimal total cost of ownership. However, these DBFMO contracts are still very rare in the residential market. These DBFMO contracts are more common in other divisions from Building Inc. such as infra & utilities, the expectation is that this will be the standard in the future. In a DBFMO contract, the market party / consortium of market parties is responsible for the financing, design and construction of an object, but also for the building maintenance and the provision of (a part of) the facility services for a specific period (e.g. 25 or 30 years). This means that there is no separate negotiation with architects, contractors, banks, cleaners and security companies, but with one consortium in which all these parties are united, and the consortium is responsible for the entire package, from design to maintenance (RVO, 2018). Thus, the main contractor becomes more than now the director of the building process. Which seems a logical role, given the experiences the builders already have in bringing, for example, subcontractors, painters, installers together. However, it is important to accept that role, otherwise others will do it. Therefore, Building Inc. tries to take on the role of an ally, a movement from a 'natural leader to a 'trusted partner' and 'trusted advisor'.

#### 4.5.2 Key resources

Key resources are necessary to profitably deliver the customer value proposition. Building Inc. wants premium quality for the best price. The main objective is to let everyone benefit from premium living in an inspiring and sustainable living environment, as the premium provider in The Netherlands of residential areas, housing and residential products and services. Employees are the most valuable assets to fulfill the requirements of the profit formula and value proposition, and are a distinctive capability enhanced by the 'one BAM' culture through learning, collaboration and employee

engagement (BAM, annual report, 2018). Building Inc. wants to be a preferred employer. However, according to the World Economic Forum (2018) there is a large talent gap in the construction industry all around the world. The industry is struggling with an ongoing talent shortage caused by factors such as failure to innovate, image difficulties as well as conservative work cultures (World Economic Forum, 2018). Therefore, Building Inc. wants to be more than an attractive employer with good rewards. They offer employees development opportunities and growth. Moreover, Building Inc. has a training institute that helps employees to achieve their goals. A future cohesive and coordinated working plan should be developed to retain employees and at the same time make the industry more appealing to a larger pool of potential skilled employees. As new technologies require substantially different working skills than today's workforce possesses.

Furthermore, scale and expertise are key resources. Building Inc. wants to improve profitability with a disciplined focus on projects and market segments where they can either use expertise or scale as critical success factors. Therefore, Building Inc. separated their production into four units namely: special projects, new build concepts, custom build and renovation concepts. Each unit has its own distinctive capabilities and long-term relationships with partners and clients. These long-term relationships are also a key resource. Long-term relationships with co-makers ensure that the company stays innovative and at the same time reduce the cyclical sensitivity because of price agreements. However, the general consensus among employees of Building Inc. is that these price agreements with co-makers are under pressure or cannot be fulfilled, because of a large cost inflation for construction input resources caused by the recent economic upswing. Since every sub-contractor, partner or client is trying to profit from the good years after several poor years in the construction industry during the economic downswing. Moreover, Building Inc. uses sustainability as a guideline for all their actions and is the leader in sustainability and the first builder to get a NOM quality mark. This quality mark guarantees that a zero-on-the-meter home (a home that generates as much or even more energy than the residents need) meets a set of quality standards and delivers the promised performances. However, it is important to note that most of the actions of companies in the construction industry are mainly focused on emission reduction during the users' phase of homes and not on the production phase. Much progress regarding sustainability can be made during the production phase.

*"We are unique in how we deal with our co-makers. We invest in a long-term relationship and value their knowledge and expertise through transparency and open collaboration. Through shared knowledge and skills, we can make the most sustainable and best products and remain innovative (BAM Wonen, SharePoint, 2017)".*

*"We have to attract and train the best people, lead in the field of sustainability and innovation (Rob van Wingerden, Royal BAM Group CEO, 2016)."*

#### 4.5.3 Key processes

Building Inc. started with business information modeling (BIM) in 2000. BIM is a process involving management and the generation of digital representations of functional and physical characteristics of places (make it before you make it). BIM brings together data and visualization within a 3D model to understand how a building will function and look, how it will operate and what it will cost, before it is even built. Nowadays, BIM is core in the approach of most projects. BIM is used to create maximum financial value for Building Inc. and other stakeholders. Moreover, BIM makes life easier for everyone involved in projects, working more collaboratively, helping to avoid clashes, reducing costs, reducing waste and saving time because it allows users to effectively prototype the client's vision. Therefore, the BIM technology should be used in every project. However, according to a colleague from Building Inc. this is not yet achieved. Nowadays, every big competitor also uses BIM technology. Thus, to achieve a competitive advantage with this technology Building Inc. tries to demonstrate their capabilities and experience by showing cost reductions and time saving advantages through the BIM technology. Therefore, Building Inc. has partnered with software developer Autodesk, to ensure that they can access the latest BIM software and innovations. In October 2017, Building Inc. introduced a

new Business Management System (BMS Bam Wonen). All processes from the initiative phase to the completion phase are described in this system, for each unit, and the unit itself has ownership. The BMS describes how to organize the building process. Moreover, BMS does not only describe the processes for realizing the product (primary processes) but also the supporting processes such as finance, personnel, making resources available and procurement. Furthermore, Building Inc. uses a CRM system to manage all company's relationships and interaction with customers, partners and potential customers. Safety and health policies are also an important process for Building Inc. Over the years they have progressively improved and developed their safety management systems. This process is ongoing, resulting in an improved safety performance.

#### 4.5.4 Profit formula

As aforementioned, Building Inc. states in their value proposition they want a shift from build (B) to design, build, finance maintain and operate (DBFMO) with a minimal total cost of ownership. However, in practice Building Inc. generates almost all its revenues by selling and renovating houses. Companies in the construction industry for residential buildings use a highly traditional cost-plus pricing model, which means that the price is defined as the cost of all input resources multiplied by a targeted margin level. The targeted profit margin of 2-4 % seems relatively low, but can be justified because the main contractors' business is not capital intensive. To deliver the best quality for the best price, Building Inc. has its own successful standardized housing and renovation concepts. To reduce failure costs Building Inc. uses BIM technology successfully. Moreover, Building Inc. uses economies of scale and shares the overhead costs between different units. The largest cost items are the sub-contractors and materials as the main contractor is more than ever the director of a building process and outsources most of the work. Building Inc. establishes long-term relationships with partners (co-makers) to reduce the cyclical sensitivity. However, there is still a large cost inflation for construction input resources. Therefore, the construction industry has a low profit margin even in the economic upswing.

#### 4.6 Scenario choice

As the four scenarios indicate, the construction industry could look radically different in the future. The current business model of a main contractor in the Dutch housing market will not be sufficient in any of these four scenarios.

The four developed scenarios offer a framework to think creatively about the future and to prepare better for possible future developments. The common elements of the four scenarios in combination with one scenario (the one which was judged as most likely to come true) formed the basis for a new business model. After an assessment of the four scenarios done by the author of this paper in collaboration with employees from Building Inc. and the interview insights the scenario: "Survival of the fittest" was chosen as most probable.

This scenario was chosen because the general tendency in the interviews and literature is that the main contractor is probably not able to realize the full potential of new technologies alone. The sector is still too conservative, the margins are too low, and thus there is not enough money available to invest in R&D. Moreover, a completely different skill set is required to deal with new (digital) technologies and data. There is a shortage on the labor market of people with the right digital skills, and re-training of employees will be a very costly and lengthy process. Therefore, cooperation with technology companies will be most likely. Moreover, it is expected that parties such as Google will enter the construction value chain, because future houses will yield a lot of valuable data and the technology market is massive. However, the expectation is that they are not interested in building the physical house. Therefore, the 'crash' scenario is not the most probable scenario. At the same time, the industry experts expect that only large main contractors for serial housing production will survive, since massive investments must be made to realize the potential of new technologies and to meet new sustainability requirements. To conclude, all four scenarios are images how the future construction industry could look like and provide insights into major drivers of change. As aforementioned, 'survival of the fittest' is the most likely scenario to occur in the future. Based on the gap between this new 2030 world and the current business model a new business model is proposed.

*"I think that only for small niche markets like the large luxury villa segment there will be room for small companies. But for serial housing construction only a few large players will remain. Mainly due to the large investments that must be made to realize the full potential of digital technologies (interviewee 7)."*

*"My expectation is that only a few big main contractors will survive as the future probably will require massive investments. At the same time, our profit margins are too low for massive investments and the amount of money invested in R&D is not enough. At the same time, a completely different skill set is required to realize the full potential of digital technologies. Therefore, I expect that the remaining large contractors will establish intensive collaborations with technology companies, too complement each other's core businesses (interviewee 3)."*

#### 4.7 New business model

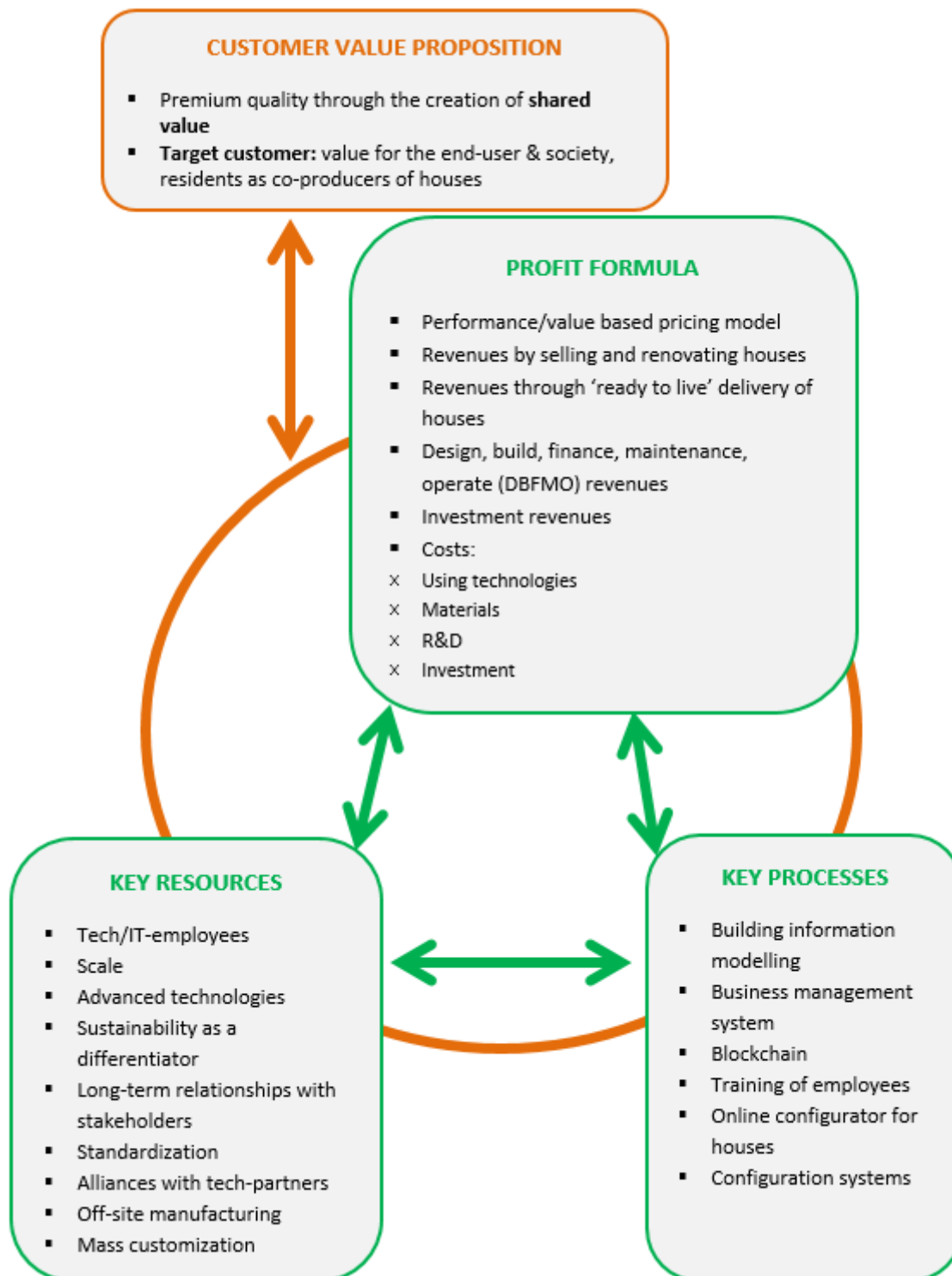


Figure 11: Innovated business model of Building Inc.

#### 4.7.1 Value proposition

As aforementioned, the construction industry is characterized by short-term profit goals and low-cost rewards. Thus, cost cutting is traditionally seen as the only way to increase profits. At the same time, almost all construction companies in The Netherlands with a focus on the Dutch housing market use the same business model which results in a heavy price competition in which companies provide the same value through mostly uniform structures and activities. Therefore, the business model concept is not used as a strategic differentiator, leaving little room for a sustainable competitive advantage.

The forecasted scenario has implications for the value proposition of Building Inc. The current value proposition focuses on premium quality for the best price, this value proposition cannot be considered as unique as all the competitors are offering the same. Nowadays, the whole construction value chain is rewarded based on minimized costs. However, in this future 2030 world a business model is needed, that relates prices and earnings to actual performance delivered to society and customers. Therefore, a turn in mindset is required for the whole industry and the customers. At the same time, increased expectations from society at large concerning sustainability and other societal needs, new legislations from the government and a highly competitive environment in which technology entrants took a significant share of the construction value chain ensured that this value proposition is outdated. Moreover, technology companies have entered the construction industry and there is little room for main contractors to develop distinctive capabilities, since the remaining main contractors will be dependent on the technologies of these companies. Thus, to survive in the highly competitive world of 2030 the business model must be approached as a differentiator and a different unique value proposition is required. Therefore, the new value proposition does not focus on premium quality for the best price but rather on premium quality through creation of shared value. Value is defined as benefits relative to costs, and not just profits. Shared value involves creating economic value in a way that also creates value for society by addressing its challenges and needs such as safety and sustainability. Identifying and addressing society's needs could be reached by involving communities through the whole construction life cycle from design to construction through to the operations phase. Because this offer is unique Building Inc. has a relatively strong competitive position compared to their rivals. In the forecasted 2030 world society accepts the devastating effects of man-made climate change and considers action on climate change as a necessity. To create shared value, Building Inc. considers sustainability as a strategic differentiator and an effective way to increase profits, as it will create added value and enhance the key reputational aspects of Building Inc. In this value proposition, sustainability initiatives will be integrated within all key business activities throughout the construction life cycle. The focus is on becoming a sustainability leader and having a net positive impact on the environment. Therefore, Building Inc. will become an attractive party to collaborate with.

To meet future building standards most of the houses build will be standardized and consists of prefabricated components produced in newly built factories in central locations in the Netherlands to reduce pollution caused by transportation of goods. The use of advanced modeling technologies, such as BIM, enables prefabrication to become scalable and sustainable, as houses will be modelled in advance. Moreover, technologies such as BIM have the potential to integrate engineering, pricing, manufacturing and information about embedded energy of materials in the modelling process, the result is an optimal use of raw materials and reduction of waste. This will lead to maximum efficiency in every phase of construction, which is necessary to profitably deliver the customer value proposition to create premium quality through the creation of shared value. By producing in a controlled offsite environment, waste can be recycled in-house, which is a significant improvement over sending waste directly to a landfill from a traditional construction site. Due to the controlled (and possibly automated) production environment employees are safer and the quality of the products will be high. Production will become more predictable and thus allows for a more accurate prediction of construction completion times, because production will be less dependent on circumstances such as bad weather. However, it must be noted that to reach the full potential of these new technologies the employees in

the construction industry need a vastly different skillset from the one they currently possess. Therefore, Building Inc. should focus on retraining employees and attracting skilled IT personnel. At the same time, Building Inc. should complement their digital capabilities by diversifying horizontally through alliance models or even mergers with new technology entrants. Moreover, these collaborations ensure that Building Inc. will have access to the latest new technologies such as building information modeling

Furthermore, Residents are exercising and demanding a stronger influence on the design process and are playing a role in value creation. In this new world they become co-producers of the housing product. While currently the focus is often on cost reduction and value creation simultaneously, in this new business model they are separated. The focus is on mass customization. Advanced manufacturing and mass-customization ensure that even though modules are standardized, they still meet customers' specific requirements. Therefore, Building Inc. aims at producing flexible projects/products while at the same time the achievement of economies of scale by standardization across projects/products is enabled. In practice, this means a standardized shell of a house which can expand with many different modules. Even though these modules are standardized, they still meet the customer's specific requirements and gives customers the feeling that their house is unique. Therefore, costs are lowered by reducing complexity of the building process, while at the same time customization of projects/products is delivered.

A focus on the actual performance of objects and their surroundings have led to a shift of focus from Building Inc. The focus is on design, build, finance maintain and operate for serial housing production. In which the main contractor also provides guarantees for management and maintenance of the delivered objects. This shift provides Building Inc. with a long-term incentive for performance of the objects, since this is a way to create added value. At the same time, this shift in focus will stimulate innovativeness and sustainability of these objects, as it is the responsibility of Building Inc. and their partners. Through in-house skilled IT employees and alliances with parties which are specialized in data analytics, the performance of objects can be easily measured and proactive actions can be taken if necessary. Therefore, added value is created for Building Inc. as well as for the customers and society.

#### 4.7.2 Key resources

For Building Inc. to profitably deliver the value proposition: premium quality through the creation of shared value, employees are the most valuable assets. There is a large talent gap in the construction industry. Especially for skilled IT employees, who will become important in this forecasted world. Therefore, Building Inc. should prioritize re-training current employees and aim to attract skilled IT employees as the core components in their business model. This talent shortage is mainly caused by factors such as a failure to innovate, image difficulties as well as conservative working cultures. However, by creating shared value, alliances with technology companies in combination with good rewards, both tangible as intangible, Building Inc. will potentially become an attractive employer. To make the industry jobs more attractive, Building Inc., should adopt innovative technologies at scale, create modern workplaces, attractive career paths and create an environment for development and learning.

The aim is mass customization, which is necessary to profitably deliver the value proposition. Therefore, standardization is a key resource. At the same time, massive investments are required to achieve DBFMO and to keep up with the newest technologies. Therefore, to survive in this forecasted world, scale is a key resource. Moreover, in any of the given scenarios Building Inc. should adopt advanced technologies at scale, these technologies will also be a key resource in the new business model.

To reach premium quality through the creation of shared value, prefabrication must be common for Building Inc. Prefabrication can lead to shorter project cycles, safety and better working conditions for employees and better quality, as there is more control over the quality of materials being prefabricated. At the same time, these controlled working environments will significantly reduce waste and emissions during the production phase and therefore shared value is created. Alliances with



partners will be crucial to survive, the hard/software technology market is huge and a lot of data can be extracted from houses. Therefore, in the forecasted scenario it was concluded that it is inevitable that tech companies will enter the construction industry. The entire construction process has become transparent and collaboration is made easy with the use of BIM. So, there is not much room for distinctive capabilities. An alliance combines the best of two worlds: main contractors use the R&D capacity of technology companies with significant monetary resources, and main contractors do what they do best, built and renovate houses, with progressive new technologies and low risks. Therefore, alliances are considered a key resource in this business model.

#### 4.7.3 Key processes

Nowadays, billions of euros are wasted in the building process, because hundreds of parties are involved in the construction value chain. Therefore, a simplification of the construction value chain is a prerequisite to survive. Moreover, the core of this business model is the collaborations with technology suppliers through alliances or even mergers. Therefore, everything will be integrated on a central platform such as BIM as extensively discussed before. Everything must be built virtually in this forecasted world, therefore BIM as a virtual information building model will be used throughout the whole construction life cycle. However, there is also a need for greater transparency and security. Blockchain is already proving that it can fulfill this role. With blockchain every single transaction is shared on a peer-to-peer network, therefore, these transactions are unalterable and permanent. So, once they are added to the chain it cannot be altered. Thus, blockchain makes information publicly verifiable and is therefore a core process for collaboration in the construction value chain. Together these core processes will lead to a highly transparent fraud-less transparent market. The business management systems will still be used and will enhance quality as all the processes from initiative phase to completion phase are described. In this new business model, Building Inc. wants to achieve mass customization and provide the customers with thousands of extra options on a standardized shell. Therefore, one of the key processes from Building Inc. should be an online configurator for houses. Such an online configurator creates added value for customers as they can completely personalize their home, therefore each house will be unique leading to satisfied customers. As aforementioned, alliances/collaborations are central in this new business model. Therefore, inter-organizational knowledge transfer is a key process, that will significantly improve knowledge and innovative capabilities of Building Inc., by leveraging the skill and knowledge of others both across as within the firm.

#### 4.7.4 Profit formula

In the new world of 2030 the highly traditional cost-plus model is replaced by a performance based pricing model in which prices and earnings are linked to the actual performance of project/products delivered to society and customers. Profits are generated by selling and renovating houses. The focus in this value proposition is on standardization and simultaneously on mass customization, meaning that the products are more standardized and mostly produced in factories to reduce environmental impact and construction costs. At the same time, applied IT tools such as automated business processes, online housing configurators and product design allowed for mass customization where the end-users can choose from various product variants and choose the house that matches their unique needs for a low price (cost minimization). Thus, the focus is on efficiency and cost minimization, while profit margins remained relatively low for renovation and the sales of houses. Therefore, the main contractor should generate other revenues. Alliances with technology parties made a shift possible from build (B) to design, build, finance, maintain and operate (DBFMO). These collaborations combine the capabilities of a proven main contractor for serial housing construction with the large investment potential and technologies of a major technology party. Therefore, revenues are not only generated with short-term construction, but also with short, medium and long-term investments returns and medium and long-term maintenance revenues and profits. Because of these long-term contracts there is a predictable cash flow for a long period, this will reduce the cyclical sensitivity of main contractors.



Because of the necessary major investments and capabilities, large contractors will dominate the market. These long-term obligations contribute to the value proposition, since these obligations provide the companies with incentives to create shared value and premium quality, as delivering premium sustainable quality will save cost for the long term and it is based on 'no service, no fee'.

Additional services and thus revenues will be generated with the 'ready to live' delivery of homes. This 'ready to live' delivery of homes is expected to grow significantly. The newest technologies will take customers more than now on a digital customer journey, a customer can order a standardized house and extend it with thousands of extra buyers' option. Transparent collaboration platforms such as building information modeling and blockchain will enable the main contractor to establish partnerships with all kind of suppliers such as kitchen suppliers, tile suppliers and a plumbing company.

In this 2030 world the costs are divided differently than in the current business model. The costs compared to the costs in the current business model should be reduced as massive investments have been made, and technology parties have taken a significant share of the construction value chain. These technology parties will generate a lot of revenues from the data they extract from houses. The cost of new sustainable materials is high in this future 2030 world. However, sustainability is a main differentiator in the new business model and will also be valued properly. A big cost account in the current business model are failure costs. However, with new technologies, standardization, the use of data and prefabrication the whole building process became very predictable, projects delay and cost overruns are reduced and complexity is managed. Therefore, the failure costs and overhead costs are reduced. At the same time, the on-site work force is reduced and therefore also the on-site costs. However, the cost of employees is still a big cost account stimulated by the huge demand for qualified tech/it workers in any of the future scenarios, this is very costly because of the intensive competition. At the same time, many of the current off-site employees should be re-trained, as a different skill set is required than nowadays which is also a costly process. In the current business model, the largest cost account are the sub-contractors. In this highly fragmented value chain thousands of individual suppliers/sub-contractors are involved; each value chain interface could be a possible disruption in performance delivery. A fundamental prerequisite for delivering sustainability and performance across the whole construction value chain is a radical simplification of it. Fewer partners and suppliers are necessary and long-term partnerships and price agreements are made. Thus, the costs are reduced because of simplification, while companies in the construction value chain should get used to earning based on performance instead of costs.

#### 4.8 Implications of the other scenarios

As aforementioned, the construction industry could look radically different in the future. The current business model of a main contractor in the Dutch housing market will not be sufficient in any of these four scenarios.

First, a simplification of the construction value chain is necessary in all scenarios. Moreover, the prevailing cost-plus pricing model will not be sufficient in any of the scenarios. A huge cultural change in the whole industry is necessary, pricing services based on performance and value instead of costs.

First, the champions scenario, this scenario indicates that the main contractor will dominate the future construction industry. This future world will be characterized by digital technologies, meaning that almost all manual work will become redundant. The few people involved in the construction value chain will be highly skilled IT experts. However, for the main contractor there is a large risk, since they could cannibalize their own business, because the work they used to perform will disappear. Everything will be digital and connected in this world, large amounts of data will be needed and gathered over which the main contractor has ownership. Therefore, these large amounts of data could become the major source of revenues for main contractors. As aforementioned, the current business model of main contractors will not be sufficient to create and capture value in this world; therefore, this business model is replaced by a data-driven business model. For example, data could be monetized by selling it in data marketplaces or the data could be analyzed to offer advanced services. As everything will be equipped with sensors and automatically processed into a data system

and the economy will probably be circular the main contractor could also generate revenues by establishing an online platform in which used building materials could be bought or borrowed by other parties that want to build.

Second, the digital scenario, in this future world the main contractor adopted advanced technologies at scale and became the digital leader of the construction value chain. However, massive investments had to be made while the profit margins slightly increased, but remained relatively low in this future world. Therefore, a constant production is necessary to earn a decent return of investment. The focus of the main contractor in this forecasted world will be on the elimination of waste and on producing as much, as fast, predictable and as cost-effective as possible to reach satisfying returns of the massive investments made. Therefore, a lean-driven business model would be proposed for this 2030 world. In this business model the aim is still on the best quality for the best price. But, factories will be running the world, the construction time will be shortened, cheaper, more sustainable and more flexible. However, the lean-driven business model would require substantial changes. The focus will not be on the lowest costs, but on the elimination of waste, predictability and optimized outcomes. Therefore, revenues will be generated on basis of performance/value.

Lastly, crash, in this future world the main contractor has lost ground to other parties in the construction value chain. Therefore, the focus in this world is purely on survival. A starting point would be to approach the business model concept as flexible. The main contractor must innovate their current business model, and try to regain some of its power by specializing very narrowly in one segment. For example, on the renovations markets which is a huge future market in The Netherlands, since the Dutch government's goal of no longer emitting CO<sub>2</sub> in 2050. To survive, the main contractor must accept that they are dependent on other parties for new sustainable materials and technologies. Therefore, the main contractor should adopt a collaborative business model that is fully designed to cooperate with other more powerful (technology) parties in the construction value chain.

## 5. Discussion

The focus in this research was on a large main contractor active in serial housing construction industry. The expectation is that several disruptive forces will have a big impact on the current business models and existing structures. Therefore, this research tries to answer the general research question: *"How can a large construction company in the Dutch housing market design a new business model to create and capture value in 2030 by using scenario planning?"*

The results of this study confirm that the construction industry is on the edge of radical change, caused by several exogenous forces. This is in accordance with the literature, which states that the construction industry is on the edge of radical disruptive changes, caused by several exogenous changes (ING, 2016; McKinsey, 2015; Rutten, 2013). However, there is insufficient knowledge on the future business environment of the construction industry. Therefore, this research has proposed a method to deal with these radical disruptive changes and uncertainties. The results of this study have shown that by using this method a company in the construction industry can design a new business model to create and capture value in 2030 by using scenario planning. The proposed framework consists of a standardized, tool based approach to scenario planning. The results indicated that there are four plausible future industry states based on a solid analysis. However, a limitation is the limited generalizability of these results. First, the method was used in the construction industry, future research should investigate if the method works for other industries. Secondly, the goal was to include external industry experts in the sample, however, the appointments made were delayed and therefore the external expert interviews were excluded from this research. Therefore, future research should investigate the results of this study based on a large sample and by involving external industry experts. However, the variety of functions from the industry experts and the focus of this thesis on in-depth analysis of information rich cases rather than generalizability within the construction industry made this sample reliable for this study. Moreover, as found in this study, competitors in the construction industry have many similarities, for example, they are all using a traditional cost-plus pricing model and face the same exogenous forces. Therefore, the results of this study could be used by other

companies in the construction industry, because the expectation is that if the proposed framework is used by other companies in the construction industry, the results will have many similarities. This should be verified by future research.

The first and second sub-question of the case study were concerned with the future trends and developments in the construction industry and resulted in the development of four scenarios. During this research it was surprisingly found that globalization and stronger economic & financial integration of the European union are secondary elements, which have a relatively low impact on the company. Which is surprising, as these factors could open new markets and boost innovation, contributing to the company's goals. A possible explanation could be that the rules and regulations concerning construction differ significantly across countries. A different explanation concerning the mentioned findings above could be the traditional focus of the respondents on the Dutch housing market. Therefore, it could be that they do not consider opportunities across borders. Another surprising finding is that robotization is expected to have a relatively low impact on the business model of Building Inc. This result contradicts reports from McKinsey (2015) and ING (2016), as they consider robotization as a 'hot item' given the rising prices and shortage of labor. As mentioned before, it could be because experts expect that prefabricates will have a high impact on Building Inc. Consequently, if most products will be prefabricated there is less labor required for on-site production and therefore robotization will have a lower potential impact on Building Inc. Moreover, it could also be that robotization has a relatively low impact according to the respondents, because there is a certain amount of flexibility required by on-site production and robots are less flexible than human beings, at least for now.

Clustering the critical uncertainties was crucial for the quality of the scenarios. The clustering of the critical uncertainties 'price development of houses' and 'fluctuating prices of raw materials' resulted in the key uncertainty 'development of the cyclical sensitivity', based on their economic and cyclical nature. The other two identified critical uncertainties 'digitalization' and 'prefabricates' were both identified as technological factors by the interviewees and resulted in the key uncertainty 'the development of the technological environment'. However, this was done based on identified common impacts and elements as perceived by the researcher, which could potentially be biased. However, after consulting several industry experts from Building Inc. for their opinion, the matching was supported. It must be noted, that the points mentioned above could have had some influence on the development of the scenarios into full consistent stories. Moreover, it cannot be ruled out that these points had an influence on the scenario choice. However, the distribution of the driving factors into secondary elements, critical uncertainties and trends was supported by reliable quantitative data and by expert perceptions. Moreover, the scenario choice was supported with the results from the interviews.

The last sub question of the case study was concerned with the current business model of a large construction company. In accordance with literature, the results of this study confirm that the business model concept is a flexible and dynamic concept that describes: the rationale of how an organization creates, captures and delivers value. Moreover, the literature states that innovation of business models is regarded as necessary to survive and thrive in a business environment where the rules change quickly, which is found to be true for the construction industry. External discontinuities and disruption are often regarded as major drivers of business model innovation (Voelpel et al., 2004; Teece, 2010; Schneider, 2017). Therefore, companies face the challenge to develop an innovated business model, which transforms opportunities into sources of economic value creation (Bohnsack et al., 2014). The results of this research also indicate that the business model concept should be considered as a strategic differentiator, as proposed by Zott et al. (2011). However, this does not match the current approach to the business model concept of firms in the construction industry, as the business model concept is not considered as a flexible, dynamic concept and as a strategic differentiator. These results were in accordance with a study performed by Holti et al. (2001), who found that the business models of main contractors are too similar to enable value based competition and that main contractors compete on their overhead costs instead of their unique core processes. Therefore, the findings suggest that the current static view on the business model concept does not

meet the requirements of the current highly turbulent and dynamic business landscape. Especially, when considering the results of the interviews concerning the future industry structure, during which most interviewees mentioned they expect new entrants diversifying from other sectors who could possibly take over a large market share with innovative business models. An explanation for the current static view on business models could be that the whole construction industry is characterized by competition based on minimized costs. Changing this would be a huge cultural change for an industry that is accustomed to being compensated on a cost-plus basis, especially since the construction value chain is highly fragmented with hundreds of parties involved.

Lastly, a new business model was developed based on the scenario which was judged as most likely to come true. However, as discussed before, choices made earlier in research could have influenced the scenario's and the decision which scenario is most likely to occur. Therefore, this paper also incorporates a short discussion about what kind of changes the other scenarios would require. Moreover, it is of importance to consider the subjectivity of the used scenario planning method. However, the specific research directions and the scenarios are supported with results from the interviews and the quantitative analysis. Although, the author is aware that other possible futures might exist. Future research should investigate value creation and capturing in 2030 based on the other proposed scenarios. Another avenue for future research concern the proposed new business model from this study. According to Teece (2010) business model innovation requires a process of experimentation, insight and evolutionary learning. Therefore, future research could verify the results of this study by the implementation of the proposed business model.

Lastly, this research has some methodological limitations which are relevant to bear in mind when reading this research. A point limiting the generalizability was that the questionnaire was sent to 625 employees of Building Inc. of which 71 responded. No specific selection regarding functions was made, which means not everyone included in the sample was an industry expert. Even though, a comparison of answers given by industry experts and other employees did not result in notable differences, solely focusing on industry experts might garner different results. Additionally, some respondents indicated that they struggled with rating the uncertainty value of certain factors. Although the Cronbach Alpha for impact and uncertainty indicated an acceptable reliability and internal consistency, it cannot be guaranteed that the respondents' rating difficulties did not have an impact on the findings. Another important point to mention is the role of the dissection of the Impact/Uncertainty grid. The role of the adopted axis scales could be relatively large in determining the relevance of some factors in the further scenario process, as some factors ended up close to the dissection borders. Even though, the distribution of the factors into secondary elements, trends and critical uncertainties was supported by reliable data, the company supervisor and the authors common sense, it cannot be guaranteed that the results are not influenced by these choices.

## 6. Conclusion

The final chapter summarizes the main findings of this study. Furthermore, the theoretical and practical contributions are discussed. Lastly, recommendations to Building Inc. are presented.

### 6.1 Main findings

Several large industries have been disrupted and revolutionized by several disruptive forces, which have fundamentally changed how value is created and captured. Even though, it was found that the construction industry hasn't changed that much over the years. However, the expectation is that disruptive forces will have a big impact on business models and existing structures in the construction industry. But, it is still unknown what forces will have a big impact in the construction industry. Therefore, the main research question was: *"How can a large construction company in the Dutch housing market design a new business model to create and capture value in 2030 by using scenario planning"*? The results of this study indicate that the proposed method works for a company in the construction industry. According to literature and industry experts a new era for the construction is approaching. The results of this study indicated that the construction industry structure is a highly

fragmented, project oriented, competitive industry with high risk and low profit margins. Moreover, the power of buyers and suppliers is hindering the profitability and their power is expected to rise in the future, as it is expected that new entrants diversifying from other sectors will enter the construction industry.

It was found that the current business models of companies in the construction industry are very similar, which means the business model is not used for securing and expanding competitive advantage. All companies in the construction industry use a highly traditional cost-plus pricing model. However, various trends and developments will potentially disrupt how value is created and captured. Referring to the results of the interviews, none of the interviewees believed in survival of large main contractors if they do not adapt adequately to this new era for construction. This was confirmed by the constructed scenarios, which illustrated that the current business models of main contractors in construction will not be sufficient to create and capture value in the future. All scenarios are likely to influence all interlocking elements of the current business model; a transformational change is necessary.

The results of this study indicate that the most likely scenario that main constructors should adjust for is the 'survival of the fittest', a scenario in which massive investments must be made to realize the full potential of new technologies and to meet new sustainability requirements, therefore, only big scale companies for serial housing construction will survive. It was found that a simplification of the construction value chain is an important prerequisite for delivering value, sustainability and performance at the same time. To adjust for this, the business model of these companies should focus on alliances with other parties, probably technology parties, as it was found that the main contractor is probably not able to realize the full potential new technologies alone. In this new business model, the main contractor should focus on value creation and capturing by focusing on performance/value as opposed to the current focus on minimized costs. Moreover, to survive in this highly competitive world of 2030 the business model should be approached as a strategic differentiator with a unique value proposition. Therefore, the value proposition in this future world should be 'premium quality through the creation of shared value instead of the current value proposition 'premium quality for the best price. Concluding, main contractors in the construction value chain need to prepare strategically to thrive in the face of anticipated disruption in the future.

## 6.2 Theoretical & practical contribution

First, this research puts forward a framework to design a new business model to create and capture value in the highly volatile and complex construction environment by integrating a variety of theoretical concepts into an analytical lens. Moreover, the framework contributes to the growing research stream in strategic entrepreneurship that considers the business model concept as a dynamic and flexible concept and that it can be used as a strategic response to meet the requirements of the current turbulent and highly volatile business landscape (e.g. Schneider, 2017; Voelpel et al., 2004; Zott et al., 2011). Furthermore, Pateli & Giaglis (2005) described in their article that the literature that combines business models and scenario planning is very scarce, in their conclusion they suggest to further elaborate the literature with studies that combine business models and scenario planning. This study answered to this request by providing the first study in the field of building and construction that combines business models and scenario planning. Lastly, this thesis adds the growing stream of literature that business models are associated with expanding and securing competitive advantage, since the main purpose of a business model is to differentiate a company from others and therefore give it an advantage to its competitors.

From a practical perspective, the future of the construction industry is of great interest of a variety of stakeholders. These include, main contractors, sub-contractors but also technology companies. External changes in the business environment could disrupt organization's usual functioning abruptly (Demil & Lecocq, 2010). By using the scenario planning method, a wide range of possible futures is detected. By identifying key driving forces and by projecting their potential impact and uncertainty on the business environment, the uncertainty of various trends and developments in the changing construction industry is reduced. Moreover, the developed scenarios support

stakeholders to aid in decision making in the face of uncertainty, while for others it might clarify alternatives. The constructed scenarios stimulate strategic conversation that enable decision-makers to develop new business models and strategic plans that will help their company to effectively prepare for success in the future. Therefore, Building Inc. will be much better positioned to take advantage of possible unexpected opportunities that will come along. Moreover, this research has shown that the proposed method to design a new business model works for companies in the construction industry. The four scenarios represent four distinct plausible construction industry states based on a solid research. Therefore, these scenarios can help other companies in the construction industry to gauge the potential effects of the predicted changes on their business models and strategies and determine how to deal with these future industry states. Because, the current business models of main contractors in the Dutch housing market are quite similar and these companies must deal with the same driving forces that could fuel change. Furthermore, the business model is in the construction industry not seen as a concept that provides firms within the construction with opportunities to gain a competitive advantage. However, the results of this thesis indicate that a business model can be an important differentiator in the future business environment.

### 6.3 Recommendations to Building Inc.

- Replace the highly traditional cost-plus business model by a performance/value based business model.
- Use the developed scenarios to gauge the potential effects of each of the distinct future industry states.
- Adopt advanced technologies at scale.
- Approach the business model as a strategic differentiator and develop a unique value proposition.
- Focus on standardization and mass customization for cost efficiency and sustainability.
- Focus on sustainability throughout the whole construction life cycle.
- From build (B) to design, build, finance, maintain, operate (DBFMO).
- Integrate and collaborate across the construction industry's value chain.
- Diversify horizontally with technology companies through alliances or even mergers and acquisitions.
- Develop a coordinated and cohesive working plan to become a preferred employer for highly educated IT/tech talent and retrain the current workforce as this future 2030 world requires a radically different skillset than the one the current workforce possesses.



## References

- ABN. (2018). *Harde groei bouwsector niet zonder risico's*. Retrieved from <https://insights.abnamro.nl/2018/01/harde-groei-bouwsector-niet-zonder-risicos/>
- Abuzeinab, A., & Arif, M. (2014). *Emergence of the business models in the building and construction literature*.
- Achmea. (2016). *Bouw & Vastgoed samen bouwen aan fundament voor de toekomst*. Retrieved from <https://www.achmea.nl/SiteCollectionDocuments/Bouw-Vastgoed.pdf>
- Afuah, A., & Tucci, C. L. (2001). *Internet business models and strategies* (p. 358). New York: McGraw-Hill.
- Aho, I. (2013). *Value-added business models: linking professionalism and delivery of sustainability*. Building Research & Information, 41(1), 110-114.
- Alvarez, S. A., & Barney, J. B. (2007). *Discovery and creation: Alternative theories of entrepreneurial action*. Strategic entrepreneurship journal, 1(1-2), 11-26.
- Anderson, C. (2010). *Presenting and evaluating qualitative research*. American journal of pharmaceutical education, 74(8), 141.
- Andreini, D., & Bettinelli, C. (2017). *Business Model Innovation: From Systematic Literature Review to Future Research Directions*. Springer International.
- Andrews, K. R. (1971). *The concept of corporate strategy*. New York.
- Amit, R., & Zott, C. (2001). *Value creation in e-business*. Strategic management journal, 22(6-7), 493-520.
- Bazeley, P., & Jackson, K. (Eds.). (2013). *Qualitative data analysis with NVivo*. Sage Publications Limited.
- Baden-Fuller, C., & Haefliger, S. (2013). *Business models and technological innovation*. Long range planning, 46(6), 419-426.
- Belzen, T. (2018). *Bouwdirecteuren over 2018: superjaar met flinterdunne marges*. Retrieved from: <https://www.cobouw.nl/woningbouw/nieuws/2018/01/topmannen-2018-wordt-raar-jaar-en-superjaar-101256907>
- Bohnsack, R., Pinkse, J., & Kolk, A. (2014). *Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles*. Research Policy, 43(2), 284-300.
- Bradfield, R. M. (2008). *Cognitive barriers in the scenario development process*. Advances in Developing Human Resources, 10(2), 198-215.
- Britten, N., Jones, R., Murphy, E., & Stacy, R. (1995). *Qualitative research methods in general practice and primary care*. Family practice, 12(1), 104-114.
- Casadesus-Masanell, R., & Ricart, J. E. (2010). *From strategy to business models and onto tactics*. Long range planning, 43(2), 195-215.



- Cavalcante, S., Kesting, P., & Ulhøi, J. (2011). *Business model dynamics and innovation:(re) establishing the missing linkages*. *Management Decision*, 49(8), 1327-1342.
- Chesbrough, H., & Rosenbloom, R. S. (2002). *The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies*. *Industrial and corporate change*, 11(3), 529-555.
- Demil, B., & Lecocq, X. (2010). *Business model evolution: in search of dynamic consistency*. *Long range planning*, 43(2), 227-246.
- Doz, Y. L., & Kosonen, M. (2010). *Embedding strategic agility: A leadership agenda for accelerating business model renewal*. *Long range planning*, 43(2), 370-382.
- Duinker, P. N., & Greig, L. A. (2007). *Scenario analysis in environmental impact assessment: Improving explorations of the future*. *Environmental impact assessment review*, 27(3), 206-219.
- Foss, N.J. and Saebi, T. (2017). *Fifteen years of research on business model innovation: how far have we come, and where should we go?* *Journal of Management*, 43, 200– 227.
- Harrell, M. C., & Bradley, M. A. (2009). *Data collection methods. Semi-structured interviews and focus groups*. Rand National Defense Research Inst Santa Monica ca.
- ING Economisch Bureau. (2016). *Technologie in de bouw. Mass customization wordt mogelijk*. Retrieved from [https://www.ing.nl/media/ING-Technologie\\_in\\_de\\_bouw-Februari\\_2016\\_tcm162-98766.pdf](https://www.ing.nl/media/ING-Technologie_in_de_bouw-Februari_2016_tcm162-98766.pdf)
- Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008). *Reinventing your business model*. *Harvard business review*, 86(12), 57-68.
- Kaplan, S. (2012). *The Business Model Innovation Factory: How to Stay Relevant when the World is Changing*, Wiley. com.
- Kaplan, R. S., & Norton, D. P. (1995). *Putting the balanced scorecard to work*. *Performance measurement, management, and appraisal sourcebook*, 66(17511), 68.
- Lucas, H. C., & Goh, J. M. (2009). *Disruptive technology: How Kodak missed the digital photography revolution*. *The Journal of Strategic Information Systems*, 18(1), 46-55.
- Magretta, J. (2002). *Why business models matter*.
- Massa, L., & Tucci, C. L. (2013). *Business model innovation*. *The Oxford handbook of innovation management*, 20, 18.
- McDonald, M., & Meldrum, M. (2013). *The complete marketer: 60 essential concepts for marketing excellence*. Kogan Page Publishers.
- McGrath, R. G. (2010). *Business models: A discovery driven approach*. *Long range planning*, 43(2-3), 247-261.
- Mckinsey & Company. (2015). *Industry 4.0: How to navigate digitization of the manufacturing sector*. Retrieved from <https://www.mckinsey.com/business-functions/operations/our-insights/industry-four-point-o-how-to-navigae-the-digitization-of-the-manufacturing-sector>

Mokhlesian, S., & Holmén, M. (2012). *Business model changes and green construction processes*. Construction Management and Economics, 30(9), 761-775.

Morris, M., Schindehutte, M., & Allen, J. (2005). *The entrepreneur's business model: toward a unified perspective*. Journal of business research, 58(6), 726-735.

Nicolini, D., Holti, R., & Smalley, M. (2001). Integrating project activities: the theory and practice of managing the supply chain through clusters. *Construction Management and Economics*, 19(1), 37-47.

Nordic Innovation. (2012), *Green Business Model Innovation: Conceptualisation next practice and policy*, Nordic Innovation.

Osterwalder, A. (2004). *The business model ontology: A proposition in a design science approach*.

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.

Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). *Clarifying business models: Origins, present, and future of the concept*. Communications of the association for Information Systems, 16(1), 1.

Pateli, A. G., & Giaglis, G. M. (2005). *Technology innovation-induced business model change: a contingency approach*. Journal of Organizational Change Management, 18(2), 167-183.

Pekuri, A., Pekuri, L., & Haapasalo, H. (2013). The role of business models in Finnish construction companies. *Construction Economics and Building*, 13(3), 13-23.

Peterson, G. D., Cumming, G. S., & Carpenter, S. R. (2003). *Scenario planning: a tool for conservation in an uncertain world*. Conservation biology, 17(2), 358-366.

Phadnis, S., Caplice, C., Sheffi, Y., & Singh, M. (2015). *Effect of scenario planning on field experts' judgment of long-range investment decisions*. Strategic Management Journal, 36(9), 1401-1411.

Porter, M. E., & Porter, M. E. (1979). *How competitive forces shape strategy*.

Porter, M. E. (1998). *Clusters and the new economics of competition* (Vol. 76, No. 6, pp. 77-90). Boston: Harvard Business Review.

Porter, M. E. (2008). *The five competitive forces that shape strategy*. Harvard business review, 86(1), 25-40.

PWC. (2016). *Industry 4.0: Building the digital enterprise*. Retrieved from <https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf>

Rappa, M. (2002). *Managing the digital enterprise-business models on the web*. North Carolina State University.

Rayna, T., & Striukova, L. (2016). *From rapid prototyping to home fabrication: How 3D printing is changing business model innovation*. Technological Forecasting and Social Change, 102, 214-224.

Roland Berger. (2016). *Digitization in the construction industry. Building Europe's road to "construction 4.0"*. Retrieved from <https://www.rolandberger.com/en/press/Digitization-in-the-construction-sector.html>

Royal BAM Group NV (2018, 01, 01). Integrated Report 2017. Retrieved March 18, 2018, from <https://www.bam.com/sites/default/files/domain-606/documents/bam-integrated-report-2017-606-152033951377226714.pdf>

Rutten, M. (2013). *Van "kan nie" naar Passie. Succesvol vernieuwen in de bouw-, installatie- en vastgoedsector.* Retrieved from [https://issuu.com/marjetrutten/docs/boek\\_vankannienaarpassie\\_lrdef](https://issuu.com/marjetrutten/docs/boek_vankannienaarpassie_lrdef)

RVO. (2017). *TFC-constructie: Design Build Finance Maintain and Operate (DBFMO)*. Retrieved from <https://www.rvo.nl/onderwerpen/innovatief-ondernemen/innovatiefinanciering/toolbox-financieringsconstructies/zoek-op-constructies/leningen/financieringen/dbfmo>

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed.). Essex: Prentice Hall.

Schneider, S. (2017). *How to approach business model innovation: the role of opportunities in times of (no) exogenous change.* R&D Management.

Schoemaker, P. J. (1995). *Scenario planning: a tool for strategic thinking.* Sloan management review, 36(2), 25.

Shane, S. A. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus.* Edward Elgar Publishing.

Schwartz, P. (1991). *The Art of the Long View: Scenario Planning Protecting your Company Against an Uncertain Future.* Century Business: London, UK.

Schwartz, P. (1996). *The art of the long view: paths to strategic insight for yourself and your company.* Crown Business.

Teece, D.J. (2010). *Business models, business strategy and innovation.* Long Range Planning, 43, 172–194

Ton, Y. (2018). *Bouw moet met de tijd mee; als je afwacht ga je Kodak achterna.* Retrieved from <https://www.cobouw.nl/bouwbreed/nieuws/2018/01/bouw-moet-met-tijd-mee-als-je-afwacht-ga-je-kodak-achterna-101256390#.Wk59TVwccng.mailto>

United Nations. (2015). *Unido focusing on sustainable development goals.* Retrieved from <https://www.unido.org/who-we-are/unido-focusing-sustainable-development-goals>

Van der Heijden, K. (2011). *Scenarios: the art of strategic conversation.* John Wiley & Sons.

Vecchiato, R., & Roveda, C. (2010). *Strategic foresight in corporate organizations: Handling the effect and response uncertainty of technology and social drivers of change.* Technological Forecasting and Social Change, 77(9), 1527-1539.

Voelpel, S. C., Leibold, M., & Tekie, E. B. (2004). *The wheel of business model reinvention: how to reshape your business model to leapfrog competitors.* Journal of change management, 4(3), 259-276.

Vrijhoef, R., & Koskela, L. (2000). The four roles of supply chain management in construction. *European journal of purchasing & supply management*, 6(3-4), 169-178.

Wack, P. (1985). *Scenarios: shooting the rapids. How medium-term analysis illuminated the power of scenarios for shell management* (No. REP-9208. CIMMYT.).

Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). *Business models: Origin, development and future research perspectives*. *Long Range Planning*, 49(1), 36-54.

World Economic Forum. (2018). *Shaping the future of construction: an action plan to solve the industry's talent gap*. Retrieved from [http://www3.weforum.org/docs/WEF\\_Action\\_plan\\_to\\_solve\\_the\\_industrys\\_talent\\_gap.pdf](http://www3.weforum.org/docs/WEF_Action_plan_to_solve_the_industrys_talent_gap.pdf)

Worthington, I., & Britton, C. (2009). *The business environment*. Pearson Education.

Wulf, T., Meissner, P., & Stubner, S. (2010). *A scenario-based approach to strategic planning—integrating planning and process perspective of strategy*. Leipzig Graduate School of Management.

Zervas, G., Proserpio, D., & Byers, J. W. (2014). *The rise of the sharing economy: Estimating the impact of Airbnb on the hotel industry*. *Journal of Marketing Research*.

Zott, C., Amit, R., & Massa, L. (2011). *The business model: recent developments and future research*. *Journal of management*, 37(4), 1019-1042.

---

### Scenario Planning

---

#### Vragenlijst (1ste van de 2) – Factoren (trends en ontwikkelingen) van invloed

Graag wil ik mij even voorstellen. Mijn naam is Rick Kamers, ik ben 24 jaar en ik ben bezig met de opleiding Business Administration aan de universiteit van Twente. Ik zit in het laatste jaar van mijn opleiding en ben bezig met afstuderen bij BAM Wonen voor de richting; ondernemerschap, innovatie & strategie.

De hoofdvraag van mijn onderzoek is; "Hoe kan een groot bouwbedrijf actief op de Nederlandse woningmarkt waarde creëren in 2030". Er zijn verschillende factoren waardoor de manier van waarde creëren in de bouwsector kan veranderen. Ik wil de toekomst van de bouwsector verkennen door verschillende scenario's te schrijven. Deze scenario's wil ik opbouwen door eerst alle externe factoren die mogelijk van invloed zijn te herkennen door middel van gesprekken met experts in de sector, zowel intern als extern. Nadat ik alle factoren in kaart heb gebracht wil ik de factoren die dicht bij elkaar liggen clusteren. Vervolgens stuur ik online een enquête waarin ik deelnemers vraag om op een schaal van 1 tot 10 de potentiële impact en de mate van onzekerheid van de verschillende factoren te beoordelen. De uitkomsten zullen de basis vormen voor de opbouw van 4 scenario's. Deze scenario's worden gebruikt om de toekomst te verkennen en aanbevelingen te doen aan BAM Wonen over waarde creatie in 2030.

#### Het proces van de vragenlijst

Bedankt voor het deelnemen aan dit onderzoek. Deze interviews vormen de basis voor het ontwikkelen van scenario's voor de bouwsector van de toekomst. Jullie deelname bestaat uit 2 stappen.

1. Eerst zal ik persoonlijk bij jullie langs komen om een interview af te nemen. Het doel van dit interview is om externe factoren (Bijvoorbeeld; politiek, economisch, sociaal-demografisch) te herkennen die de toekomstige ontwikkeling van de bouwsector kunnen beïnvloeden in de komende 12 jaar.
2. Nadat de interviews achter de rug zijn ontvangt u van mij een korte online vragenlijst. In deze vragenlijst gebruik ik de uitkomsten van alle interviews met experts. Hierin staan geclusterde factoren die u en de andere participanten hebben benoemd. Ik vraag u in deze online vragenlijst of u de factoren kunt beoordelen op een schaal van 1 tot 10 met betrekking tot de potentiële impact die ze zullen hebben op de bouwsector en de mate van onzekerheid die de factor met zich meebrengt.

De uitkomsten worden geëvalueerd, op basis van deze uitkomsten kan ik de meest belangrijke trends en de grootste onzekerheden herkennen. Deze trends zullen de basis vormen voor de ontwikkeling van de 4 scenario's.

**Belangrijk: De antwoorden zijn vertrouwelijk en alleen beschikbaar voor mij. De data die gebruikt zal worden in het onderzoek zal compleet anoniem worden gepresenteerd.**

Indien gewenst, zal ik zowel de resultaten van de interviews als mijn complete onderzoek naar u opsturen.

#### Uitleg en voorbeelden van de verschillende groepen factoren

- 1) **POLITIEK-JURIDISCHE FACTOREN:** zijn ontwikkelingen, beslissingen met een politieke achtergrond

#### Een voorbeeld uit de auto industrie;

Jaren geleden besloot de Nederlandse overheid om zuinig en schoon rijden te stimuleren met belastingverlaging (d.m.v. lage bijtelling) dit leidde ertoe dat er in Nederland massaal plug-in hybrids en hybrid auto's werden aangeboden en verkocht. Achteraf bleek dat deze auto's helemaal niet zuiniger waren en werd de belastingverlaging weer teruggedraaid.

Subsidies voor schonere auto's
--------------------------------

Wat zijn volgens u de meest belangrijke POLITIEKE-JURIDISCHE veranderingen/ontwikkelingen die van invloed kunnen zijn op de bouwsector in de komende 12 jaar? En waarom?

Factoren van invloed;


2) **ECONOMISCHE FACTOREN:** Zijn factoren die resulteren van de algemene economische ontwikkeling, bijvoorbeeld de rente, inflatie, bruto binnenlands product

**Een voorbeeld uit de Restaurant-industrie:**

In tijden van laagconjunctuur als er in een land een hoge werkloosheid is en de koopkracht van mensen afneemt wint Fastfood terrein op duurdere gezondere maaltijden of restaurants.

Laagconjunctuur → Hogere werkloosheid → Minder koopkracht → Fastfood markt groeit sneller dan gezonde duurdere alternatieven
------------------------------------------------------------------------------------------------------------------------------------

Wat zijn volgens u de meest belangrijke ECONOMISCHE veranderingen/ontwikkelingen die van invloed kunnen zijn op de bouwsector in de komende 12 jaar? En waarom?

Factoren van invloed;



**3) SOCIAAL-DEMOGRAFISCHE FACTOREN;** bijvoorbeeld veranderende levensstijl trends, demografische verandering, veranderende klantbehoeften

**Een voorbeeld uit de voedingsindustrie;**

Veel fabrikanten van voedsel zijn massaal biologisch voedsel gaan maken, omdat er door een verschil in levensstijl en denkwijze vanuit de bevolking veel vraag is naar verantwoord biologisch voedsel.

Houding van de bevolking t.o.v. biologisch voedsel
----------------------------------------------------

**Wat zijn volgens u de meest belangrijke SOCIAAL-DEMOGRAFISCHE veranderingen/ontwikkelingen die van invloed kunnen zijn op de bouwsector in de komende 12 jaar? En waarom?**

**Factoren van invloed;**


**4) TECHNOLOGISCHE FACTOREN** Komen voort uit nieuwe technologische innovaties

**Voorbeeld uit de muziekindustrie:**

De traditionele manier van inkomsten werven d.m.v. CD's en LP's is compleet voorbij gestreefd door inkomsten die voortkomen via het internet, namelijk uit online streamingsdiensten. 46% van die inkomsten uit de muziekindustrie komt al via onlinestreamingsdiensten waar bedrijven zoals Spotify met nieuwe online platformen de markt hebben veroverd,



In de muziekindustrie zijn onlinestreamingsdiensten (platforms) nu de voornaamste bron van inkomsten, mogelijk gemaakt door de ontwikkeling van het internet en de komst van smartphones

**Wat zijn volgens u de meest belangrijke TECHNOLOGISCHE veranderingen/ontwikkelingen die van invloed kunnen zijn op de bouwsector in de komende 12 jaar? En waarom?**

**Factoren van invloed;**


**5) ECOLOGISCHE FACTOREN;** Factoren die te maken hebben met de omgeving, bijv. CO2-uitstoot

**Voorbeeld uit de hotel industrie:**

De wereld realiseert zich steeds meer dat het klimaat verandert, de CO2-uitstoot zal omlaag moeten. Men realiseert zich steeds meer dat de verschillende industrieën een grote bijdrage kunnen leveren aan minder CO2-uitstoot en de wetgeving wordt erop aangepast. Daardoor kan het zo zijn dat de olieprijs door extra belasting erg hoog wordt, waardoor het weinig duurzame vliegen extreem duur kan worden. Een gevolg voor de hotelindustrie kan zijn dat er minder toeristen komen waardoor er minder bezetting is in de hotels.

Door klimaatverandering → Hogere belasting met als gevolg hogere olieprijs → Lagere bezetting hotels

Wat zijn volgens u de meest belangrijke ECOLOGISCHE veranderingen/ontwikkelingen die van invloed kunnen zijn op de bouwsector in de komende 12 jaar? En waarom?

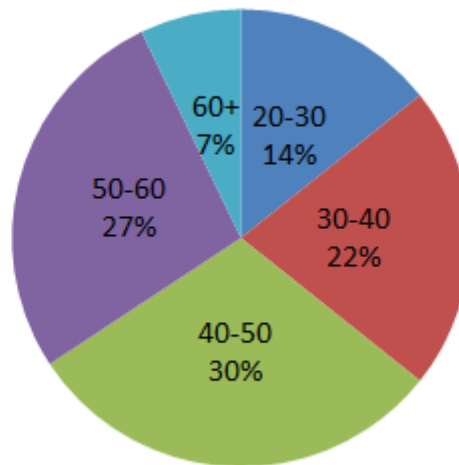
**Factoren van invloed;**


Indien u nog toevoegingen heeft, kunt u de ruimte hieronder gebruiken. Kunt u aangeven bij welke van de 6 groepen de additionele factor behoort?

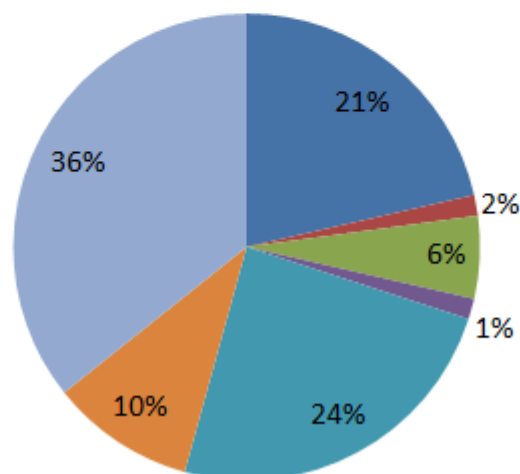
**Groep # Factoren van invloed**


Bedankt voor uw hulp. Indien u nog vragen of commentaar hebt, kunt u altijd contact opnemen. Ik zal u de resultaten en het complete onderzoek opsturen als het klaar is.

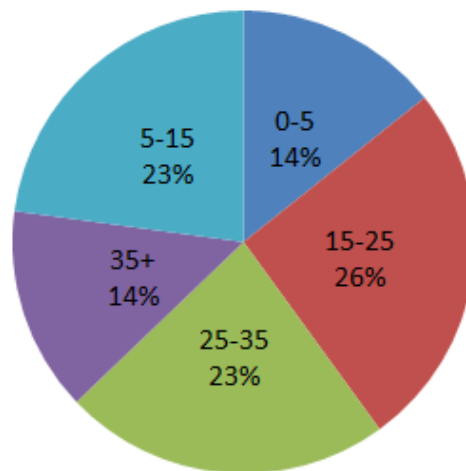
## Age in years



## Function



## Working experience in years



## Appendix III

<b>Political factors (trends and developments)</b>
<b>Stricter requirements regarding sustainability and environmental friendly constructions</b> <ul style="list-style-type: none"><li>• Circular economy in 2050</li><li>• New taxes on energy</li><li>• Taxation on polluting materials</li><li>• Climate agreement (Paris) of 200 countries to do something about CO2 emissions</li><li>• New legislations to reduce emissions during the production process, nowadays most laws are mainly for the user's phase</li><li>• New legislations for lifetime costs of a home instead of the one-off construction costs</li></ul>
<b>Withdrawing government, less bureaucracy.</b> <ul style="list-style-type: none"><li>• New environmental law. More freedom for market parties. Also for main contractors.</li><li>• Liability of the main contractor. Quality assurance of everything that will be built must be demonstrated that it meets requirements and that it has been built according to the rules.</li><li>• Price agreement of 200 countries to do something about CO2 emissions. Houses energy neutral.</li><li>• Changing policy regarding the sale of land positions. Nowadays, selection often based on the highest bid. Because of this, insufficient supply of affordable houses.</li><li>• Development of privacy legalization.</li><li>• Faster process for building requests.</li></ul>
<b>Stronger European Union. More economic &amp; financial integration of the European Union. Therefore, more European tenders and the European union will take more regulatory action.</b> <ul style="list-style-type: none"><li>• European regulations concerning quality marks/building decree.</li><li>• Political polarization. For example, the Brexit.</li></ul>
<b>Economic factors (trends and developments)</b>
<b>Fluctuating prices of (raw) materials and labor</b> <ul style="list-style-type: none"><li>• Trend in economic growth (high/low). Construction industry is very sensitive to cyclical up/down swings.</li><li>• Fluctuating material prices (cyclical sensitivity).</li><li>• Fluctuating raw material prices (cyclical sensitivity).</li><li>• Labor productivity.</li><li>• Prices of labor (cyclical sensitivity).</li></ul>
<b>Globalization</b> <ul style="list-style-type: none"><li>• Suppliers are increasingly dependent on global trends. Price fluctuations that affect the main contractor are more dependent of events happening globally. Therefore, more dependent on global superpowers such as China, Russia and the US.</li><li>• Monetary union (Eurozone) → European interest rates (CEB), everything more equal. More trade flows across borders. So, a larger market → stimulate innovation.</li><li>• European collaboration. Uniform agreements about build regulations. Therefore, larger market → stimulate innovation.</li></ul>
<b>Price performance products (houses)</b> <ul style="list-style-type: none"><li>• Labor shortages in the construction industry, because of the aging work population this labor shortage can become structural.</li></ul>

- Price of houses → affordability is under pressure. The construction sector became relatively expensive compare to other sectors.
- Wage development of employees in the construction industry
- Inequality of income. Buying a house is becoming possible for fewer and fewer people. So, less people own more.
- (Raw) material and labor prices.

### **Social-demographic factors (trends and developments)**

#### **Sharing economy: from possession to use**

- Sharing economy.
- Urbanization.

#### **Demand for other types of homes**

- Individualization.
- Aging population.
- Urbanization.
- Massa migration can play a role due to global polarization & climate change.
- International influences. For example, Arabic home is different from a Dutch home.
- Population growth.

### **Technological factors (trends and developments)**

#### **Digitalization**

- BIG Data.
- Augmented reality
- Virtual reality
- Internet of Things (IoT)
- Artificial intelligence.
- Blockchain.
- Platform economy.
- Digitalization of information flows. For example, online configuration of houses.

#### **Robotization**

#### **Change in the generation and storage of energy**

- Decentral energy network. People can generate and store their own energy. This would fundamentally change how a house is built and used.

#### **Prefabrication (Assembly on construction site).**

- More standardization. Standard products that can be flexibly used with all kinds of flexible options.

### **Ecological factors (trends and developments)**

#### **Climate change**

- Climate is changing, sea level rises, more extreme weather. Therefore, climate adoptive building. The Netherlands is better prepared than most other countries. Therefore, opportunities for main contractors internationally.
- Circular buildings. Sustainable, renewable materials.
- The finiteness of fossil fuels.
- Overpopulation of the world

