

## MASTER

### The effect of external stakeholders on the adoption of radically new, sustainable innovations in a contractor setting

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# Master Thesis Report

*The effect of external stakeholders on the adoption of radically new, sustainable innovations in a contractor setting.*

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- Socio-political acceptance
- Community acceptance
- Market acceptance
- Market structure
- Interaction problems
- Customer learning
- Instrumental attributes
- Environmental attributes
- Symbolic attributes
- Firm image
- Commitment
- Communication process
- Conflict resolution process
- Early involvement of key participants
- Evaluation process
- Education process
- Tools
- Outcomes

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## Chapter 1. Introduction

This research will be about the challenges that are likely to be faced when implementing radically new, sustainable innovations and how different stakeholders influence their adoption. First, the research topic will be introduced both practically and theoretically. Next, the problem definition will be specified and the accompanying research gaps will be defined. After all gaps are defined, the expected contribution of each gap will be specified. Next, the delimitations of the research will be specified to create a scope. Finally, the research outline will be given, which will provide an overview of this thesis. A summary of the research can be found in Appendix 1.

### 1.1 Practical inducement

Between 2010 and 2020 the world population will grow approximately 1.1%, while the gross national product is expected to rise with 4.4% (Libertus Energy Finance, 2014). Natural resources will not be able to keep up at this rate. Consequently, many countries, including the Netherlands, need to import fossil fuels from other countries to be able to keep up with the energy demand. This creates dependency from such countries, which can be exploited by them to create leverage in conflict situations. To exemplify, Russia has a track record of using its natural gas supplies as a political weapon (Skaar, 2014). The political war over Ukraine has escalated with trade boycotts, but the European Union's (EU's) reliance on gas out of Russia feeds caution. In particular, the EU imports around one-third of its gas from Russia. Russia is able to use Europe's dependence on Russian energy as leverage (Factsheet European Parliament, 2014). Besides the uncertainty around the import of fossil energy, there are some other problems. First, fossil energy is scarce and rapidly depleting. It has been estimated that our known oil deposits will be gone in 2052 and that there will probably be no more gas and oil anymore in 2060 (Ecotricity, 2014). As a result, energy cost will rise and another source of energy needs to be found. Second, strict carbon dioxide (CO<sup>2</sup>) emission regulations are imposed on countries, which leads to a transition to economies based on efficient use of renewable, non-polluting energy sources rather than carbon-based fuels.

Many European countries have noticed these problems and want to take action. One such an example is the Netherlands. In the Netherlands there are nine top sectors, of which the energy sector is one (Energie, 2014). The emphasis on this subject has led to several collaborations and partnerships that strive to expand knowledge and implement new insights into the Dutch society (SER, 2013; Stichting Duurzame Energie Koepel, 2014; Topsector Energie, 2014). A notable example of one of these partnerships is the conclusion of The Energy Agreement ("Het Energieakkoord"). The Energy Agreement is a collaboration of over 40 parties including the government, employers' organizations, trade unions, environmental organizations, housing associations, consumer groups, and umbrella organizations for industry, transport, and energy sectors. All parties have agreed to invest heavily in energy conservation and renewable energy generation. Examples of the vision they share are (1) all citizens have to be living in an energy-neutral home by 2050, (2) accelerating the development of clean technologies and therein take an international leadership position, and (3) speeding up innovations and making them easier to commercialize (SER, 2013).

### 1.2 Theoretical background

Due to the worldwide increasing emphasis on sustainability, many companies have taken steps to become more sustainable (Ecotricity, 2014). One of these companies is a large contracting company called Heijmans. Large contracting companies can have a significant share in implementing sustainable developments since they can build complete sustainable urban environments. However, several problems regarding the implementation of the innovations needed to attain this goal still remain.

The first hurdle that needs to be overcome emerges from the type of innovation that is needed. Because traditional sustainable products, like solar cells or wind turbines, have been criticized because they are for instance not reliable enough, have too low gains, or are not visually



appealing, new innovations are needed to accomplish a more sustainable urban environment. This means that contracting companies will have to invest in innovations that are both radically new and sustainable (Wüstenhagen, Wolsink, & Bürer, 2007). Literature suggests that both types of innovation have proven to be challenging to implement in the past for different reasons.

In general, all innovations will have some implementation challenges. For any innovation it is important that the customer perceives the innovation as useful. In order for it to be perceived as useful, it needs to be better than its predecessor, it needs to fit with previously established values, it needs to be easy to understand, customers need to be able to try, and its results need to be visible. All these factors influence the adoption of the innovation (Rogers, 1995).

Sustainable innovations are known to require more investments and adaption than their non-sustainable substitutes. Therefore, acceptance of this kind of innovations is often problematic. Another problem subordinate to sustainable innovations is slow diffusion. Slow diffusion arises from established market customaries and too strong or weak interaction between firms. Finally, the attributes from sustainable innovations are more complex than they would be for non-sustainable innovations. Users will not only look at the instrumental attributes, i.e. the positive or negative effects of outcomes of ownership and use of an innovation. They will also look at the environmental attributes, i.e. the positive and negative outcomes of the ownership and use of a sustainable innovation for the environment, and the symbolic attributes, i.e. the positive or negative outcomes of the ownership and use of the sustainable innovation for one's image (Noppers, Keizer, Bolderdijk, & Steg, 2014).

Radically new innovations also have their own set of challenges. According to literature, most of the challenges that are specifically related to radical innovations are internal and therefore out of the scope of this report. However, one important problem still remains. Literature suggests that there exist gaps between what managers think their customers value and what customers say they value. Customer learning aims to prevent these gaps, which will lead to better adoption (Gourville, 2006).

Literature suggests that firm image can help the adoption of innovations. Sustainable innovations can influence the image of the user. This suggests that firm image can also be influenced by creating sustainable innovations, which in turn leads to better adoption (Moore & Benbasat, 1991).

The second hurdle is concerned with the fact that the type of innovations that are central in this report will be influenced substantially by several stakeholders.

The first type of stakeholder is the B2B partner. This stakeholder will be important because the technology and knowledge that is needed for successful development and implementation of the innovations is most likely not present in just one firm. Moreover, B2B partners who perform the construction will have to be willing to train their personnel to be able to install the new products (Beach, Webster, & Campbell, 2005).

The second type of stakeholder is the government. The government is an important stakeholder in several ways. Since the innovations will likely be implemented in public areas, the government will be an important and influential customer. Besides being a big customer, the government also has the power and resources to provide subsidies and national goals for implementing such innovations (Negro, Alkemade, & Hekkert, 2012; Wüstenhagen, Wolsink, & Bürer, 2007).

The third type of stakeholder that influences the adoption of sustainable innovations is the public (Dunphy & Herbig, 1995). Public opinion is important because it has the power to give sustainable innovations either a positive or negative image (Noppers et al, 2014) and they influence its diffusion (Dunphy & Herbig, 1995). Public image is important because ultimately the public will decide whether or not an innovation is accepted.

The final hurdle comes from the phenomenon that perceived adoption and actual adoption seems to differ (Fuglie & Kascak, 2001; Lu, Yao, & Yu, 2005). Literature has shown that theoretically

initial acceptance of the sustainable innovation seems high, but when people have to make actual investments they are not that interested anymore. This is known as the Not In My Back Yard phenomenon (Negro, Alkemade, & Hekkert, 2012; Wüstenhagen, Wolsink, & Bürer, 2007). To be able to adjust for this phenomenon the factors of partnership intention have also been identified. When stakeholders show the intention to start a partnership, they automatically show commitment to the innovation because they are also dependent on its success.

Partnering also has several other strategic and operational benefits that can help the successful development of innovations (Beach, Webster, & Campbell, 2005). These benefits are among other the sharing of risk and an increased confidence.

Besides benefits there can also be drawbacks that are concerned with partnering. These drawbacks include increased complexity, loss of autonomy and information asymmetry (Williamson, 1975) and emerge from unpredictability of the partner. These drawbacks can partly be reduced by a detailed contract, the other part relies on trust (Gulati, 1995).

### **1.3 Problem definition and research question**

A literature review<sup>1</sup> has revealed that there are several notable gaps regarding the effect of external stakeholders on the adoption of radically new, sustainable innovations. The identified gaps are (gap 1) the lack of research on the combined factors that influence the adoption of radical and sustainable innovations, (gap 2) the identification of which factors that influence the adoption of sustainable innovation are most important for which stakeholder and (gap 3) the difference between perceived and actual adoption of the radically new sustainable innovations by stakeholders and why this difference exists. The importance of each of these problems will be elucidated in this chapter. Each identified problem will be concluded with a coherent research question. Finally a general problem statement will be given.

#### **1.3.1 Problem gap 1**

Literature suggests<sup>1</sup> that there are different ways to characterise innovations. For instance, many scholars suggest a difference between radical and incremental innovations (Garcia & Calantone, 2001; Sorescu & Spanjol, 2008; Subramaniam & Youndt, 2005). Both types of innovations come with their own set of challenges that influence adoption. Similarly, there is a difference between the factors of sustainable and non-sustainable innovations that influence adoption. However, no literature exists on the combined factors of different research streams on this topic. This is problematic because firms who want to launch innovations with combined characteristics do not know which factors are salient for successful adoption.

The research question that will have to be answered to fill this gap is the following:

*Which factors influence the adoption of radically new, sustainable innovations?*

#### **1.3.2 Problem gap 2**

Literature<sup>1</sup> has shown that the adoption of radically new, sustainable innovations can usually not be implemented without the support of key stakeholders (Nieto & Santamaría, 2007). However, different stakeholders have different reasons to adopt or reject an innovation. For instance, the government might be more interested in the environmental aspects, whereas the public might be more interested in cost savings. No literature seems to exist which distinguishes between these different kinds of stakeholders while using the same set of factors that influence adoption. The problem with this lack of research is that firms might not know on what factors to focus when they want to influence adoption for certain stakeholders.

The research question that will have to be answered to fill this gap is the following:

<sup>1</sup> The literature study can be requested from the author by sending an e-mail to the following address:  
lars\_meima@hotmail.com

*Which factors that influence the adoption of radically new, sustainable innovations are most important for which stakeholder?*

### **1.3.3 Problem gap 3**

Another finding in the literature review<sup>1</sup> is that there is a difference between perceived and actual adoption of the radically new sustainable innovations (Fuglie & Kascak, 2001; Lu, Yao, & Yu, 2005). Often initial adoption intentions seem high, but actual adoption is disappointing. This is problematic because this phenomenon makes it hard for firms to forecast whether or not their innovation will be successful. There has been research on this topic, but not specifically for radically new, sustainable innovations. Moreover, literature in this field does not make a distinction between the motivators or de-motivators that are normative for different stakeholders.

The research question that will have to be answered to fill this gap is the following:

*What are the motivators and de-motivators for B2B and B2G stakeholders to become a partner in implementing radically new, sustainable innovations?*

### **1.3.4 General problem statement**

When all the previously stated gaps are filled, it will give new insights into the following general problem:

*What is the effect of different external stakeholders on the factors that influence the adoption of radically new, sustainable innovations in a contractor setting?*

## **1.4 Contributions**

The goal of the research is to fill the identified. Each different gap will have its own distinctive contribution to both managers and literature.

### **1.4.1 Contributions of examining gap 1**

Determining which factors influence the adoption of radically new, sustainable innovations can have contributions for both literature and practice. First, the contribution to literature is that the factors that influence the adoption of such innovations have not yet been integrated. At the moment there are two different streams of literature, i.e. literature on the factors that influence the adoption of radical innovations, and literature on the factors that influence adoption of sustainable innovations. Determining the combined factors can give insights into what factors are perceived as most important and why. These insights can potentially be used to give a better understanding of why certain radically new, sustainable innovations are likely to be adopted or rejected. Second, the contribution to practice will be that managers can use this research to determine which factors to focus on when developing radically new, sustainable innovations. If they know which factors are likely to be important for the successful adoption of these innovations, they can use this knowledge to determine which innovations will potentially succeed. When this is used in an early stage, managers can select high-potential innovations and allocate resources to the successful development of these specific innovations rather than to all innovations.

### **1.4.2 Contributions of examining gap 2**

By determining which factors that influence the adoption of radically new, sustainable innovations are most important for which stakeholder, some literature and managerial applications can be found. First, the contributions to literature will be that different stakeholder views are considered on the perceived importance of the combined factors that influence the adoption of radically new, sustainable innovations (as described in chapter 1.3.1). Using different stakeholder perspectives can provide a deeper understanding of which factors are important for which stakeholders and why. This knowledge can be used to determine in which stakeholder category the radically new sustainable

<sup>1</sup> The literature study can be requested from the author by sending an e-mail to the following address:  
lars\_meima@hotmail.com

innovation is most likely to be adopted. Second, managers can use this knowledge to create a deeper understanding of the difference in criteria stakeholder categories use to assess the innovations. Managers can use this knowledge to target a specific stakeholder category. For instance, if managers detect that public acceptance is likely to be low, they know which factors they should improve to increase it. This means that resources can potentially be allocated more effectively, which ultimately leads to cost savings and higher adoption rates.

### **1.4.3 Contributions of examining gap 3**

To be able to close the gap between perceived and actual adoption, it can be useful to determine what the motivators and de-motivators are for B2B and B2G stakeholders to become a partner in implementing radically new, sustainable innovations. By asking this question to the different stakeholders, their actual motives of adoption or rejection will potentially become clear. This can have both academic and managerial contributions. First, the literature contributions are that there is no research on the (de-)motivators that influence the adoption or rejection of radically new, sustainable innovations. Researching this area can be useful to create an understanding of why there is a difference between perceived and actual adoption of such innovations and how this difference can be minimized. Second, managers can use this knowledge to determine if their perceived adoption rates are realistic. If managers know what the actual motivators and demotivates are for the adoption of such innovations, they can make a more realistic estimate for actual adoption. This can help to determine whether or not the innovation will be profitable and which stakeholder they should focus on.

## **1.5 Delimitations**

In this section the scope of the research will be determined which will help to create a focus on relevant information. It seems that contracting firms need to innovate and change to become more sustainable in order to prepare for future demands (ECN, Energie-Nederland, Netbeheer Nederland, 2014). To be able to create a focus on this general problem, the focus will be split up in different variables. First, the type of innovation will be specified since different types of innovations impose different problems (Sorescu & Spanjol, 2008). Second, the phase in the project life cycle will be determined because each phase comes with other challenges (Labuschagne & Brent, 2005). Third, since there are both internal and external challenges, it needs to be determined whether the view will be internal or external. Fourth, the dependent variable will be determined. Finally, the most important stakeholders that can influence the implementation of the sustainable innovation will be determined.

### **1.5.1 Type of innovation**

In literature, innovations are usually roughly categorized into two different categories, i.e. incremental innovations and radical- or breakthrough innovations (Garcia & Calantone, 2001; Sorescu & Spanjol, 2008; Subramaniam & Youndt, 2005). Sorescu & Spanjol (2008 p. 115) define incremental innovations as “new products that do not deliver novel and significant consumer benefits to the market.” Breakthrough innovations are defined as new products that are the first to bring novel and significant consumer benefits to the market. The innovations that are being developed by Heijmans, like the Smart Highway and the Hydrae Thermpipe, are new products that use new technologies and/or use existing technologies in a new way. Moreover, innovations like this can provide significant customer benefits because they offer new ways to save energy. These innovations can therefore be categorized as radical- or breakthrough innovations.

The degree of newness is used to further specify the type of innovation. There are four types of newness (Annacchino, 2003). First, there are new to the world products, these are products that have never been produced before. Second, there are new to the firm products, these are products

that have been launched by other firms, but are new for the focal firm. Third, there are additions to existing product lines, these products extend the influence of existing products. Finally, there are improvements or revisions of existing products, these can be quality improvements or cost reductions. Innovations like the Smart Highway and the Hydrae Thermpipe fall in the category of new to the world products since these are products that have never been produced before.

Finally, the innovations that Heijmans is working on are all aimed at sustainability. This means that they can also be categorized as sustainable innovations. It is important to make a distinction between sustainable- and non-sustainable innovations because sustainable innovations present different challenges (Boons, et al. 2013).

### 1.5.2 View

Radical innovations require changes, both internal and external. To exemplify, internal changes are required because marketing and selling new products is different from selling existing products (Ahearne, Rapp, Hughes, & Jindal, 2010). Moreover, workers will have to be trained to manufacture the new product. External changes might include the change of customer behaviour that is needed to implement the innovation or the type of customer that will be interested in the new products. To further specify the focus, the decision between either internal or external focus will have to be made. For this research it is chosen to take an external view. This view is chosen because the discussions with Heijmans have revealed that there were still a lot of interesting uncertainties from that point of view. Moreover, innovation scholars have often posited that the primary stimulus for organizational innovation and change come from the external environment; hence, characteristics of an organization’s environment may be critical to its ability to innovate (Damanpour & Schneider, 2006; Oliveira & Martins, 2011).

### 1.5.3 Project phase

Labuschagne & Brent (2005) specify six project life cycle phases, i.e. the Pre-Feasibility phase, the feasibility phase, the development phase, the execution and testing phase, the launch phase and finally the post implementation review (Figure 1.1). This report will focus on the launch phase since most innovations that are under development by Heijmans are in the execution and testing phase, which means that the launch phase will be an interesting research topic as this can help to successfully execute the next step. Moreover, in discussions with Heijmans, a contact person also acknowledged that the launch phase would be an interesting phase to focus on since a lot of uncertainties still exist in that phase.

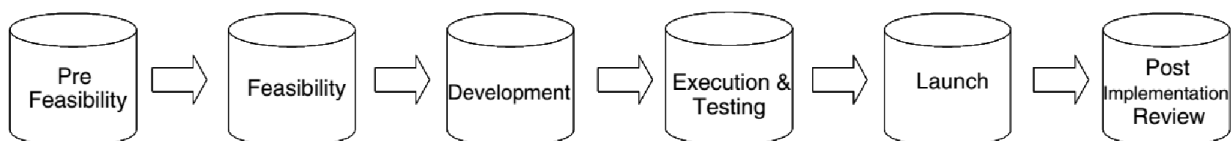


Figure 1.1: Project life cycle (Labuschagne & Brent, 2005)

### 1.5.4 Success measurement

Success can be measured in different ways. It seems that most firms measure success financially in terms of profit or revenue (Spitzer, 2007). However, success can also be measured by, for instance, a growing customer base, adoption rate of products, or customer satisfaction (Spitzer, 2007). In an interview with the Chief Technology Officer (CTO) of Heijmans was stated that they will first look at adoption rate, but ultimately success is measured in profit. The focus of this report will be on all factors that foster a higher adoption rate, which in turn will most likely lead to higher expected

profit, but also to other indirect successes like company image or brand awareness (Marcati, Guido, & Peluso, 2008).

### **1.5.5 Stakeholder identification and partnerships**

Heijmans is interested in how different stakeholders can influence the adoption of their sustainable innovations. Due to time restrictions, a selection of the most important stakeholders will have to be made. Since it is already established that there will be an external view, the focus will only be on external stakeholders. In consultation with Heijmans three different types of stakeholders have been identified as most important. The first type of stakeholder is the business to business (B2B) partner. This stakeholder type will relate to the business partners that help develop the innovations, or are needed to implement the innovations. This stakeholder is chosen because it can have high influence on the adoption of innovations. If the partner does not have the knowledge, expertise or vision that is needed to develop or implement the innovations, Heijmans will not be able to successfully launch them. On the contrary, if the partners do have the required knowledge, expertise and vision, the new way of building can become a standard which will push the innovations to the market.

The second stakeholder will be the government. The government is an important stakeholder for two reasons. First, many of Heijmans's projects concern civil areas that are regulated by the government, so the government is an important customer. Second, the government has the power to provide subsidies for the implementation of sustainable innovations (and has done so in the past).

The third stakeholder that will be part of the scope is the public. Public opinion has proven to be important for implementation of sustainable innovations in the past (Noppers, Keizer, Bolderdijk, & Steg, 2014). Logically, if an innovation has a negative public image, it is not likely to be adopted.

Literature suggests that there is a difference between the intention to adopt new products and the actual adoption (Fuglie & Kascak, 2001; Lu, Yao, & Yu, 2005). It is suggested that the intention to adopt is likely to be higher than the actual adoption. For sustainable innovations this is known as the 'Not In My Back Yard' phenomenon, which will be explained in chapter 2.1.3.1. To address this issue, the focus will not only be on adoption, but also on partnership intentions. When stakeholders are in a partnership they logically are committed to the innovation and will consequentially adopt it. The focus will only be on business to government and B2B partners because it is practically impossible to partner with the public.

### **1.6. Research outline**

The goal of this report is to form a deeper understanding of the adoption of radical, sustainable innovations. This is needed to be able to determine if there are any interesting gaps that are in need of (further) research. To attain this goal a literature study will be performed. Before the actual research will be commenced, there will first be a pre-research which will be used to help determine the interview questions for the actual research. Next, the actual research will be conducted in which data will be collected through semi-structured interviews. All collected data will be analysed, and the results will be presented and discussed. Finally, the research will be concluded and recommendations and managerial implications will be given.

## Chapter 2. Literature research

In this chapter, literature from several sources<sup>1</sup> will be used to find the factors that influence the adoption of radically new, sustainable innovations and partnership intention. The literature research will also be used to identify the most important stakeholders that influence adoption of such innovations.

### 2.1. Factors of adoption and their definitions

In this chapter the different factors that influence adoption will be identified and defined. First, the importance and definition of adoption will be given. Second, the variables of adoption will be categorised and defined. The specific sub-variables that are important for each variable will also be identified and defined. Finally, all variables that influence adoption will be listed in one table that will ultimately be used to help identify research gaps.

The variables that will be used to determine adoption are customer perceived usefulness, adoption of sustainable innovations, customer learning and firm image. These categories are identified using a literature review<sup>1</sup> and the scope as specified in chapter 1.3.

#### 2.1.1 Importance and definition of adoption

Rogers (1976 p. 21) defines the adoption process as “the process through which an individual or other decision-making unit passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.” This implies that adoption is the key to new product success simply because if a product is rejected instead of adopted it will not sell or diffuse. Adoption can also be made numerical by using the rate of adoption. The rate of adoption is the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the number of individuals who adopt a new idea or product in a specified time period, for instance each year. So the rate of adoption is a quantifiable measurement that can be used to create an adoption curve. When the curve gets steeper, the adoption is faster and vice versa (Rogers, 1976).

#### 2.1.2 Customer perceived usefulness

In literature many scholars use five attributes that influence the rate of adoption as proposed by Rogers (1995). These attributes are relative advantage, compatibility, complexity, trialability, and observability. **Relative advantage** is the degree to which an innovation is perceived as being better than the idea or product it is supposed to replace. The degree of relative advantage can be measured in a variety of ways depending on the user’s perception. Usually it is measured as economic profitability, social prestige, or other benefits. The nature of the innovation helps determine what type of relative advantage is important to adopters, although the characteristics of the potential adopters also affect which sub dimensions of relative advantage are most important (Rogers, 1995). This implies that sustainable innovations are likely to provide other relative advantages than for instance incremental innovations. **Compatibility** is the degree to which an innovation is perceived as consistent with the previously established values, experiences, and needs of potential adopters. An innovation that is more compatible causes less uncertainty for the potential adopter, and is likely to fit in the individual’s lifestyle. Moreover, compatibility helps the individual give meaning to the new idea (Moore & Benbasat, 1991; Rogers, 1995). **Complexity** is the degree of an innovation’s perceived difficulty. This relates to the ability of a potential adopter to understand and use the innovation. Any innovation can be classified on the complexity-simplicity continuum. Some innovations are easy to understand to potential adopters whereas others are not (Moore & Benbasat, 1991; Rogers, 1995). Moreover, during launch, firms must be cautious with customers who perceive the new product as complex because they might not understand the new idea and its potential benefits. This can lead to a loss in adoption because consumers are likely to fear the unknown (Brentani, 2001; O’Connor, 1998; Veryzer, 1998). **Trialability** is the degree to

<sup>1</sup> The literature study can be requested from the author by sending an e-mail to the following address:  
lars\_meima@hotmail.com

which an innovation may be experimented with or experienced. New ideas that can be tried on before launch are generally adopted more rapidly than innovations that are not. The personal trying-out of an innovation is a way to give meaning to an innovation, to find out how it works under one's own conditions. However, some innovations are more qualified for trial than are others (Rogers, 1995). **Observability** is the degree to which the results of using an innovation are visible. Just like trialability, it also depends on the innovation itself whether or not this is possible (Moore & Benbasat, 1991; Rogers, 1995). For instance, entirely new products are more easily observable than internal innovations in existing products.

### **2.1.3 Adoption of sustainable innovations**

According to Wüstenhagen et al. (2007), increasing the share of renewable energy is deemed important in countries around the world. However, countries that are only at the beginning of the diffusion curve, such as the UK, the Netherlands, Switzerland or France, are also facing vivid debates on local and sometimes national levels. Different scholars identify varying challenges that underlie this problem. In this chapter, the different types of problems and their factors associated with adoption of sustainable innovations will be underlined. First, social acceptance will be reviewed. Next, the diffusion problems will be specified. Finally, the attributes of sustainable innovations that influence adoption are specified.

#### *2.1.3.1 Social acceptance of sustainable innovations*

The **social acceptance** and implementation of renewable energy technology has largely been neglected when the policy programs started in the eighties. Most developers of such technologies, including energy firms, government institutions, and private local investors thought that implementation should not be a problem. First surveys on the public acceptance of renewables revealed very high levels of support for the technology. However, more in depth studies revealed that neither public support, nor support from crucial stakeholders could be taken for granted (Wolsink, 2012; Wüstenhagen, Wolsink, & Bürer, 2007). Wüstenhagen, Wolsink, & Bürer (2007) specify three types of social acceptance, i.e. socio-political acceptance, community acceptance and market acceptance (Figure 2.1), and their shortcomings in research. **Socio-political acceptance** is the most general kind of social acceptance. It covers societal acceptance of both policies and technologies. As specified before, this social-political acceptance is generally high, but does not reflect actual acceptance (Wolsink, 2012; Wüstenhagen, Wolsink, & Bürer, 2007). This is where community acceptance comes into play. **Community acceptance** refers to the specific acceptance of renewable energy projects by local stakeholders, particularly residents and local authorities. These stakeholders have to be willing to invest and provide space for the sustainable innovations. This is where the problems start to show (Wolsink, 2012; Wüstenhagen, Wolsink, & Bürer, 2007). Many of these stakeholders suffer from the 'Not In My Back Yard' phenomenon. This means that they initially have a positive attitude towards sustainable innovations, which leads to high socio-political acceptance, but when they have to sacrifice something, like space or money, they are hesitant (Negro, Alkemade, & Hekkert, 2012; Wüstenhagen, Wolsink, & Bürer, 2007). Social acceptance can also be interpreted as **market acceptance**, which is the process of market adoption of an innovation (Wolsink, 2012; Wüstenhagen, Wolsink, & Bürer, 2007). This is also where the literature on diffusion of innovation (Rogers, 1995) becomes relevant. Rogers (1995) explains the adoption of innovative products by consumers through a communication process between individual adopters and their environment. However, since energy technologies are almost always bound to infrastructural change, diffusion is more complex than it would be with consumer products (Wolsink, 2012; Wüstenhagen, Wolsink, & Bürer, 2007).





Figure 2.1: The triangle of social acceptance of renewable energy innovation (Wüstenhagen, Wolsink, & Bürer, 2007).

### 2.1.3.2 Diffusion of sustainable innovations

Another implementation problem lies within the slow diffusion of renewable energy innovations (Negro, Alkemade, & Hekkert, 2012). Considering that many years of public and government effort and money have been invested in order to speed up the development, diffusion and implementation of renewable energy technologies, one would expect that such technologies should be established in the society by now. However, experiences in different countries show that this is still a very slow and tedious process (e.g. del Río & Unruh, 2007; Raven & Verbong, 2004). Negro et al. (2012) specify five systemic problems including market structure problems, infrastructural problems, institutional problems, interaction problems, and capabilities problems that all lead to slow diffusion.

Infrastructure, institutional, and capability problems are internal problems and are therefore out of scope and will not be defined. **Market structure** can be defined as the organisation of the current market and the criteria used to select innovations. For instance, a new technology may suffer from competing established substitutes that have proven results (Negro, Alkemade, & Hekkert, 2012; Reinganum, 1981). **Interaction problems** arise from relationships with other firms and other institutions like the government, public knowledge institutes, and third parties such as specialised consultants. Finding the right intensity of interaction is the key to success and getting it wrong can be harmful to the firm. Too strong interactions are problematic because they might result in closed groups. Closed groups fail to process outside knowledge and will not exit the group or let outsiders in. This phenomenon is also known as 'The Nut Island effect' (Levy, 2001). Actors may also be 'locked into' their relationships due to asset specificity, switching costs or due to lack of alternative partners. On the other side, too weak interactions are also problematic. If organisations in a system interact poorly it may lead to a lack of shared vision of future technology developments, which in turn might hinder the coordination of research efforts and investment (Negro, Alkemade, & Hekkert, 2012; Nill & Kemp, 2009).

### 2.1.3.3 Attributes of sustainable innovations

It is often assumed that instrumental attributes are of key importance for the adoption of products, including sustainable innovations (Dittmar, 1992; Noppers et al., 2014). However, sustainable innovations typically have less favourable instrumental attributes compared to their less sustainable competitors, which may dampen their adoption. For instance, solar panels and windmills require substantial financial investments and are considered a less reliable source of energy because their energy production depends on weather conditions (Noppers et al., 2014). Noppers et al. (2014), further argue that besides instrumental attributes, two other types of attributes are important for the adoption of sustainable innovations, i.e. environmental attributes and symbolic attributes (see Figure 2.2). **Instrumental attributes** reflect the functional (positive or negative) outcomes of ownership and use of a sustainable innovation (Dittmar, 1997). Studies on product choice often focus on instrumental attributes. To exemplify, a review of eleven studies on factors influencing car choice revealed that studies typically exclusively focus on instrumental attributes. Moreover, it showed that consumers are more likely to choose a car when they perceive more instrumental advantages (with regard to purchase price, car weight, and number of seats) (Choo & Mokhtarian, 2002; Heffner, 2007) Alternatively, they can have disappointing results or a long return on investment. **Environmental attributes** reflect the (positive and negative) outcomes of the ownership and use of a sustainable innovation for the environment. Logically, sustainable innovations are more environmentally friendly than their non-sustainable alternatives. This might lead to benefits like CO<sup>2</sup> emission reduction or the feeling of doing something good for the world (Noppers, et al, 2014). **Symbolic attributes** reflect the (positive or negative) outcomes of the ownership and use of the sustainable innovation. Symbolic attributes can be used to promote one's image, someone can feel better about him- or herself because he has a positive influence on the environment or the attributes can be used to signal positive characteristics to oneself and others. Theories and research in social psychology, sociology and marketing suggest that products have symbolic attributes that are likely to affect their adoption (e.g., Belk, 1988; Dittmar, 1997).

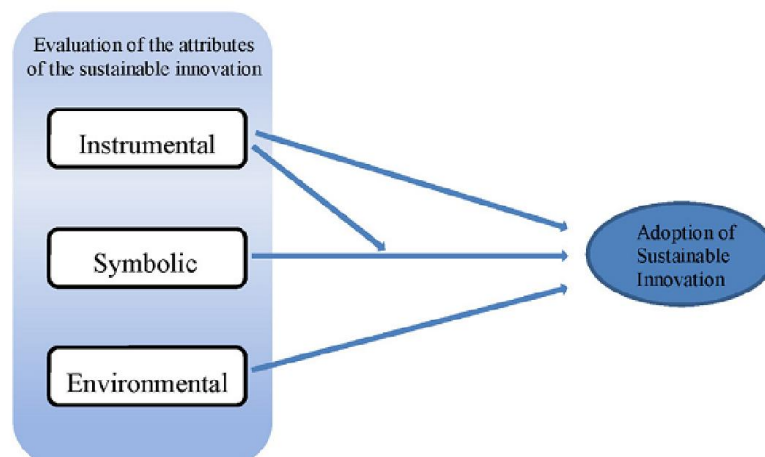


Figure 2.2: Conceptual model on motivations to adopt sustainable innovations (Noppers, Keizer, Bolderdijk, & Steg, 2014)

### 2.1.4 Adoption of radical- or breakthrough innovations

Most literature regarding the adoption of radical- or breakthrough innovations focuses on internal challenges like identifying latent customer needs (e.g. Brown, 1991), requiring new knowledge, e.g. analysis of new customers or different customer needs (Abernathy & Clark, 1985), or obtaining a deep understanding of the customer's current and future usage situation (Deszca, Munro, & Noori,

1999). All of these challenges address some form of market research, which is an internal process and therefore outside of the scope of this paper. However, Leeman & Winer (1997, p. 615) define breakthrough products as “products that create or expand a new category and/or create cross-category competition, are new to customers, often requiring substantial customer learning, raise issues related to channels of distribution and organizational responsibility, and create the potential for new infrastructure and add-ons.” This definition does identify one interesting variable. Because the focus is on adoption and the scope is external, **customer learning** is an important factor to use. Customer learning aims to prevent gaps between what managers think their customers value and what customers say they value (Gourville, 2006; Woodruff, 1997). To illustrate, Gourville (2006) suggests that the customer needs to be able to see a benefit in the new product that exceeds the incumbent product by a factor of three. This phenomenon exists due to the fact that customers are sceptical about a new product’s performance, are unable to see the need for it, are satisfied with the existing product, and are quick to see what they already own as the status quo (Gourville, 2006). They further state that companies overestimate their innovations with a factor of three because they are convinced the innovation works, are likely to see a need for the product, are dissatisfied with the existing substitute, and are set on viewing the innovation as the benchmark. These findings suggest that customer learning is an important factor to consider for measuring adoption, simply because if a customer does not see substantial benefits, he will not buy the product.

#### **2.1.5 Firm image**

Heesup, Li-Tzang, & Jin-Soo (2009, p. 520) state that “the concept of a firm’s image has drawn increasing attention from both academia and industry, as it is believed to play a critical role in customers’ decision-making processes.” Since image development is deemed important, numerous researchers across fields have attempted to identify the driving forces of overall image and to determine its impact on buying behaviours (e.g., Baloglu & McCleary, 1999; Chen & Tsai, 2007; Lin et al. 2007). Bloemer & Ruyter (1998) conceptualize overall image as the complex of consumers’ total perceptions of the salient attributes of a firm. Assael (1984) defines overall image as a consumer’s total perceptions of a product (or a firm) shaped by processing information from diverse sources. Although researchers define this concept somewhat differently, a close look at the descriptions of overall image seems to indicate that forming an image of an object or place is a perceptual and cognitive process (Heesup, Li-Tzang, & Jin-Soo, 2009).

**Firm image** is known to help adoption of new products (Moore & Benbasat, 1991). To exemplify, the brand Apple has an innovative image (Shaughnessy, 2013) and whenever they launch a new product people line-up in front of Apple stores to buy the new products the day before the product is even for sale. This kind of behaviour is of course not to be expected for the innovations that are relevant for this paper, but it does illustrate that firm image can help to create a deep believe and trust in the firm, which will likely lead to (sometimes blind) adoption.

As stated in chapter 2.3.3, symbolic attributes related to sustainable innovations can influence the image of the user. This suggests that implementing sustainable innovations can also be used as a tool to enhance firm image.

### 2.1.6 Schematic representation of variables that influence adoption

Now that all variables have been determined, a schematic representation will be given to summarize all findings (see Table 2.1). The table will contain the dependent variable (adoption), its variables, and all sub-variables. The table will be used in chapter four to help identify research gaps.

Table 2.1: Schematic representation of variables that influence adoption

Sub-variables	Variables	Dependent variable
Relative advantage	Customer perceived usefulness	<b>Adoption</b>
Compatibility		
Complexity		
Trialability		
Observability		
Socio-political acceptance	Social acceptance	
Community acceptance		
Market acceptance		
Market structure	Diffusion	
Interaction problems		
Instrumental attributes	Attributes	
Environmental attributes		
Symbolic attributes		
	Customer learning	
	Firm image	

## 2.2 Stakeholder identification and contribution

Since the type of innovations that are central in this report will have to be implemented in urban areas, it is expected that there are many different stakeholders that influence the successfulness of the implementation. As specified in chapter 2.1.3.5, the most important stakeholders are B2B partners, the government, and the public. In this chapter, each stakeholder will be identified and its influence will be specified.

### 2.2.1 B2B partners

The implementation of new to the world, sustainable innovations can usually not be done without B2B partners (Nieto & Santamaría, 2007). There are several different B2B partners that are likely to be involved in the launch of radically new, sustainable innovations. First, most likely there will be partners involved who have expert knowledge on new technology that is needed in the new product. These partners are likely to be knowledge institutes. Second, it is likely that several partners are needed to develop the different components of the final product. And finally, the implementation of the new technology will likely also involve B2B partners since they are the ones

who will have to build or install the end product. This also suggests that B2B partners have to be willing to take some risk because they need to invest time, share knowledge, or train their personnel in order to become an effective partner. If potential B2B partners are not willing to make these investments, or in other words, adopt the innovation, the innovation can simply not be realized.

### **2.2.2 Government**

Since development costs for new to the world, sustainable innovations are high and the costs savings (by saving energy) are relatively low, the initial investment will likely be too high for most people and organisations. Sustainable values and awareness on their own do not seem to convince people to adopt green innovations (Ozaki, 2011). Therefore, the government will have to provide subsidies to make these kinds of investments more attractive. The government will have to be convinced about the innovation's added value to the community to provide subsidies. Moreover, the government will have a more direct influence when it comes to community-related projects like for instance highways or public areas. Negro et al. (2012, p. 3838) state the following: "Physical infrastructures usually play a large role in the transformation of large technical systems such as the energy system. Large investment costs and coordination problems associated with the build-up of a new infrastructure are a reason for government intervention in these transformation processes." This implies that there will be budgets for these kinds of projects that cannot easily be exceeded. Altogether, the government will be an important and influential stakeholder.

### **2.2.3 Public**

The public can influence the image of sustainable innovations. Public opinion can be formed by, for instance, experience, the media, or opinion leaders (Valente, 1996). Public opinion has the power to give innovations either a positive or negative image. For instance, windmills had a negative public image because the environmental impact of manufacturing, transporting and maintaining them supposedly was higher than what they yielded. Opponents of wind energy state that they run on subsidy (McKittrick, 2014). Furthermore, the people who will make use of the innovations are most likely citizens. They will have to make the decision to, for instance, use green energy, live in energy efficient homes or drive electric cars. Besides the "want" to use sustainable innovations, people also have to be willing to invest in sustainable innovations. Sustainable innovations can potentially save money on the long run (e.g. saving energy costs) but do require high initial investments (e.g. purchasing and installing solar cells). This implies that the end user and public opinion cannot be overlooked when developing sustainable innovations.

## **2.3 Partnership intention**

As established in chapter 2.2, partnerships are essential for implementing radically new, sustainable innovations. In this chapter, first, the benefits and drawbacks of partnerships will be discussed to provide an overview of why firms should form partnerships and why many firms are still hesitant to do so. Second, the factors that influence partnership intention will be identified and defined. All factors that are identified will be summarised in a table.

### **2.3.1 Benefits of partnering**

Strategically, organisations may start a partnership for various reasons. Some might do it in order to innovate, access new markets, overcome local market restrictions, raise entry barriers and/or share risk for mutual benefit (Beach, Webster, & Campbell, 2005). Operationally, elements such as the strategic importance of a product/service and its criticality to the final product, the cost of procurement relative to its internal manufacture, the capability of the organisation, and/or the need to focus on core competences may influence the decision to partner up (Beach, Webster, & Campbell, 2005).

Black, Akintoye, & Fitzgerald (2000), Scott (2001) and Haksever, Demir, & Giran (2001) were able to identify a number of intangible benefits of partnering. They state that there is likely to be an increased willingness to share risk, confidence of success might be increased, exposure to project risk might be reduced, transfer of practices and processes to other projects might be enhanced, there might be improved co-operation, understanding of parties might be increased, a better team spirit is to be expected, communication is likely to be more effective, there will likely be increased customer satisfaction, improved employee skills, and improved motivation of employees (Beach, Webster, & Campbell, 2005).

### **2.3.2 Drawbacks of partnering**

Even though partnership attempts have grown almost geometrically in the past, success rates are rather low (Mohr & Spekman, 1994). Some drawbacks of partnering include increased complexity, loss of autonomy and information asymmetry (Williamson, 1975). Williamson (1975) specifies several examples that underlie these drawbacks. The first one may become problematic when partners have different time or risk preferences. When these preferences differ, there are likely to be disagreements over the scale of shared investments and whether or not to reinvest the returns on these investments (Williamson, 1975). The second problem concerns control issues and can occur when one partner engages in opportunistic behaviour at the expense of the other partner (Williamson, 1975). However, these types of problems only focus on transactional issues. Some authors argue that such an approach is incorrect as it treats each transaction independently, which ignores the role of inter-firm trust that emerges from repeated collaboration (e.g. Gulati, 1995). Research suggests that transactions involving the sharing, exchange, or co-development of knowledge, which is central in this report, can be problematic as it is a special type of commodity (Arrow, 1974). Opposed to the problems found by Williamson (1975), these kinds of problems cannot be solved by simply setting up a contract and therefore rely on mostly on trust. To summarise, one of the biggest concerns for firms entering a partnership is the predictability of their partner. Making this partnership more predictable can partly be done by setting up a detailed contract, the other part relies on trust (Gulati, 1995).

### **2.3.3 Factors of partnership intention**

This section is mostly based on a meta-analysis by Beach, Webster, & Campbell, (2005). A study by Burnes & New (1996) reveals different ways in which industries and organisations have sought to use partnerships. A variety of studies on partnering (e.g. Baden-Hellard, 1995; Bennett & Jayes, 1995; Black, Akintoye, & Fitzgerald, 2000; Construction Industry Institute, 1991; Scott, 2001; Thomas, et al. 2002) provide a collective view on the developing theory and practice in partnering and the accompanying common critical success elements (Beach, Webster, & Campbell, 2005). The common critical success elements that can be derived from the meta-analysis conducted by Beach, Webster, & Campbell, (2005) are commitment, processes, tools, and outcomes.

Theorists generally agree that **commitment** has to do with the continuous pursuit of a line of action over the long run. Commitment to close relationships has been defined generally as the decision to continue a relationship, or attachment to a relationship and the intention to remain in the relationship for the foreseeable future (Admas & Warren, 1999). In order to be committed to a partnership, trust is of vital importance (Mohr & Spekman, 1994).

The most general definition of business **processes** proposed by Hammer & Champy, (1993) is that a process is a set of partially ordered activities intended to reach a goal. Beach, Webster, & Campbell (2005) identify five processes in a meta-analysis that seem to be most important. The first one is the **communication process**. Communication between stakeholders is always important, but even more so when an organisation is dealing with change. When introducing or managing a partnership, communication between parties is vital because it creates understanding of each party's expectations, attitudes and limitations (Beach, Webster, & Campbell, 2005; Mohr &

Spekman, 1994). The second process is the **conflict resolution process**. Conflicts of interest will likely occur at some stage during a project. As conflict can be harmful, the purpose of any resolution process should be to permanently resolve them as quickly as possible. This should ideally be done without the need for mediation or legal processes (Beach, Webster, & Campbell, 2005; Mohr & Spekman, 1994). The third process is the **early involvement of key participants**. This is important because early involvement of key participants allows the parties to use their knowledge and expertise to ensure a positive project outcome (Beach, Webster, & Campbell, 2005). The fourth process is the **evaluation process**. This entails the continuous evaluation of a partnership. The evaluation process is needed in order to ensure that the partnership develops according to the expectations of the parties involved (Bennett & Jayes, 1995; Lenard et al. (1996). The final important process related variable is **education**. Because of the operational and cultural change that partnering will impose, people within the partnering organisations need to be educated in order to effectively adapt. The success of this educational process also helps determining employee commitment to the concept and practice of partnering and the development of an organisational culture that freely shares knowledge with external parties (Beach, Webster, & Campbell, 2005).

Another important factor of partnerships is the accessibility to **tools**. The use of integrated teams can be beneficial for both partners. However, this means that all team members must be allowed access to the client and their assets in order to be efficient (Beach, Webster, & Campbell, 2005).

Finally, the **outcomes** are deemed important. There must be clear benefits for both parties that outweigh those that could have been achieved without partnering. Moreover, the benefits must outweigh the investment and risk involved (Beach, Webster, & Campbell, 2005).

#### **2.3.4 Schematic representation of variables that influence partnership intention**

Now that all variables have been determined, a schematic representation will be given to summarize all findings (see Table 2.2). The table will contain the dependent variable (partnership intention), its variables, and, if applicable, its sub-variables.

*Table 2.2: Schematic representation of variables that influence partnership intention*

<b>Sub-variables</b>	<b>Variables</b>	<b>Dependent variable</b>
Trust	Commitment	<b>Partnership intention</b>
Communication process	Processes	
Conflict resolution process		
Early involvement of key participants		
Evaluation process		
Education		
	Tools	
	Outcomes	

## Chapter 3. Research methodology and pre-research

In this chapter, first, the research design of the main research will be given. This research design includes the research method and the means of analysing the data. Second, the pre-research method will be specified followed by the pre-research itself. Finally, some conclusions will be drawn from the pre-research.

### 3.1. Research design

In this chapter, the means of collecting data for the research will be determined and motivated. Before the main research will be commenced, a pre-research will be conducted to help determine the interview questions for the actual research. Both the pre-research and the actual research will be qualitative. It is chosen to take a qualitative approach because of several reasons. First, qualitative research methods are particularly important if one intends to study people, groups, organizations and societies (Aken, Berends, & Bij, 2007, p.129). This study intends to study adoption behaviour and uses both societal and organisational views on this topic, so qualitative research is justified. Second, since the research topic is a new and unexplored topic, qualitative research is necessary simply because it is not possible to start measuring (quantitatively) when it is not known what to measure. Qualitative observation has to precede quantitative measurement (Aken, Berends, & Bij, 2007).

The interviews for the pre-research and actual research will be semi-structured. It is chosen to use a semi-structured approach because the research topic is unexplored. This means that there should be room for additional information that has not been identified in the literature review (Aken, Berends, & Bij, 2007).

#### 3.1.1 Pre-research

The purpose of the pre-research is to gain knowledge from people who are experienced with the implementation of radically new, sustainable innovations. This knowledge can be used to help determine what can be interesting questions to ask in the interviews for the actual research and it can help verify the pre-determined factors. The pre-research will be conducted internally in Heijmans. Seven employees who have expert knowledge on this topic will be interviewed and their thoughts and findings will be used to help determine the interview questions for the final research. For the data collection of the pre research, seven employees of Heijmans who have expert knowledge on implementing radically new, sustainable innovations will be interviewed. Some details about the employees that will be interviewed and their relevant experience can be found in Table 3.1. All interviews will be recorded and the main findings will be identified and documented afterwards by listening to the recordings. Next, all variables that have been found in the literature study will be listed and the main findings from the interviews that confirm the variable will be matched with the variables. Each variable will then be reviewed by checking whether or not it is mentioned frequently in the interviews. If a variable is mentioned, some quotes from the interviews will be used to support it. If a variable is not mentioned at all, a likely explanation will be given as to why this is the case.



*Table 3.1: Background information of interviewees of the pre-research*

*Employee 1	
Title :	CFO Heijmans
Years of experience within Heijmans:	1
Other relevant experiences:	Has started 3 companies that specialise in sustainable innovations (1 in glass technology and 2 in solar technology) Holds 5 patents in solar technology 5 years of experience as group manager at TNO 10 years of experience at Philips Lighting as R&D manager
*Employee 2	
Title :	Innovation Manager
Years of experience within Heijmans:	3
Other relevant experiences:	-
*Employee 3	
Title :	Business development manager
Years of experience within Heijmans:	7
Other relevant experiences:	Director within Heijmans Helped develop technical management and Heijmans service building Has been responsible for quality and safety in utility
*Employee 4	
Title :	Innovation manager and responsible for Strategy & Sustainability
Years of experience within Heijmans:	10
Other relevant experiences:	Active in committee policy advisory sustainability Active in committee sustainability and transformation
*Employee 5	
Title :	Business development manager and innovation manager
Years of experience within Heijmans:	7
Other relevant experiences:	Has been diversity manager Has been responsible for innovations and marketing
*Employee 6	
Title :	Responsible for innovation and commerce
Years of experience within Heijmans:	8
Other relevant experiences:	Has been responsible for business development management and maintenance
*Employee 7	
Title :	-
Years of experience within Heijmans:	1
Other relevant experiences:	Has been hired by Heijmans through an employment agency Devoted his whole working life to introducing all kinds of new products Has been working at the employment agency for 8 years

*\* For anonymity reasons no names are used in this table, instead the interviewed employees are numbered as 'Employee #'. The employee numbers are random.*

### **3.1.2 Main research**

As stated before, the data gathering for the final research will be done by using semi-structured interviews. The interviews will be conducted in three stakeholder categories, as determined in the literature review. The stakeholder categories are the public, (potential) B2B partners and (potential) B2G partners. In each category five to ten interviews will be conducted.

After all data is collected it will have to be analysed. Aken, Berends, & Bij (2007) discern two strategies to analyse qualitative data. The first one is the grounded theory approach. This approach is used for the exploration of unfamiliar territory and does not presuppose much theoretical pre-understanding. It is aimed at the development of concepts and the relationship between concepts. The second strategy is the template approach. As opposed to the grounded theory, the template

approach utilizes existing concepts and theories. This approach uses a matrix in which pre-determined codes are used to place parts of interviews that are relevant in cells (Aken, Berends, & Bij, 2007; Miles & Huberman, 1994). This method can be useful if different aspects are analysed at the same time. For instance, different people or groups may be placed in the rows and different aspects in the columns (Aken, Berends, & Bij, 2007). Since this research uses existing concepts and theories, and different groups (stakeholders) are analysed on different aspects (factors of adoption), the template approach fits best with this research and will therefore be used.

To be able to verify that the data is analysed correctly, a second person who has no substantial prior knowledge of the research will be asked to fill out the template as well. This method is used because the first analyser will be the one who writes the thesis. This means that he might be misled by tunnel vision, which makes him unable to see the total picture. Moreover, when the findings of both the first and second analyser are alike, the research is more robust.

### **3.2 Main findings pre-research**

This chapter will be structured similarly to Table 2.1 and Table 2.2. First the factors that influence adoption will be discussed. Second the factors that influence partnership intention are examined.

#### **3.2.1 Findings pre-research on customer perceived usefulness**

The importance of **relative advantage** has been confirmed in one interview. The interviewee stated that giving people more advantage of the innovation could help in implementing radically new, sustainable innovations. E.g. with windmills, if you let the people that have these in their backyard profit from the energy they produce, they are likely to be positive about them. This works according to research.

**Compatibility** problems are mentioned in one interview. One interviewee stated that if an innovation like the green lane (that recharges electric cars as they ride on it) on the smart highway is not compatible with all electric cars, or if not enough people drive electric cars, it will never be accepted.

One interviewee mentioned **instrumental attributes**. The interviewee mentioned that the only way to get people to adopt innovations is by mentioning the special features. However, these often only are attractive to a small target group.

**Complexity** problems are mentioned in three interviews. One interviewee stated that particularly the housing industry is very traditional. For example, people would rather have a hardwood frame than a plastic one because they think that hardwood ones are more robust. Moreover, they would rather have a central heating system than a heat pump because they do not understand how a heat pump works. A second interviewee thinks that not understanding the product is the biggest bottleneck because then our customers cannot explain their customers how the innovations work and what the benefits are, which means they will not buy them. Yet another employee said that he would not advise to develop a product like the thermopipe in the future because it has proven to be too complex to market. An interesting side note is that all interviewees mentioned another type of complexity. The first interviewee talked about end users who do not understand the product, the second interviewee talked about the complexity of communication between partners and the final interviewee thinks that not the product itself, but the business model is too complex.

**Trialability** is mentioned in two interviews. The first interviewee stated that by creating a living lab at the customer's location together with customers who are interested you actually get automatic adoption. Moreover, it creates a platform which you can show to other customers and let them experience the innovation. The second interviewee said that giving guarantees, which we have to, also complicates the use of innovations. We have to give a certain guarantee, but we do not yet

know how the innovations will perform. So, both interviewees thus acknowledged that proven results by trial will help convince customers to adopt the innovations.

The importance of **observability** is mentioned in two interviews. One interviewee stated that home owners often do not even know what innovations exist, which means that they will never choose for them. A second interviewee stated that often people are completely unaware of what an innovation can do. Then you just have to show something and later engage users.

### ***3.2.2 Findings pre-research on social acceptance***

The second set of factors is those that influence social acceptance. These factors are socio-political acceptance, community acceptance and market acceptance.

**Socio-political acceptance** is mentioned by three interviewees. One interviewee stated that commercial contractors and the government more often choose for the tendering model. Innovations just do not fit in this model. If we are in control of the project ourselves, the cost and risk side often is the reason that we do not choose innovations but rather use existing techniques. In contrast to the statement of the first interviewee, a second interviewee said that it used to be that the government came up with a question, and the one with the lowest price could make it. Nowadays, often the one with the best solution is the one who can make it. Yet another interviewee stated that you should not wait for the government to change the industry but rather do it yourself. It is interesting that some interviewees seem to be positive about the socio-political acceptance, whereas others are not.

One interviewee acknowledged the importance of **community acceptance**. He stated that radical innovations are rarely implemented in practice. Clients are fairly conservative. There are only a few customers that will actually choose for innovations.

**Market acceptance** and community acceptance are similar, as mentioned in chapter 2.1.3. Therefore the statements of community acceptance also apply here. However, market acceptance is wider than community acceptance. Therefore the following statement from an interviewee is relevant: I think our biggest problem is that the public does not care about many of our innovations. Therefore the government and customers do not care about them either.

### ***3.2.3 Findings pre-research on diffusion***

The third set of factors is those that influence diffusion. These factors are market structure and interaction problems.

**Market structure** is by far the most mentioned factor to influence the adoption of radically new, sustainable innovations. It is mentioned in five interviews. The first interviewee thinks that the way of tendering should be different in order to be able to apply innovations, e.g. total cost of ownership. A second employee stated that sustainable innovations almost always have higher initial investments which you will regain over time. However, if you for instance can only get a limited mortgage, you cannot make this initial investment. This makes it impossible to buy sustainable solutions for some people. A third interviewee mentioned another problem that relates to market structure. He said that at public procurement, they are often open to innovations. However, these innovations may not be restrictive to competition because that will limit price competition. This means that radically new innovations cannot succeed unless you give the technology to the competitors. Another problem with market structure was mentioned by the next interviewee. He stated that there are norms and regulations that actually restrict innovation. Adjusting these standards is very time consuming. For example, Dutch rules state that lining on highways have to be white. This restricts us to use the glowing lines project in the Netherlands. Another interviewee mentioned that there is some progress in the field of rules and regulations. He stated that if you would add together the fixed and variable (energy) costs from rental houses, it would be possible to heighten the fixed costs and lower the energy costs, making the nett investment the same. This would make sustainable solutions more attractive. However, fixed rental prices can only go up with a

maximum of 2.5% each year, making this structure impossible. On the bright side, the government is working on a solution for this issue. Another example of progress on this issue was given by another interviewee. He said that the local government of Amsterdam donated a piece of land which they made a free-zone. This means that we do not have to comply with standard rules and regulations for building our 3D printed house.

**Interaction problems** have been mentioned in three interviews. The first employee stated that some of the products have become too complex for the customers to market. Especially with sustainable innovations there are a lot of parties involved. Many of these innovations generate energy, which means that it is likely that an energy company will have to be involved as an extra partner. Another example came from a second interviewee. He stated that there is a project with water company Limburg where there is a government party at the table. You notice quite often that this makes the project more difficult. You notice that there are differences in roles. Yet another example of interaction problems was mentioned by a third interviewee. He said that an innovation like the thermopipe has proven to be complex to launch because the benefits it provides and the people who have to pay for it do not match. For example, the sewer operator company will have to pay for the thermopipe, which will generate energy. However, selling energy does not fit into their business model.

#### ***3.2.4 Findings pre-research on attributes***

The fourth set of factors is those that are concerned with attributes. These factors are instrumental attributes, environmental attributes and symbolic attributes.

The importance of **instrumental attributes** has been mentioned in two interviews. In one of the interviews the interviewee stated that people often only look at the initial investment. However, if they would focus on the life time investment, sustainable solutions would make a lot more sense. A second interviewee said that the only way to get people to adopt innovations is by mentioning the special features. However, these often only are attractive to a small target group.

**Environmental attributes** are mentioned by two interviewees. The first interviewee stated that the local government wanted to participate in the solar noise barrier project because they want to profile the city. They call this city branding. The second interviewee mentioned that image building is certainly a very important mediator for implementing radically new, sustainable innovations. At a national level, it is about the image of the Netherlands. At a more local level, local government can use such innovations for profiling their community.

The importance of **symbolic attributes** has been mentioned in one interview. The interviewee stated that people often end up choosing for an innovation or sustainability based on where they want to belong to.

#### ***3.2.5 Findings pre-research on customer learning***

The variable **customer learning** is mentioned in one interview. The interviewee stated that if you sell a house to a (public) customer, he often agrees with energy efficient or even energy-generating innovations. They find them interesting and important. However, if you ask them whether they want to invest in it suddenly becomes another story.

#### ***3.2.6 Findings pre-research on firm image***

The next variable is **firm image**. This variable has been mentioned by three different interviewees. The first interviewee stated that they are working on these innovations partly because we see opportunities and also because we have an image we want to fulfil. Another interviewee stated that people like to work on new things, but they would of course also like to see that they are successful in the market. This success also means an increase in sales or image improvement. A third interviewee mentioned that they have experienced that when you get positive media attention, you will also get lots of proud people. That same interviewee also mentioned that the main motivation

for Heijmans to participate in the 3D printing project was to gain knowledge about 3D printing and how it may affect the construction process. However, it is also used for PR, which promotes innovative image.

### ***3.2.7 Findings pre-research on commitment***

Next, the variables that influence partnership intention will be discussed. The first variable in this category is **commitment**. **Commitment** has been mentioned in three interviewees. One of them stated that working closely with customers and creating networks provides many options and solutions for innovations. This statement illustrates the importance of the commitment between stakeholders. Another interviewee also mentioned the importance of commitment between stakeholders. He proclaimed that it was not very difficult to find partners for a specific project. However, when investments have to be made, the interested stakeholders separate themselves from the stakeholders who really want to cooperate. I sometimes wonder if people really want to work together and complement and trust each other. A possible explanation of this phenomenon is mentioned by a third interviewee who stated that people often see something as their idea and nobody else can touch it. He also said that this behaviour will cost you a lot of speed, which you need with such innovations. Therefore you should look for companies that are intrinsically motivated to work on these innovations and not just to those who are for example good planners. I think these innovations can only be successful if people really believe in the idea. This statement was backed up by a fourth interviewee, who stated that companies should be intrinsically motivated to do this kind of innovations. Customers do not ask for these innovations and the government does not really do so either.

### ***3.2.8 Findings pre-research on process***

The next variable is **process**. This variable consists of five sub-variables. These sub variables are communication process, conflict resolution process, early involvement of key participants, evaluation process and education. Four of the interviews provide support for the main variable. However, not all sub-variables are mentioned. One of the sub-variables that is supported is early involvement of key participants. One of the interviewees stated that most partnerships go wrong because the start is wrong. Before we start an actual partnership first we figure out if we have the same ambitions and dreams. The second sub-variable that was mentioned was communication process. One of the interviewees proclaimed that the tricky part in this kind of project is that there are many parties and everyone wants to work in his own way. Therefore good communication is needed. The importance of communication was also mentioned by another interviewee, who said that communication and trust are very important during such projects.

### ***3.2.9 Findings pre-research on tools***

The next variable is **tools**. None of the interviewees have made a direct reference to this variable. A possible explanation for this is that there have been no problems with team integrations or access to the client's assets. Another explanation might be that it is deemed self-evident that this happens.

### ***3.2.10 Findings pre-research on outcomes***

The final variable is **outcomes**. This variable has been mentioned in three different interviews. One of them mentioned that the reason that there are so many people who are reluctant to innovations is that they need to invest but they do not know whether or not they can sell it eventually. A second employee mentioned a comparable example. He said that the reason that some companies are not interested in the solar noise barrier mainly is because of the risk. We cannot guarantee an actual profit because it is only a pilot project. Both of these outcomes are based on selling the product. Another type of outcome is mentioned by a third interviewee who stated that he has experienced

that when you get positive media attention, you will also get lots of proud people. This implies that employee satisfaction can also be a result.

### **3.3 Conclusions pre-research**

After analysing all data that is gathered in the pre-research, some conclusions can be drawn. In general, it can be concluded that almost all factors that are found in the literature research are confirmed to be influencers for either adoption of radically new, sustainable innovations or partnership intention. Moreover, no new factors are found that should be included in the literature research. However, there is one variable that seems to have some sub-variables on which it seems to depend, this variable is commitment. As can be concluded from the interviews, trust and intrinsic motivation both seem to be sub-variables of commitment. This finding shall be used in the interviews for the main research. Another interesting finding is that several interviewees mention risk as one of the biggest obstacles for fast adoption of radically new, sustainable innovations. However, the reason why this risk exists in the first place is because of other factors that are mentioned in the literature review. Most interviewees state that the risk emerges from the fact that the innovations have no proven results, which implies that trialability is the main underlying factor. Another reason that these kinds of innovations are deemed risky is that they require a new way of interaction between parties. To exemplify, most radically new, sustainable innovations will also generate electricity, which will have to be distributed by someone. This makes the innovation more risky because most often it is unknown who will do this and how. Thus, other underlying factors of risk are likely to be interaction problems and complexity. This finding can be used in the interviews to ask more detailed questions whenever risk is mentioned and will provide deeper understanding into what causes stakeholders not to participate in implementing radically new, sustainable innovations. The final interesting finding is that the variable 'market structure' is mentioned in almost all interviews. This could indicate that this is one of the main factors that influences adoption. It also means that the main research should include questions about market structure that help to pinpoint the exact problem.

### **3.4 Data collection main research**

In this chapter the means of data collection are elaborated. First, the robustness of the collected data will be discussed in terms of the amount of interviews per stakeholder group, the diversity of the sample, and whether or not all questions were answered. Second, the coding of the data and the verification of this coding will be discussed.

#### ***3.4.1 Format of the interview***

The format of the interview has been structured consistent with the method that is imposed by Aken, Berends, & Bij, (2007). The interviews<sup>2</sup> are semi-structured, which means that there is a list of specific questions that leave enough room for additional information. Each interview starts with a short introduction of the interviewer and the project. The interviewee is informed that the interview is confidential and that he can receive a copy of the final report. Next, the interviewee is asked to tell something about himself and his work. After the introductions, some general questions related to radically new, sustainable innovations are asked to determine what the specific pre-knowledge of the interviewee is and what he finds most important about such innovations. Next, the interviewee is asked some questions that are linked to the pre-determined factors to be able to determine which factors are important and why these are important. At the end of the interview the interviewee is asked if he has any additional comments or suggestions that he wants to share. After the interview, the interviewee is thanked for his assistance and he is told when he can expect the final results.

<sup>2</sup> Anonymized interview transcripts can be requested from the author by sending an e-mail to the following address: [lars\\_meima@hotmail.com](mailto:lars_meima@hotmail.com)

### **3.4.2 Robustness of collected data**

About half of the interviews are done face-to-face, the other half is executed by phone. One reason not all interviews can be done face-to-face is that some interviewees have very limited time and can only be contacted while driving between appointments. Another reason is that due to time restrictions it is not possible to visit all interviewees (some work on the other side of the country). Each interview is recorded so it can be elaborated later without the loss of any data. A total of 20 interviews are conducted to collect the data that will be used to answer the research questions. Of these 20 interviews, ten were conducted with B2B partners, five were conducted with residents to get a public opinion and five were conducted with governmental parties. The reason for the difference between the amounts of interviews in the stakeholder groups is that in practice it has proven to be much easier to get B2B contacts than it is to get government and public contacts. However, there are some circumstances that attenuate this difference in data collection. The first one is that some of the interviewees had experience in more than one stakeholder area. To exemplify, one of the residents that is interviewed also is an architect that specialises in sustainable solutions. Another example is that one of the interviewed business partners also participated in a project to make his own house more sustainable, organised by the local government in cooperation with residents and several business partners. Yet another example is from an interviewed resident that has worked for the province of Noord Brabant. Logically, it is likely that the interviewees that have experience in multiple stakeholder areas will have better insights in the interaction problems between different stakeholder groups. As a result, more in-depth questions on that topic are asked of interviewees that have experience in multiple stakeholder groups. A second attenuating circumstance is that one of the residents that is interviewed also is active in the Housing Association, which is engaged in the interests of tenants. This means that this interviewee is likely to be able to give a general opinion of many tenants. A third attenuating circumstance is that in most interviews the interviewees are asked to tell if they think that their own opinion reflects the general opinion. If this is not the case, they are asked what they think the general opinion is. The final attenuating circumstance is that one of the interviews with a government stakeholder involved two interviewees. All of these attenuating circumstances should contribute to a more generalizable data collection.

Not all pre-prepared questions are asked in all interviews<sup>2</sup>. There are several possible reasons as to why this is the case. The first one is that due to the semi-structured nature of the interviews, questions can be answered in any order and are generally open. As a result, one question can lead to the indirect answering of several other questions. Moreover, it is common that undocumented follow-up questions are asked as a response to the answer of the interviewee. These undocumented questions can also lead to the indirect answering of several other questions. The second reason that not all pre-prepared questions are asked is due to time restrictions. Occasionally, interviewees are very elaborate in their answers but also have limited scheduled time for the interviews. This can lead to skipping some of the less important questions. The third reason for not asking all pre-prepared questions is that some of the interviewees simply do not have the knowledge to answer the question. To exemplify, one of the questions asks if the interviewee can tell something about how the adoption of a previously launched radically new, sustainable innovation went. However, in many cases they did not have any experience in this area, making the question obsolete. Generally, most questions are answered either directly or indirectly in all interviews.

### **3.4.3 Coding of the data**

All the answers to the questions of each interview will be typed out. As can be seen in the coded interviews<sup>2</sup>, the questions and answers to the questions are put in a table. After all answers are assigned to the corresponding question, each interview is reread to identify the factors that are referred to in each answer. The corresponding factor is noted in the column next to the answer. To exemplify, if an interviewee says that it is important to be able to test the innovation, trialability will

<sup>2</sup> Anonymized interview transcripts can be requested from the author by sending an e-mail to the following address: [lars\\_meima@hotmail.com](mailto:lars_meima@hotmail.com)

be noted in the column next to the question. After each answer has been paired with the corresponding factor(s), the interview will be sent to a second reader. This second reader will also pair the answers to the corresponding factors he sees fit. When each interview is coded by both the author and the second reader, the factors are compared. Whenever there is a difference between the factors the author and the second reader assign to each answer, the factors will be checked by rereading the question. If after rereading the answer it is still unclear why there is a difference between the factors assigned by both parties, it will be discussed until a solution is found. Going through this procedure has revealed that almost all factors that are assigned to each question by the author are also found by the second reader. This means that it is likely that the data is coded correctly.



## Chapter 4. Results

In this chapter, the gathered data will be analysed. Since all pre-determined factors have been mentioned in multiple interviews, it can be concluded that all of these factors influence either the adoption of sustainable innovations or partnership intention. However, some factors are deemed more important than others by different stakeholder groups. First, the stakeholder group 'B2B partners' will be analysed. Both the factors that are deemed to be most important for the adoption of radically new, sustainable innovations and the factors that influence partnership intention will be revealed. Second, the stakeholder group 'government' will be analysed in the same way as the B2B partners stakeholder group. Third, the stakeholder group 'public' will be analysed. It will be analysed what the most important factors that influence the adoption of radically new, sustainable innovations will be for this group. Next, the reason for difference between interest and investment in radically new, sustainable innovations will be analysed.

### 4.1 Main findings B2B partners on adoption

Analysing the data has revealed that the main goal for investing in radically new, sustainable innovations for most business partners is ultimately to ensure long term survival. However, the means of using such innovations for this goal differs among companies. Logically, most business partners expect to eventually generate a profit from their investments by selling the products, finding a new market or simply filling production capacity. To illustrate, one interviewee stated: "In the end a company does not only care about sustainability, there needs to be profitability as well." This statement was backed up by another interviewee who said: "Most partners just want to grow and sell products." For other business partners, especially knowledge institutes, profit is not the main driver. These partners often are funded by the government, and their main goal is to create employment opportunities. They do this by trying to match different business partners and by providing knowledge to these partners. This knowledge can be used to help accelerate the development process and heighten the potential market success. Even though the means of achieving long term survival differ among business partners, they all seem to agree that radically new, sustainable innovations can be used to achieve this goal. Moreover, after analysing the data, it seemed that all types of business partners had consistent ideas about what factors influence the adoption of such innovations. Even though that throughout the interviews all factors were deemed important by some interviewees, there are clearly two sub-factors that seem to be most important for the adoption of radically new, sustainable innovations by business partners, i.e. socio-political acceptance and market structure.

#### 4.1.1 B2B results: Socio-political acceptance

The first sub-factor that is deemed as most important for the adoption of radically new, sustainable innovations by most business partners is socio-political acceptance. The reason that business partners find this factor most important is because they generally think that this is the area that is least developed. There are several reasons why business partners think that this is the case. First, the government is not consistent in their rules and regulations concerning sustainable innovations. To illustrate, one interviewee stated the following: "The government does not stimulate sustainable innovations enough, that is also the reason why there is a lawsuit filed against the Dutch government. The Dutch government is very opportunistic. To exemplify, we use natural gas, this gas is likely to be depleted in say 100 years. It would adorn the government to work on solutions for this problem in the long term. However, they fail to do so because policies are not written for decennia, but for a maximum of 5 years." Similarly, another interviewee mentioned the following: "I most of all think that decisions should be thought through to prevent hastily decisions that eventually will be reversed. We have seen this phenomenon many times in the past. To exemplify, in the year 2003 there was a favourable subsidy for solar panels which was suddenly stopped causing many companies to go bankrupt. Recently the government has started another program that stimulates

the sales of solar panels, causing market growth once again. They should gradually launch or stop these kinds of programs, not use sudden stop-and-go.” A third interviewee also agreed that these stop-and-go policies are not the solution. He stated: People in the Netherlands nowadays can get money for the access electricity they generate. Using this policy they can earn back their investment in solar cells in five or six years. This of course is very appealing because in the remaining life time of the solar cells you will have free power. This causes a boost in demand. However, it can be the case that in a few years this program will be changed again. Essentially you can see highs and lows in demand for solar cells. To exemplify, some time ago you would get 500 Euros of subsidy whenever you bought a photovoltaic (PV) –panel. That is nice for the people who buy one, however, it is a disaster for the industry. The moment that regulation is in effect, many consumers will order PV-panels, causing a high peak in demand. The existing installers who have the proper knowledge and skills will never be able to fulfil that demand. This results in the uprising of many new installers who often are qualitatively worse than the existing ones, which is bad for the industry. The second problem is that the subsidy-jar will deplete, causing a rapid depletion in demand. This leaves a large overcapacity of installers and facilities. So what you get is many unhealthy fluctuations. However, over all there is an upward trend.” Yet another interviewee stated: “You see that the government is constantly changing its opinion. If another interesting development comes along, for instance shale gas, they will suddenly only focus on that. This shows that there is no long term vision, but that it fluctuates heavily.”

The second problem with social-political acceptance is that governmental parties use a wrong way of tendering, as mentioned by several interviewees. One interviewee said: “I think innovations are restrained by governmental parties. The problem is mostly due to the rules and regulations regarding tenders. Generally it is thought that the free market principle is the best way and that it also stimulates innovations. However, the mechanism does not work for innovations. The principle works if there are many providers. However, if there are only a few providers, which is the case with most innovations, the principle does not work. Moreover, governmental parties do provide space for innovations, but lack the knowledge to specifically prescribe them, causing them to give a wide definition in their tenders, which in the end again only competes on price. Another problem is that they do not look at payback-times. Most sustainable innovations generate energy, allowing them to eventually pay for themselves by saving energy. However, governmental parties do not care about this because the investments for the project are gained from other funds than the funds for management and maintenance.” This problem was also acknowledged by a second interviewee, who stated: “The government should not select projects on the basis of construction costs, but on the basis of energy performance. If they do not do that, essentially they give non-sustainable projects an unfair advantage because their visa fees are lower due to lower initial investment costs than their sustainable competitors.” A third interviewee mentioned a comparable example: “Governmental parties often say that they find sustainability important, but in practice this is not always the case. To exemplify, I know a guy that creates energy generating roof covering. He said that he often speaks with local governments to apply such roof covering in their community. However, they often fail to do so because traditional roof covering is less expensive”.

The third problem with socio-political acceptance is that some rules and regulations prevent innovative solutions. To illustrate, one interviewee stated: “I think that rules and regulations sometimes slow down innovations because they always lack behind of what is technical possible. To exemplify, it would be nice if decentralized generated electricity (as you would find in a smart- grid) could be stored to be used later in energy demand peaks. However, an energy grid operator is prohibited by law to supply electricity. Still, that would be an ideal solution.” A second interviewee mentioned: “Certification and insurances that one expects have to pass through a difficult process with little governmental support. The government spends millions on subsidies for innovations. I think that money would be better spend on testing and supplying only the most promising innovations. They should streamline the process.” Another example that illustrates the slowing

effect of rules and regulations on sustainable innovations was mentioned by a third interviewee: “Rules and regulation slow down the adoption of solar noise barriers. It has nothing to do with the noise barriers themselves, but rather with the energy they generate. Officially the noise barriers are owned by a governmental party called Rijkswaterstaat. This is problematic because the local governments that want to invest in the noise barriers that pass- or go through their city actually are not allowed to make that decision because they do not own the noise barriers.”

#### **4.1.2 B2B results: Market structure**

The second sub-factor that is deemed as most important for the adoption of radically new, sustainable innovations by most business partners is market structure. The first problem seems to be the fact that most business partners only focus on the financial aspects like return on investment (ROI) or lowest price. To illustrate, one interviewee mentioned: “If we look at the current market we can see that it consists of squeezed out prices where almost no money can be made, this off course hinders innovations. I do not think this is changing either. Big companies like Heijmans are struggling to survive on the basis of unhealthy tenders. This problem is deposited to suppliers, which also hinders innovations. Innovations need investments and you can only invest with a healthy cash flow.” Another example was given by a second interviewee: “A few years ago we spoke with some companies about setting up a waste heat system in an industrial area in a village called Moerdijk. A lot of companies in that area had waste heat that they did not use. So we gathered some of these companies in a meeting to discuss if we could use the waste heat. The problem was that these companies were very commercialised and wanted a ROI of at least 20% on the project. When companies think like that they will destroy the project with their calculations, causing it to not be launched.”

The second problem with market structure seems to be that the construction industry is very traditional and conservative. To exemplify, one interviewee said: “It always intrigues me to see how hesitant the building industry is to apply innovations. There is an enormous difference between housing construction and for instance the airplane construction, car construction, or cell phone development. In the latter group, innovations find their way very quickly and companies react fast on these innovations. In construction they are much more reticent. This of course is due to the existing business models in which, I dare to say, they are very conservative. To exemplify, if you would speak to a large construction company about innovations they would say: “Sure, but we still have a large amount of bricklayers that we have to keep busy.” That is problematic because if you want to go to energy neutral housing you do not want to use bricks because the walls would get to thick.” A second interviewee also mentioned the conservativeness of the construction world: “I think that they want to introduce innovations too quickly. I think that throughout the process many companies will have to change their ways. If you ask me, I think that this is hardest in the construction world because they are very traditional.” A third interviewee mentioned something similar: “The problem with adoption of innovations is that people are very traditional. Moreover, the construction industry is even more traditional than most people. They have to see it before they believe it.” Finally, one more interviewee gave an example about a façade manufacturer: “I once heard a façade manufacturer say: “Sure, we can plug the one plug into the other, but we are not going to bother with electricians, no way, not our job, not our responsibility. If you have to work with companies like that, a solar façade will never be realised.”

A third problem with the market structure arises from business cases that will have to change drastically. To exemplify, one interviewee stated: I think construction companies should change their business case. Companies like Heijmans are working towards a structure in which they will provide both the building and the energy. This creates new opportunities because it allows them to build sustainable buildings that are more expensive and still make a profit on the energy they save. Nowadays, increasingly more products are not sold as a product but as a service. You could imagine such a system in the construction industry as well.” A second interviewee mentioned

something similar: “Energy companies who are now responsible for the infrastructure will get a completely different job in the future. You should ask yourself if the energy companies of today will still be the energy companies of tomorrow. We have spoken with Heijmans to see if it is possible for them to be the energy supplier for buildings or complete districts.” A third interviewee also seemed to believe in this idea. He said: “You should change the business case. I believe in the vision of Heijmans that says that they will relieve the user completely.”

## **4.2 Main findings B2B partners on partnership intention**

As mentioned before in chapter 4.1, the main reason for investing in radically new, sustainable innovations for most business partners is ultimately to ensure long term survival. However, many companies do not have the means to achieve this goal alone because they for instance lack the proper knowledge, capacity, or expertise to launch these innovations by themselves. Therefore many companies seek partnerships to be able to launch these kinds of innovations. Similar to the findings in chapter 4.1, both knowledge institutes and other business partners seem to have similar thoughts on which factors influence partnership intention. Another similarity is that most factors were deemed important in most interviews, however there were a few factors that were clearly most important. The factors that were mentioned as most important throughout the interviews were commitment, communication process and outcomes.

### **4.2.1 B2B results: Commitment**

The first variable that is deemed as most important for partnership intention is commitment. As can be read in Chapter 2.3.3, trust is of vital importance for commitment. The interviews have revealed that this indeed seems to be the case. To exemplify, one interviewee stated: “Trust is the most important factor for good partnerships. You have to have common ground between people. When you trust each other you will help your partner attain his goals.” Another interviewee said: “Especially for smaller companies it is hard to be open in a partnership. If you share your knowledge with a large company, you risk the chance that they will steal your knowledge. Moreover, these small companies do not have lawyers to protect their knowledge. So trust is very important in these kinds of collaborations.” Several methods to gain this trust have been mentioned by different interviewees, but they all start with meeting the people you will collaborate with. To illustrate, one interviewee mentioned: “We always try to meet at the company of one of our partners. This allows you to empathize more with the organisation and you share more with each other. I think that this can foster trust.” This statement was supported by another interviewee who said: “You need to have physical meetings. The social aspects do count. You have to have a good feeling about the people you work with and have similar thoughts. This makes you more inclined to share information.” Another interviewee had a variation on how to get to know their partners. He told that he once said: “Instead of spending the first consortium day in a meeting room we should go and do an activity to first get to know each other on a more personal level. This should foster trust.” When you are already part of a consortium, you can foster trust by having an open attitude. This can be concluded from an interviewee who said: “We are open and share everything with the other parties. That creates trust. Within a consortium you can be open about innovations, which you should be.”

### **4.2.2 B2B results: Outcomes**

The final variable that was mentioned as one of the most important factors to influence partnership is outcomes. This variable was mentioned in every single interview as being one of the most important factors. Generally, all interviewees seem to agree that every partner should have equal benefits of the partnership. To illustrate, one interviewee said: “Outcomes should be mutual. The outcome value for one party should not exceed the outcome for the other by much.” To further illustrate this point, another interviewee mentioned: “Outcomes should strengthen each other; there should be a shared interest.” To ensure that these outcomes are aligned, the right parties

should be matched. To exemplify, one interviewee mentioned: “If all parties take a different piece of the puzzle, they can complement each other. Moreover, it prevents that different parties have the same interest”. This statement was supported by a second interviewee who said: “It is important that partnerships include partners throughout the whole product chain until the market introduction. In the end, all of these partners should see an equal benefit. Everybody needs to have his own benefits. Some want social interest, others want things like profit, to create employment, or finding a new market. Everybody needs to have his own benefits and they should fit together.” If these outcomes are unclear, problems can occur. To exemplify, one interviewee stated: “I have had some construction related partnerships in the past. During such projects, more and more partners left the partnership. The reason for that phenomenon was that many companies did not see how these projects would help them tomorrow. They were concerned with what they would show the management if they would ask what they had gained. The point is that you should always have a clear goal of what you want to gain with these projects.”

### **4.3 Main findings governmental parties on adoption**

Analysing the data has revealed that the main reason for investing in radically new, sustainable innovations for most governmental partners is ultimately to ensure that they and their community are prepared for the future. Governmental parties use these innovations in different ways to attain this goal. They can for instance use these innovations to create an innovative or green image, which will attract businesses that want to invest and develop these innovations. In turn, this can lead to economic growth. To illustrate, one interviewee said: “We want to real-in knowledge to our community and maintain a pole position in sustainable innovations. This will eventually strengthen the economic structure.” Another interviewee said: “We, as a local community, want to lead and collaborate with other parties. So if anyone wants to test or try concepts of their radically new, sustainable innovations they can do it here. Eventually we as a community will reap the economic benefits.” Another reason to invest in this kind of innovations is that governmental parties want to be prepared for the rules and regulations of tomorrow. To illustrate, one interviewee mentioned the following: “We, as a local community, provide knowledge and skills because we have to. According to the Council, we have to comply with the upcoming climate targets.” Another interviewee said: “We invest in this kind of innovations because the idea is that the Netherlands will be energy neutral in the future. This means that existing buildings will also have to be converted. We have to have market ready concepts if we want to comply.”

It can be concluded that the interviewed governmental parties agree that radically new, sustainable innovations can help them reach their future goals. Analysing the data has revealed that the main factors that influence the adoption of these innovations by governmental parties are socio-political acceptance and firm image.

#### **4.3.1 Government results: Socio-political acceptance**

Similar to the findings on the factors that influence adoption for B2B partners in chapter 4.1.1, governmental parties also seem to agree that socio-political acceptance needs to be developed further. Most interviewees state that some steps are taken to stimulate adoption of sustainable innovations, however, they also acknowledge that most of these steps are insufficient. To exemplify, one interviewee stated: “Rules and regulations are implemented quite arduously. We do our best to change this. To exemplify, we are working on rules that regulate the external appearance of buildings to create a pilot area in which these regulations are loosened intensively to stimulate innovations. There is support from a political point of view, however, officials are used to working in a particular fashion and the urban design is not appreciated by everyone, which makes it complicated. There are small steps forward, but not as fast as I had hoped.” Another example that accentuates the previous statement came from a second interviewee who said: We have to sell electricity creatively on a local scale with all kinds of tax discounts. In that sense, they try to

stimulate sustainable innovations fiscally. However, that is just a small step. You will always have to comply with existing systems that regulate the sale, purchase and distribution of electricity. So it is like a quest in which you should try to maneuver around the problem. In general, I think that rules and regulations hinder innovations." A third interviewee supplemented: "The government can play its part by including sustainable projects in its policy. These developments are still scantily."

Despite the slow governmental developments, some local governments do seem to support sustainable innovations successfully. To exemplify, one interviewee stated: "On the one hand you have to pull very hard to accomplish your goals. However, on the other hand if you find yourself in the right place in the right time you can accomplish your goals in no time. To exemplify, I have spent almost 2 years on launching a project called Riothermie. One day I found myself in the right position and within three months a project was realized. This was possible because I had access to a wide network and enthusiastic people." A second interviewee gave this example: "If you ask why we want to innovate as a local government, I say that we do this because of goals we have imposed ourselves. We want to be a leader as a local government and create cooperation with businesses. So if anyone wants to test this kind of innovations, we will provide the possibility to do so." Finally, a third interviewee said: "We are a large contractor as a local government and we have loads of space assets to stimulate such innovations."

#### **4.3.2 Government results: Interaction problems**

There seem to be several interaction problems that hinder the adoption of innovations. The first problem is that there are likely to be conflicts of interest between parties. To illustrate, one interviewee mentioned: "You can see that there are many collaborations between governmental parties in which knowledge is shared. However, governmental parties are hesitant to share this knowledge with contractors because of conflicts of interest and the Procurement Law." Another form of conflict of interest was given by a second interviewee who said: "We stimulate the collaboration between different companies. However, this has proven to be difficult because they sometimes are competitors for instance. From a point of view of the residents it has become evident that they find it pleasant if someone from the local government assists them personally. They like the informal way of treatment." Another interviewee added: "We work together with Heijmans as a partner. Internally, they thought that we would only work with them in the future. We have had to have many conversations to clarify that this was not the case and that we were not married with Heijmans."

The second interaction problem is related to the complexity of the collaborations that are needed to implement the innovations. To exemplify, one interviewee mentioned: "It is a fairly complex structure because you link a sustainable innovation to a building. This means that you will have to cope with many different parties like PV developers, contractors, and rules and regulations. So it is actually the collaboration that is complex, not the innovation itself. The concept itself is quite complicated, but the application is even more complex." Another example of complex collaborations was given by a second interviewee: "The complexity comes into play when we have to work with private individuals. This makes it especially more complex juridical. The sewer authority does want to provide the heat, however, he does not want to be the one who sells the energy it produces. This means that the local government has to appoint a distributor who will sell the heat. This is hard because you would like to appoint this distributor at the start of the project. However, at the start of the project you do not yet know who the end users will be. So it is not really the innovation that is complex, rather it is the revenue model. Another problem with the complexity of implementing this kind of innovations to end users is mentioned by a third interviewee who stated: "Especially on the end user level users have to be educated. They have to understand that they will have to heat their homes in a different way than they have been doing for the past 50 years." A final interviewee mentioned one other example that relates to the complexity of interaction between parties. He gave the following example: "It is partially the knowledge of how organizations work. Heijmans often does

not understand why certain projects are being stopped by governmental parties. Because we are very open and elaborate on how the governmental structures work they can better understand the governmental procedures and work around them to still get the contracts. So it actually is also a kind of social innovation.”

#### **4.3.3 Government results: Image**

As mentioned in the introduction in Chapter 4.1, some local governments believe that they can use an innovative and green image to attract employment. To exemplify, one interviewee mentioned: “We are one of the three nominees who are participating for the title European Green Capital. If we win this title we can use it as a kind of business card.” A second interviewee added: “We want to profile ourselves as Helmond Smart Mobility. We want to attract knowledge and maintain a pole position. This will eventually strengthen the economic structure.” A third interviewee said: “Nationwide publicity is also very important. Moreover, we will gain experience in implementing such products.”

#### **4.4 Main findings government partners on partnership intention**

The main finding on partnership intention of governmental parties is that the factors that influence it most are the exact same as for B2B partners. This means that most local governments find the factors commitment, communication process and outcomes most important.

##### **4.4.1 Government results: Commitment**

Many local governments seem to think that commitment and trust are very important for a good partnership. The most mentioned way of getting committed to a partnership is by getting to know your partner on a more personal level. To exemplify, one interviewee said: “It might go without saying, but I think that the most important thing for a good collaboration is trust. There are many pre-judgements between parties, so you first have to get to know each other. We have tried to stimulate this by for instance organizing excursions. This seems to work very well. You get to know each other in another way, which fosters trust.” A second interviewee added: “Within the BEC we visit many different companies in person. This is nice, because you can build trust by doing so. When you have an early collaboration within these kinds of innovations, that is very important. We once went on an excursion with all participants of the BEC in the same bus. That really helped in getting to know each other in another way.” The previous statement also mentioned the importance of visiting the partners in their own building. This phenome was also mentioned by a second interviewee who said: “I think that it is very important that you visit each other’s businesses. This stimulates collaboration. You feel that this builds trust, which can lead to people granting each other projects more often.” A third interviewee added: “Yes we visit each other’s companies. This fosters a positive collaboration because it creates initiative and trust.”

##### **4.4.2 Government results: Outcomes**

Logically, local governments do not spend time and money on sustainable innovations without expecting any results. There are several reasons why they do invest in these innovations.

First, they simply have to comply with upcoming rules and regulations. To exemplify, one interviewee said: “We, as a local government, provide knowledge and skills because we have to according to the council who has set certain environmental goals.” A second interviewee gave another example. He stated: “We want to reduce CO<sup>2</sup> emissions. In the long term you will create an implementation for the energy requirements and in the short term we will comply with the CO<sup>2</sup> emission regulations.” When asked why one of the interviewees thought that their local government invested in sustainable innovations, he said: “Simply because provinces and local governments have certain climate goals.”

A second outcome can be that some local governments believe that economic gains can be made. This can be concluded from the following statement: “We want to attract knowledge into our community and maintain a pole position. Eventually, this will strengthen our economic structure.”

#### **4.5 Main findings public on adoption**

Analysing the data has revealed that most people do not know or do not care about sustainable innovations. The people that do care are clearly the early adopters who are already interested in these kinds of innovations. These early adopters are intrinsically interested in sustainability or innovative technology. To illustrate, one interviewee mentioned: “I think that the people that already start using these innovations have the ambition to live more sustainable and reduce their carbon footprint. These are the people that just believe that this is the way to go. However, I think that these people are early adopters. To exemplify, if I am going to get groceries and it is just a five minute bike ride I will take my bike. Some people ask me if I really think about this. The answer is yes. It may save me just two times refuelling a year, but if everyone would do this it would add up quickly and reduce emission. In that respect I think that there is a small world improver in people who already adopt these kinds of innovations.” The same interviewee further mentioned: “The market is very slow. The average civilian is not ready for an energy neutral home. To exemplify, there is a program on a national TV station called *Ons Huis Verdient Het* (Our Home Deserves It). In this show, someone stands in the middle of a shopping mall to ask people if they know what an energy neutral home is. This reveals that nobody really knows. I will give you another personal example. The house next to us was for sale and some people came to visit the house. Afterwards my neighbour was talking to the lady that had visited the house and told her she should also visit my house because we have converted it to an energy neutral house. She replied: They must be cold in the winter than. This shows that some people have no idea how it works.” Another example came from a second interviewee who said: “I am a technician, so I believe it should work and find these innovations interesting. Moreover, I think that the environment is important.” He further mentioned: “I think that part of the society is ready for these kinds of innovations and another part is not even aware they exist. That second group is busy finding a job, gaining more income or starting a family. Only after their life is in order people start to think about other things. So I think that most people will not resist these kinds of innovations, they just do not know or care they exist.” Finally, one more interviewee said: “It seems that the early adopters have been reached and a natural growth remains elusive.”

Evidently, most people need to be stimulated to adopt these kinds of innovations. Analysing the data has revealed that the factors that influence the adoption of these innovations are compatibility, complexity, observability, interaction problems, and instrumental attributes.

##### **4.5.1 Public results: Compatibility**

It seems that the interviewees seem to agree that implementing the sustainable innovations should not be a radical process, at least if it is related to their own house. To illustrate, one interviewee said: “My considerations to convert my home to an energy neutral one were that I had to be able to regain my invested money and that it was easily applicable in my house without any renovations. I did not want any drilling or that kind of stuff.” A second interviewee added: “If you choose a solution for which you have to renovate half your house, it will be very costly and maybe not even sustainable anymore.” A third interviewee said: “I think that you can only make small steps in existing houses. If you really want to install a whole new system you can only do so by renovation or in new buildings. So it is very important that these innovations are applicable in the existing stations if you want to apply them on a large scale”.



#### **4.5.2 Public results: Complexity**

Most people do not care how their product exactly works, as long as it works. If a product is too complex to operate or a user requires a deep understanding of the product to be able to use it, he will not use it. To illustrate, one interviewee said: “In the enthusiasm of designers they tend to see things that they think is great, but they forget about the end-user. A classic example is balanced ventilation. It is a system that has existed for about 20 years I think. It is a revolutionary concept with a theoretically sound model. However, they have not thought about how the end-user should use it at all, causing it to sustain heavy resistance. The end-user should not have to be able to understand the system, they should just know the essence of why it is better and how they can influence its performance.” A second interviewee added: “You should not tell a complex story to end users. You just need a good and trustworthy story that is not too complex. Most civilians find it hard enough to understand new technologies, so if they do not understand the use, they will not use them.” A third example came from another interviewee who said: “You can compare it with buying a new car. A car is quite complex. People know that they have to fill it up with gas and that it has software that helps them drive. They do not have to know how this works in detail as long as they trust that it works. In that sense the construction industry is much more primitive. I think that if people believe that what you build is good, they will use it.”

#### **4.5.3 Public results: Observability**

Being able to observe the results of sustainable innovations seems to be important to most interviewees. First, it helps to confront and inform the users. To exemplify, one interviewee said: “I once participated in an energy saving contest. They gave me a display which showed how much energy I was using on a specific moment, per day or on average. By replacing lightbulbs and putting switches between certain machines I could save about 45% of electricity. For me, this was the first reason to make my house energy neutral”. He further mentioned: “Being able to see what you save really helps. You confront and inform people with their energy use. To exemplify, I once saw that we used a lot of energy, so I asked my wife how this was possible. She replied, I am sorry but I have to be able to do the laundry. I think that is a nice example of how such a thing can get a life of its own. Only if you are confronted with your own behaviour you think about it. A second interviewee gave another example. He said: “We have an app for our tablet that shows how much energy you consume, how much you generate and much more. I think that if you would give such a system to people that they would see it as a competition to save as much as possible. I think that being able to see what you consume will affect your behaviour.” Second, showing other people that sustainable innovations work and showing how they look also fosters adoption. To illustrate, one interviewee said: “Ventilation is something that is hard to make attractive on forehand. If you look at solar panels you can see that it has something fun and sexy. You can show your neighbour that you have them and that your energy bill has gone down. I once heard from PR people that you should create a sort of me too factor”. He further said: “Showing people is the first step. To exemplify, if you decide to convert your home to an energy neutral one you can choose to not really change the exterior. However, you can also choose for a radically different exterior. The latter can be used to trigger people because it is really visible.” Another interviewee added: “I think that our house is one of the factors that helped stimulate the growing demand for sustainable solutions in this area. It is quite a statement in this neighbourhood.” A third interviewee mentioned: “I am also an architect and I use my house as a kind of showcase for my customers. It helps when people can see that it is possible. It helps when people can look at our house and see what a heat pump looks like or how it looks when you have 36 solar panels on a roof.”

#### **4.5.4 Public results: Interaction problems**

As stated in the introduction of Chapter 4.5, many people do not even know that sustainable innovations exist. It seems that good communication and support can help to reduce this. To

illustrate, one interviewee said: “You have to make these innovations understandable for people. Many people would like to participate but simply do not know about the developments or they do not know who to ask. Entrepreneurs should communicate clearly to the end users.” The same interviewee added: “I think that people want to know how to cope with sustainable innovations and that some entrepreneurs are unable to see this.” The same interviewee also said: “I think that the government should deploy more activities to inform the Dutch citizens in how they can gain information.” A second interviewee said: “I think that companies should give loads of attention to providing objective information. Holding back information will eventually backfire.” To illustrate the importance of support, a third interviewee gave the following example: “If you install something innovative, you have to monitor its effects and adjust if necessary. Do not use the existing system which they use in construction now, which is called the nag-system; Build something, run away and do not look back unless the customer starts to nag. If you use that system, inevitably you will get problems which lead to an installation that no one trusts anymore. A well-known story is that if you have one bad comment you will need ten good comments to balance it. So prevent negative stories. To exemplify, I have a good ventilation system, which I know I do. However, the struggle to get it working like it should was horrible. The installer did not help and it has taken a year to get it right. I know how it works and should work, but an average civilian would lose his mind.” A final interaction problem is that most suppliers do not offer sustainable solutions. To illustrate, one interviewee said: “Some time ago, in my neighbourhood, a house was renovated for a substantial amount of money. And, as you can guess, not a single sustainable solution was implemented. If that same person had come to me, I would have surely tried to convince him to spend some of that money on sustainable solutions.”

#### **4.5.5 Public results: Instrumental attributes**

Since people need to invest in sustainable innovations, they also want to gain something. There are different positive outcomes of owning a sustainable innovation that help people choose for them. First, there is a potential financial gain. To illustrate, one interviewee said: “Apart from the idealist, it is mostly an economic principle. People want to know what it costs and what they can get back.” He later added: “If I convert my house now it will be easier to sell in the future compared to my neighbour.” A second interviewee gave the same example. A third interviewee said: “I think that sustainable innovations should be cheaper. I have installed a heat pump, but it was about two and a half times more expensive than a standard CV unit. That is a big reason for most people to not invest in it. In reality, the investment is too high to compensate with energy savings for most people.”

The second reason to invest in sustainable innovations is that people want to be independent. One interviewee said: “I think that it is shameful that we have to rely on gas from Poetin. I do not want to be a customer of him, so I do not want to use gas anymore.” A second interviewee mentioned: “I am free now, but I want to be freer. I want to be energy independent. I think that this is also important for the next generations because we become more and more energy dependent.”

## Chapter 5. Discussion

This chapter will be dedicated to discussing the results as established in Chapter 4 and provides some general theoretical implications. All main findings will be discussed and linked to existing literature when possible. The link to literature is needed to be able to determine why certain phenomena exist and what possible solutions can be. First, the stakeholder group 'B2B partners' will be discussed. Second, the stakeholder group 'government' will be discussed. Third, the stakeholder group 'public' will be analysed. All findings of each group will be discussed and linked to literature separately.

### 5.1 Discussion findings B2B partners on adoption

As can be seen in Chapter 4.1, the main factors that influence the adoption of radically new, sustainable innovations for B2B partners are socio-political acceptance and market structure. Each of these factors will be discussed next and links to literature will be made when possible.

#### 5.1.1 B2B discussion: Socio-political acceptance

The first reasons that B2B partners see socio-political acceptance as an important factor for adoption is because they believe that the government is too short-sighted and opportunistic. In other European countries like Germany, France, and Belgium, the government has been leading a consistent policy. In the Netherlands, this policy zigzags a lot, which scares away entrepreneurs (Het Fianciecele Dagblad, 2015; Reijngoud, 2011). Governmental parties seem to only use policies that last a maximum of five years. This causes hastily dictions which often are reversed within a few years. This is problematic because this also creates unhealthy market fluctuations. To illustrate, when a policy is launched, there will be a large increase in demand, which causes the establishment of many companies that can absorb this demand. When the policy is dropped again the demand plummets and all those companies will go bankrupt. A possible explanation for this phenomenon is that the government has insufficient knowledge about sustainable innovations to make long-term decisions. Another explanation can be that the government in the Netherlands is switched every four years, which means that visons can switch as well.

The second reason is that B2B partners think that the government uses the wrong criteria to select projects. Governmental parties select projects on the basis of old models, like the free market principle, which totally discard the fact that sustainable innovations can (partially) pay for themselves. This causes governmental parties to select projects on lowest initial investment. Since most sustainable projects have higher initial investments, they will never be chosen. A possible explanation is that the government has several pre-determined budgets for different purposes. To illustrate, the budget for construction is another budget than the one for management and maintenance. If these budgets were to be combined, sustainable solutions would be more favourable. Energy savings, or even revenues, would lower the management and maintenance costs, which can then be used for the higher investment costs of sustainable solutions.

The third problem with socio-political acceptance is that some rules and regulations prevent innovative solutions. To exemplify, sustainable innovations often generate energy which has to be distributed. However, not just anybody can distribute electricity by law. A possible explanation for this phenomenon is that governmental parties do not have enough insight knowledge to these problems. Another explanation can be that hey simply do not know that these problems even exist. A third explanation can be that modifying the rules and regulations is a complex problem which takes time.

#### 5.1.2 B2B discussion: Market structure

There are several problems with the current market structure that hinder innovations. The first problem is that companies only focus on financial aspects, the second problem is that the

construction industry is very traditional, and the third problem is that existing business cases do not allow for the collection or distribution of energy. There are two possible solutions for this problem. The first one is that businesses change their business case in such a way that it can incorporate sustainable innovations. They can for instance sell the energy they produce or use it themselves to power their business. A second option is that they will consult an energy broker, who will take care of all energy related issues.

## **5.2 Discussion findings B2B partners on partnership intention**

As can be seen in Chapter 4.2, the main factors that influence partnership intention for B2B partners are commitment, communication process, and outcomes. Each of these factors will be discussed next and links to literature will be made when possible.

### **5.2.1 B2B discussion: Commitment**

The basis of commitment is trust (Mohr & Spekman, 1994). According to most B2B partners you need this trust to collaborate effectively. The reason that trust helps effective collaborations is that people know what the other partners want and what they can say to each other. Moreover, communication is open and honest. All of these benefits foster the speed of innovation, (Covey, 2006) idea suggestion and implication (Clegg et al, 2002). According to the interviewees, gaining trust can be achieved by open communication, visiting each other's companies and by organising non-work activities with all partners. Literature suggests several different ways of fostering trust. The first method is called Risk Talking. This theory describes that when a trustee realises that a trustor has to endure considerable risk to trust the trustee, the trustee will be motivated to behave in a trustworthy manner itself (Das & Teng, 1998; Johnson et al, 1997). The second method is called Trust from Equity Preservation. This method ensures that equity and fairness between partners is mostly preserved (Das & Teng, 1998; Korsgaard, Schweiger, & Sapienza, 1995). This method also connects to the findings in the results section in Chapter 4.2.1 of this report. The third method is called Trust from Communication. This method specifies that open and fast communication is the key to trusting relationships (Das & Teng, 1998; Thomas & Trevino, 1993). Again, this method reflects on the findings in Chapter 4.2.1. The fourth method is called Trust from Interfirm Adaptation. This method specifies that trust is formed if one firm is willing to adapt its behavioural patterns to better fit the other firm (Das & Teng, 1998; Heide & John, 1992).

### **5.2.2 B2B discussion: Outcomes**

Generally, all interviewees seem to agree that every partner should have equal benefits of the partnership. Moreover, partners should know what the other stakeholders in the collaboration want to achieve to be able to align the outcomes for each partner. The reason why equal outcomes are deemed important is because well aligned outcomes strengthen the role of each element in the project and benefit the relationship development process overall. Moreover, well aligned outcomes can foster trust (Beach, Webster, & Campbell, 2005). As discussed in Chapter 5.2.1, trust can strengthen commitment, which was also indicated as an important factor for partnership intention. Logically, trust will not be the final outcome that companies intend. Therefore, it can be stated that trust is a mean to achieve other different outcomes that can only be gained by trustful partnerships.

## **5.3 Discussion findings governmental partners on adoption**

As can be seen in Chapter 4.3, the main factors that influence partnership intention for B2B partners are socio-political acceptance, interaction problems and image. Each of these factors will be discussed next and links to literature will be made when possible.

### **5.3.1 Government discussion: Socio-political acceptance**

Due to contact restrictions, mostly local governments are interviewed. Therefore this discussion will be mostly based on a more local view rather than a national view. Local governments seem to agree that some steps are taken to stimulate the adoption of radically new, sustainable innovations. However, they also acknowledge that this is a slow and tedious process. A possible explanation for this slow acceptance can be that officials are not used to work fast and effectively. They are used to work according to procedures and protocols that slow down decisions. This is problematic because innovations have the tendency of moving fast (Stalk Jr & Hout, 1990). A possible solution can be to not wait for the rules and regulations, but rather just develop and use the innovation and let rules and regulations follow. When innovations are restricted by rules and regulations, local governments sometimes have the possibility to appoint an area in which projects can be built with reduced rules and regulations, allowing innovations to be tested. When the test is successful, rules and regulations should follow faster and can be specified more accurately.

### **5.3.2 Government discussion: Interaction problems**

For governmental parties it is sometimes difficult to interact with businesses. The problem with possible business partners is that governmental parties have to avoid conflicts of interest, which may lead to false competition.

The second problem is that the interactions with people are complex. People need to understand that sustainable innovations need to be treated differently. Most of these innovations generate their own electricity, which means that it has to be distributed as well. Companies find this problematic because they either do not want to change their business model and civilians find this problematic because they do not want to change the way they have been heating their house for 50 years. An explanation might be that people generally fear change and the unknown (Cao et al, 2009). A possible solution can be to make sure that the actual change is as less as possible for most people. This can possibly be done by appointing an energy broker, who will regulate all energy related issues.

### **5.3.3 Government discussion: Image**

Most of the local government interviewees seemed to think that a green and innovative image might foster employment and other fanatical benefits in the future. They believe that such an image will attract the attention of companies who want to be associated with sustainable innovations.

## **5.4 Discussion findings governmental partners on partnership intention**

As can be seen in Chapter 4.4, the main factors that influence partnership intention for B2B partners are the same as for the B2B partners. The factors are commitment, interaction problems, and outcomes. Each of these factors will be discussed next and links to literature will be made when possible.

### **5.4.1 Government discussion: Commitment**

Similar to the B2B partner discussion, local governments also seem to agree that open and unofficial interactions seem to be the key to commitment because it fosters trust. Therefore, the same reason that this is important applies. The reason that trust helps effective collaborations is that people know what the other partners want and what they can say to each other. Moreover, communication is open and honest. All of these benefits foster the speed of innovation (Covey, 2006), and idea suggestion and implication (Clegg et al, 2002). According to the interviewees, gaining trust can be achieved by open communication, visiting each other's companies and by organising non-work activities with all partners.

### **5.4.2 Government discussion: Outcomes**

Interestingly enough, the most important outcome for governmental parties seems to be a green and innovative image because this image can be used for employment and financial gains.

## **5.5 Discussion findings public on adoption**

As can be seen in Chapter 4.5, the main factors that influence adoption of sustainable innovations for the public are compatibility, complexity, observability, interaction problems, and instrumental attributes. Each of these factors will be discussed next and links to literature will be made when possible.

### **5.5.1 Public discussion: Compatibility**

Public adoption has the most influence on sustainable innovations when you want to apply such innovations in the homes of people, especially when you want to apply these changes into existing houses. As mentioned before in chapter 5.3.2, people commonly do not like change (Cao et al., 2009). The interviews have shown that most people do not want to have major renovations to implement sustainable innovations. Therefore it is very important that sustainable innovations can be applied easily in existing situations or else resistance can be expected. A possible solution is adduced by one of the interviewees. He mentioned that you should make sustainable solutions the new standard. To exemplify, when you decide to change your roofing, the roofer should standardly offer solar roofing. In that way, you will have no extra nuisance than you would with a standard roof change, but you will generate energy, which is a nice extra. It is kind of like a cell phone principle. Originally they were just invented for mobile calls. Nowadays everyone has a smartphone which has all kinds of options.

Consistent with the literature on compatibility, the interviews have also shown that higher compatibility leads to a higher adoption rate (Dunphy, 1995; Rogers, 1995).

### **5.5.2 Public discussion: Complexity**

Most people do not care how their product exactly works, as long as they work. If a product is too complex to operate or a user requires a deep understanding of the product to be able to use it, he will not use it. This is consent with the literature on complexity. Higher complexity will lead to lower adoption rates (Dunphy, 1995; Rogers, 1995). Since sustainable innovations have the tendency of being quite complex in execution, minimising that complexity is very important. A possible solution can be that installers check the performance of the sustainable installation they have placed on a regular basis until they work optimally. Furthermore, people should be given clear and simple instructions about how the system works and what they can do to optimise its performance. Finally, the system should be easy to operate if necessary.

### **5.5.3 Public discussion: Observability**

Being able to observe the outcomes of investments people have made seems to be important as well. Sustainable innovations mostly save or generate energy. Since people like to see proof that their investment really pays off, it would be nice to make these energy savings observable. Furthermore, confronting people with their own behaviour makes them more aware of it and can stimulate them to improve it (Kollmuss & Agyeman, 2002). A possible solution to make this more observable is to give people the possibility to monitor their own energy consumption and generation with an app or monitor they can consult at any time.

### **5.5.4 Public discussion: Interaction problems**

One big problem that people seem to encounter is that there are all kinds of interaction problems when trying to implement sustainable innovations. Most of the interviewees seem to be convinced that people are prepared to implement sustainable innovations. However, most people do not know

they exist or do not know who to ask. A possible solution can be that building companies advertise their sustainable solutions and make sure that they can help with all questions related to these solutions. A second problem is that most building companies do not even offer sustainable innovations. This phenomenon probably exists because of the same problem that was mentioned in Chapter 4.1.2; construction companies are very traditional and conservative.

#### ***5.5.5 Public discussion: Instrumental attributes***

Most people do not invest in sustainable innovations just because they are environmentally friendly. The first reason that they invest in sustainable innovations is because they think that they can gain fanatical benefits from it in the future. They can regain their investment by saving on energy costs or by making their house more sustainable so that it will sell better in the future. Moreover, some people want to be free from the existing energy network because of political reasons. It is important to have several substantial benefits for people to make the switch between what they know and what you want them to adopt. People value what they have more than what they do not have. In literature this is called the endowment effect (Gourville, 2006).

## Chapter 6. Conclusion

In this chapter, first all research questions will be answered using the information gathered throughout the research. Each research question will be covered in the same order as they have been presented in Chapter 1.2. Second, managerial implications will be given for each individual research question. Finally, some limitations and future research suggestions will be specified.

### 6.1 Conclusion research question 1

The first research question that is proposed is:

*Which factors influence the adoption of radically new, sustainable innovations?*

This research has shown that all factors that have been identified during the literature review have been confirmed to be important to some extent. Some factors were obviously deemed more important than others, but even the less important factors were mentioned in several interviews. Therefore, it can be concluded that all factors that have been identified in the literature review influence the adoption of radically new, sustainable innovations. Moreover, the identified factors are very diverse. They range from observability and trainability, which are on a more product bases scale, to community acceptance and political acceptance which are concerned with behavioural changes and other ways of thinking.

### 6.2 Conclusion research question 2

The second research question that is proposed is:

*Which factors that influence the adoption of radically new, sustainable innovations are most important for which stakeholder?*

This research has shown that even though governmental and B2B partners have different goals (i.e. business partners want to achieve long term survival and profit while governmental partners want to prepare their community for the future), they still find the same factors important. Both governmental and B2B partners have selected socio-political acceptance as one of the most important factors that influences the adoption of radically new, sustainable innovations. The reason that governmental and B2B partners find this factor important is because they both see that some big governmental changes are needed to make such innovation the new standard. For business partners, market acceptance seems to be problematic as well. Conservative construction companies and outdated tendering offers seem to be the biggest issues that prevent such innovations from being successful. Governmental parties seem to find interaction problems and image important factors for adoption. The interaction problems make it difficult to work with B2B partners (conflicts of interest) and impede interaction with the public. Image seems to be a useful factor because it can attract sustainable and innovative companies to the community, which fosters economic growth. The public find more and other factors important than B2B and governmental. The factors that are deemed most important for public adoption are compatibility, complexity, observability, interaction problems, and instrumental attributes. The public uses other criteria to select such innovations because they face other issues than governmental and B2B partners. They are only concerned with living their own life, which they do not want to complicate with such innovations. Therefore they value compatibility, do not like complexity and want easy and clear interaction with the companies that provide such innovations. Moreover, most people do not even know that such innovations exist, which makes observability important. Finally, since the public needs to invest in such innovations, they want to see benefits from them e.g. in the form of payback times, visual improvement, or higher comfort.

### 6.3 Conclusion research question 3

The third research question that is proposed is:

*What are the motivators and de-motivators for B2B and B2G stakeholders to become a partner in implementing radically new, sustainable innovations?*



This research has shown that there is an underlying problem that causes the difference between interest and investment (becoming a partner) in radically new, sustainable innovations. According to the results, there are three major causes for the difference between interest and investment, i.e. high investment costs, lack of believe and practical problems. The appliance and development of sustainable innovations often is accompanied with higher initial investment costs. A solution for this problem can be that companies form alliances to tackle the initial investment costs for the development of such innovations. A solution for the appliance of such innovations can be that companies can use the money they save on energy for the payment of the sustainable solutions.

The second reason for the difference between interest and investment is the lack of believe in radically new, sustainable innovations. It is hard to make people believe in things they do not believe in themselves. Therefore the best solution is probably to just show them wat the benefits are of such innovations. When this group has proof of the possible success of such innovations, they should believe it automatically.

The third problem is associated with practical problems like insufficient space or complex procedures that take too long, like energy distribution problems. Space related problems can probably be only resolved by the correct timing of the project introduction. For instance, when local governments already have plans to build or renovate a building or area, it is much easier to implement radically new, sustainable innovations. The energy distribution problems might be resolved by a third party who collects and distributes all energy, like an energy broker.

According to this research, the most important factors that can counter these discrepancies between interest and investment for both government and B2B partners are high commitment and well aligned outcomes. When interests are aligned properly and parties are committed, they are more likely to see the success and gains of such innovations. Consequentially, they are more likely to make higher investments, and collectively find solutions for the practical problems. When such a project is successful in practice, other companies or governments are likely to start believing its possibilities.

#### **6.4 Conclusion main research question**

The general research question that is proposed is:

*What is the effect of different external stakeholders on the factors that influence the adoption of radically new, sustainable innovations in a contractor setting?*

This research has shown that the three identified external stakeholders (i.e. B2B partners, governmental partners and the public) all affect the different factors that influence the adoption of radically new, sustainable innovations. It can be concluded that all factors that are identified in the literature study<sup>1</sup> have been found important for the adoption of radically new, sustainable innovations by all stakeholder categories independently. Moreover, some factors are deemed more important than others. The main factors that influence this adoption differ among all stakeholders (as can be seen in Chapter 6.2). A second conclusion is that the main factors that influence the partnership intention, and therefore adoption, also are the same for both B2B and governmental partners (as can be seen in Chapter 6.3).

#### **6.5 Managerial implications**

The findings of this research can be used to denote several managerial implications. The first managerial implication is that companies who want to introduce radically new, sustainable innovations should not wait for rules and regulations to allow them to. Rather they should find local governments who have the same ambitions and vision. Such local governments can provide pilot areas with adapted rules and regulations that can be used to demonstrate these kinds of innovations. If they are received successfully, rules and regulations will likely follow since the Dutch government also has set up country wide environmental goals.

<sup>1</sup> The literature study can be requested from the author by sending an e-mail to the following address:  
lars\_meima@hotmail.com

The second managerial implication is that companies like Heijmans should try to counter market structure problems by changing their business case. Most companies are very conservative, focus only on the financial gains, or do not want to change their own business case to incorporate energy. Therefore, companies like Heijmans who supply radically new, sustainable innovations should change their own business case to minimise these problems. Heijmans should not only install the innovation, but also regulate the energy supply and demand. This allows them to provide a clear benefit to the user (i.e. the user has no more energy related concerns and the price per kWh will likely be lower), and Heijmans can use the saved energy costs to cover their own investment. Regulating the energy supply requires new capacities from Heijmans. Therefore, they should establish a new department (besides the three existing departments that have been specified in the literature study<sup>1</sup>) that is focussed on regulating energy supply and demand.

A third managerial implication is that the success of radically new, sustainable innovations seems to rely heavily on the cooperation with the right partners. Since both governmental and B2B partners find commitment in the form of trust very important, companies like Heijmans should build their alliances on trust. This can be achieved by open and honest communication and by organising non-work related excursions with all partners. Moreover, such relationships also foster being honest about your goals. This means that it will be easier to identify and align those goals, which in turn will lead to clear outcomes for each partner involved.

A fourth managerial implication is that when companies like Heijmans launch radically new, sustainable innovations, they should make sure that they do not complicate day-to-day life for the public. When such innovations need to be implemented in existing houses or in residential areas, Heijmans should make sure that the innovation is compatible with the existing situation, that the complexity is low and that they communicate clearly what impact the changes will have. To exemplify, when someone already needs a new roof, he should be offered a sustainable roof that generates electricity. This minimises the inconvenience of implementing such a solution because the customer had already planned to do a renovation.

A fifth managerial implication is that you need to show the public that using such an innovation has several benefits. Most importantly for most people is that the financial investment should make sense. However, other aspects also matter. To exemplify, when people buy a new kitchen or car, they seldom choose the cheapest one. They also consider other aspects, like appearance or comfort. Therefore, Heijmans should not only advertise such innovations as cost savers, they should also highlight other benefits.

## **6.6 Limitations and future research suggestions**

The first limitation of this research is that almost all interviewees that have participated in this research have direct or indirect connections to Heijmans. This means that some interviewees can have a biased opinion that might not be generalizable. Future research should counteract this bias by interviewing stakeholders that are not related to each other.

The second limitation of this research is that because of the qualitative and explorative nature of the research it is not possible to quantify the results and prove the numerical significance of the specified factors. Future research could quantify the factors that have been identified in this research to check if they are indeed significant. Moreover, future research can use quantitative analysis to identify possible underlying relationships between factors.

Another limitation is that it has been chosen to take an external view in this research. However, during the interviews it has become clear that internal acceptance of such innovations is also problematic both horizontally and vertically. Therefore it would be interesting for future research to take an internal point of view.

A fourth limitation is that the interviewed governmental parties mostly were local governments. However, the national government could likely make more effective rules and regulations that help solve the socio-political problems. Moreover, these local governments were

<sup>1</sup> The literature study can be requested from the author by sending an e-mail to the following address:  
lars\_meima@hotmail.com

already interested in such innovations. Although this phenomenon has been controlled for by asking general questions, the results might still be biased. Both of these problems could be solved in future research by interviewing the national government or governmental parties that work with several local governments.

A fifth limitation is that only the factors that were deemed most important for each stakeholder itself have been identified. In future research it might be interesting to check what stakeholders think that other stakeholders find important factors. Findings from such a research could help determine if there is a difference between what people think that others value and what they actually value. This research has indicated that there are differences between what stakeholders think other stakeholders value and what they actually value. To exemplify, several B2B partners think that the public only values payback times. However, the public interviews have shown that they also value aesthetics and comfort. Further research is needed to pinpoint what these discrepancies are exactly and if minimising them can foster adoption.

## Bibliography

- Abernathy, W., & Clark, K. (1985). Innovation: mapping the winds of creative destruction. *Research Policy*, 3–22.
- Admas, J. M., & Warren, J. H. (1999). *Handbook of Interpersonal Commitment and Relationship Stability*. United States of America: Kluwer Academic / Plenum Publishers.
- Ahearne, M., Rapp, A., Hughes, D. E., & Jindal, R. (2010). Managing Sales Force Product Perceptions and Control Systems in the Success of New Product Introductions. *Journal of Marketing Research*, 764–776.
- Aken, J. E., Berends, H., & Bij, H. v. (2007). *Problem Solving in Organisations*. United States of America: Cambridge University Press, New York.
- Annacchino, M. A. (2003). *New Product Development: From initial idea to product management*. USA: Elsevier.
- Arrow, K. (1974). *The limits of an organization*. New York: Norton.
- Assael, H. (1984). *Consumer Behavior and Marketing Action*. Kent, Boston.
- Baden-Hellard, R. (1995). *Project partnering: principle and practice*. London: Thomas Telford.
- Baloglu, S., & McCleary, K. (1999). A model of destination image formation. *Annals of Tourism Research*, 868–897.
- Beach, R., Webster, M., & Campbell, K. (2005). An evaluation of partnership development in the construction industry. *International Journal of Project Management*, 611–621.
- Belk, R. (1988). Possessions and the extended self. *Journal Consumer Research*, 139–168.
- Benedetto, A. C. (1999). Identifying the Key Success Factors in New Product Launch. *Journal of Product Innovation Management*, 530–544.
- Bennett, J., & Jayes, S. (1995). Trusting the team: the best practice guide to partnering in construction. *Center for Strategic Studies in Construction, University of Reading*.
- Bennett, J., & Jayes, S. (1995). *Trusting the team: the best practice guide to partnering in construction*. Reading: Center for Strategic Studies in Construction, University of Reading.
- Black, C., Akintoye, A., & Fitzgerald, E. (2000). An analysis of the success factors and benefits of partnering in construction. *International Journal of Project Management*, 423–434.
- Bloemer, J., & Ruyter, K. (1998). On the relationship between store image, store satisfaction and store loyalty. *European Journal of Marketing*, 499–513.
- Boons, F., Montalvo, C., Quist, J., & Wagner, M. (2013). Sustainable innovation, business models and economic performance: an overview. *Journal of Cleaner Production*, 1–8.

- Brentani, U. d. (2001). Innovative versus incremental new business services: Different keys for achieving success. *The Journal of Product Innovation Management*, 169–187.
- Brown, J. (1991). Research that reinvents the corporation. *Harvard Business Review*, 102–111.
- Burnes, B., & New, S. (1996). *Strategic advantage and supply chain collaboration*. London: Manchester School of Management: UMIST, AT Kearney.
- Cao, H. H., Han, B., Hirshleifer, D., & Zhang, H. H. (2009). Fear of the Unknown: Familiarity and Economic Decisions. *Review of Finance*, rfp023.
- Chen, C., & Tsai, D. (2007). How destination image and evaluative factors affect behavioral intentions? *Tourism Management*, 1115–1122.
- Choo, S., & Mokhtarian, P. (2002). The Relationship of Vehicle Type Choice to Personality, Lifestyle, Attitudinal, and Demographic Variables. . *University of California, Davis Report*, 02-06.
- Clegg, C., Unsworth, K., Epitropaki, O., & Parker, G. (2002). Implicating trust in the innovation process. *Journal of Occupational and Organizational Psychology*, 409-422.
- Construction Industry Institute. . (1991). *In search of partnering excellence. Special publication*. Texas: Construction Industry Institute. .
- Covey, S. M. (2006). The speed of trust: The one thing that changes everything. *Simon and Schuster*.
- Damanpour, F., & Schneider, M. (2006). Phases of the Adoption of Innovation in Organizations: Effects of Environment, Organization and Top Managers. *British Journal of Management*, 215–236.
- Das, T. K., & Teng, B. S. (1998). Between trust and control: Developing confidence in partner cooperation in alliances. *Academy of management review*, 491-512.
- del Río, P., & Unruh, G. (2007). Overcoming the lock-out of renewable energy technologies in Spain: the cases of wind and solar electricity. *Renewable and Sustainable Energy Reviews*, 1498–1513.
- Deszca, G., Munro, H., & Noori, H. (1999). Developing breakthrough products: challenges and options for market assessment. *Journal of Operations Management*, 613–630.
- Deszca, G., Munro, H., & Noori, H. (1999). Developing breakthrough products: challenges and options for market assessment. *Journal of Operations Management*, 613–630.
- Dittmar, H. (1992). The Social Psychology of Material Possessions: To Have Is to Be. *St. Martin's Press, Hemet Hempstead/Harvester Wheatsheaf/New York*.
- Dittmar, H. (1997). The Social Psychology of Material Possessions: To Have Is to Be. *Journal of Euro-Marketing*, 41–56.

- Dunphy, S. H. (1995). ACCEPTANCE OF INNOVATIONS: THE CUSTOMER IS THE KEY. *The Journal of High Technology Management Research*, 193-209.
- ECN; Energie-Nederland; Netbeheer Nederland. (2014). *Energietrends 2014*. ECN.
- ecotricity. (2014). *ecotricity ecotricity*. Retrieved from <https://www.ecotricity.co.uk/our-green-energy/energy-independence/the-end-of-fossil-fuels>
- Energie, T. (2014). *Topsector Energie: empowering the new economy*. Retrieved 10 15, 2014, from Topsector Energie: empowering the new economy: <http://topsectorenergie.nl/organisatie/>
- Fuglie, K. O., & Kascak, C. A. (2001). Adoption and diffusion of natural-resource-conserving agricultural technology. *Review of Agricultural Economics*, 386-403.
- Garcia, R., & Calantone, R. (2001). A critical look at technological innovation typology and innovativeness terminology: a literature review. *The Journal of Product Innovation Management*, 110—132.
- Gourville, J. T. (2006). Eager Sellers Stony Buyers; Understanding the Psychology of New-Product Adoption. *harvard business review*, 98-106.
- Gulati, R. (1995). Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances? *Academy of management journal*, 85-112.
- Haksever, A., Demir, I., & Giran, O. (2001). Assessing the benefits of longterm relationships between contractors and subcontractors in the UK. *International Journal of Construction Market*.
- Hammer, M., & Champy, J. (1993). *Re-engineering the Corporation; A Manifesto for Business Revolution*. . New York: Harper Business.
- Heesup, H., Li-Tzang, (. H., & Jin-Soo, L. (2009). Empirical investigation of the roles of attitudes toward green behaviors, overall image, gender, and age in hotel customers' eco-friendly decision-making process. *International Journal of Hospitality Management*, 519–528.
- Heffner, R. (2007). Semiotics and Advanced Vehicles: What Hybrid Electric Vehicles (HEVs) Mean and Why it Matters to onsumers. *Institute of Transportation Studies, University of California, Davis Research Report*, 07-30.
- Heide, J. B., & John, G. (1992). Do norms matter in marketing relationships? . *Journal of Marketing*, 32-44.
- Heimans. (2014, 13 11). *Bouwen aan de contouren van morgen*. Retrieved from <http://www.heijmans.nl/nl/expertises/>
- Herbig, P. A. (1995). ACCEPTANCE OF INNOVATIONS: THE CUSTOMER IS THE KEY! *The Journal of High Technology Management Research*, 193-209.
- Het Fiancieele Dagblad. (2015, 06 29). *duurzaam-ondernemen.nl*. Retrieved 07 13, 2015, from <http://www.duurzaam-ondernemen.nl/kabinet-toont-te-weinig-duurzame-initiatieven/>

- Johnson, J. L., Cullen, J. B., Sakano, T., & Takenouchi, H. (1997). Setting the stage for trust and strategic integration in Japanese-U.S. cooperative alliances. . *Cooperative strategies: Vol. 1. North American perspectives: ,* 227-254.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental education research*, 239-260.
- Korsgaard, M. A., Schweiger, D. M., & Sapienza, H. J. (1995). Building commitment, attachment, and trust in strategic decision-making teams: The role of procedural justice. . *Academy of Management Journal*, 60-84.
- Labuschagne, C., & Brent, A. C. (2005). Sustainable Project Life Cycle Management: the need to integrate life cycles in the manufacturing sector. *International Journal of Project Management*, 159–168.
- Leeman, D., & Winer, R. (1997). *Product Management*. Irwin, Chicago: Il.
- Leifer, R., O'Connor, C. G., & Rice, M. (2001). Implementing radical innovation in mature firms: The role of hubs. *The Academy of Management Executive*, 102-113.
- Lenard, D., Bowen-James, A., Thompson, M., & Anderson, P. L. (1996). Models for success. *Adelaide: Construction Industry*.
- Levy, P. F. (2001). The Nut Island effect. When good teams go wrong. *Harvard Business Review*, 51-59.
- Libertus Energy Finance*. (2014). Retrieved 10 15, 2014, from Libertus: <http://www.libertus.nl/waarom-is-duurzaamheid-ook-alweer-belangrijk/>
- Lieberman, M., & Montgomery, D. (1988). First-mover advantages. *Strategic Management Journal*, 41–58.
- Lin, C., Morais, D., Kerstetter, D., & Hou, J. (2007). 7. Examining the role of cognitive and affective image in predicting choice across natural, developed, and theme park destinations. *Journal of Travel Research*, 183–194.
- Lu, J., Yao, J. E., & Yu, C.-S. (2005). Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. *Journal of Strategic Information Systems*, 245–268.
- Marcati, A., Guido, G., & Peluso, A. M. (2008). The role of SME entrepreneurs' innovativeness and personality in the adoption of innovations. *Research Policy*, 1579–1590.
- McKittrick, R. (2014, 08 31). *Professor Ross McKittrick: Wind turbines don't run on wind, they run on subsidies*. Retrieved 03 06, 2015, from stop these things: <http://stopthesethings.com/2014/08/31/professor-ross-mckittrick-wind-turbines-dont-run-on-wind-they-run-on-subsidies/>

- Mohr, J., & Spekman, R. (1994). Characteristics of partnership success: partnership attributes, communication behavior, and conflict resolution techniques. *Strategic Management Journal*, 135-152.
- Moore, G., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 173–191.
- Negro, S. O., Alkemade, F., & Hekkert, M. P. (2012). Why does renewable energy diffuse so slowly? A review of innovation system problems. *Renewable and Sustainable Energy Reviews*, 3836–3846.
- Nieto, M. J., & Santamaría, L. (2007). The importance of diverse collaborative networks for the novelty of product innovation. *Technovation*, 367-377.
- Nill, J., & Kemp, R. (2009). Evolutionary approaches for sustainable innovation policies: from niche to paradigm. *Research Policy*, 668–680.
- Noppers, E. H., Keizer, K., Bolderdijk, J. W., & Steg, L. (2014). The adoption of sustainable innovations: Driven by symbolic and environmental motives. *Global Environmental Change*, 52–62.
- O'Connor, C. G. (1998). Market Learning and Radical Innovation: A Cross Case Comparison of Eight Innovation Projects. *Journal of Product Innovation Management*, 151– 66.
- Oliveira, T., & Martins, M. F. (2011). Literature Review of Information Technology Adoption. *The Electronic Journal Information Systems Evaluation*, 110-121.
- Ozaki, R. (2011). Adopting Sustainable Innovation: What Makes Consumers Sign up to Green Electricity? *Business Strategy and the Environment*, 1–17.
- Parlement, F. E. (2014). *Relatie EU-Rusland*. Retrieved 2014, from [http://www.europa-nu.nl/id/vhkuiga832pv/relatie\\_eu\\_rusland](http://www.europa-nu.nl/id/vhkuiga832pv/relatie_eu_rusland)
- Raven, R., & Verbong, G. (2004). Ruling out innovations – technological regimes, rules and failures: the cases of heat pump power generation and bio-gas production in The Netherlands. *Innovation Management, Policy and Practice*, 178–198.
- Reijngoud, T. (2011, 12 22). *Triodos Bank*. Retrieved 07 10, 2015, from <https://www.triodos.nl/downloads/over-triodos-bank/kleur-geld/duurzame-meters-maken>
- Reinganum, J. F. (1981). Market structure and the diffusion of new technology. *The Bell Journal of Economics*, 618-624.
- Rogers, E. M. (1976). New Product Adoption and Diffusion. *Journal of Consumer Research*, 290-301.
- Rogers, E. M. (1995 ). *DIFFUSION OF INNOVATIONS*. New York: THE FREE PRESS.
- Scott, B. (2001). *Partnering in Europe – incentive based alliancing for projects*. London: Thomas Telford.



- SER. (2013). *SER-Commissie Borging Energieakkoord*. Retrieved 11 01, 2014, from <http://www.energieakkoordser.nl/~media/files/energieakkoord/overzicht-belangrijkste-maatregelen-energieakkoord.ashx>
- Shaughnessy, H. (2013, 15 01). *Apple and Google, #1 and #2 Of World's Most Innovative Companies. Why?* Retrieved 03 16, 2015, from <http://www.forbes.com/>: <http://www.forbes.com/sites/haydnshaughnessy/2013/01/15/apple-and-google-1-and-2-of-worlds-most-innovative-companies-why/2/>
- Skaar, O. (2014, 11 13). *Curiousmatic*. Retrieved 11 20, 2014, from <http://curiousmatic.com/russia-uses-oil-gas-pipelines-economic-weapon/>
- Song, M. X., & Parry, M. E. (1999). Challenges of managing the development of breakthrough products in Japan. *Journal of Operations Management*, 665–688.
- Sorescu, A. B., & Spanjol, J. (2008). Innovation's Effect on Firm Value and Risk: Insights from Consumer Packaged Goods. *Journal of Marketing*, 114–132.
- Spitzer, D. R. (2007). *Transforming Performance Measurement*. New York: AMACOM.
- Stalk Jr, G., & Hout, T. M. (1990). Competing against time. *Research Technology Management*, 19.
- Stichting Duurzame Energie Koepel. (2014). Retrieved 11 01, 2014, from <http://www.dekoepel.org/brancheorganisaties-van-de-duurzame-energie-koepel/>
- Subramaniam, M., & Youndt, M. A. (2005). The Influence of Intellectual Capital on the Types of Innovative Capabilities. *Journal of Management*, 450-463.
- Thomas, J. B., & Trevino, L. K. (1993). Information processing in strategic alliance building: A multiple-case approach. . *Journal of Management Studies*, 779-814.
- Thomas, S., Rose, T., Mak, M., & Chen, S. (2002). Problematic issues associated with the project partnering – the contractor perspective. *International Journal of project managemnet*, 437–449.
- Topsector Energie. (2014). *Topsector Energie: empowering the new economy*. Retrieved 11 01, 2014, from <http://topsectorenergie.nl>
- Urban, G. L., Weinberg, B. D., & Hauser, J. R. (1996). Premarket forecasting of really-new products. *Journal of Marketing*, 47-60.
- Valente, T. W. (1996). Social network thresholds in the diffusion of innovations. *Social networks* , 69-89.
- Veryzer, R. (1998). Key Factors Affecting Customer Evaluation of Discontinuous New Products. . *Journal of Product Innovation Management*, 136 –50.
- Williamson, O. (1975). *Markets and Hiearcies: Analysis and Antitrust Implications*. New York: Free Press Macmillan.

- Wolsink, M. (2012). The research agenda on social acceptance of distributed generation in smart grids: Renewable as common pool resources. *Renewable and Sustainable Energy Reviews*, 822-835.
- Woodruff, R. B. (1997). Customer value: the next source for competitive advantage. *Journal of the academy of marketing science*, 139-153.
- Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. 2683–2691.

## Appendix 1: Research summary

There is a worldwide increasing emphasis on sustainability due to population growth, rapid depletion of fossil fuels and emission regulations. This development has been noticed by several European governments, including the Netherlands. Consequentially, many companies have taken steps to become more sustainable. One of these companies is a large contracting company called Heijmans. Large Contracting companies can have a significant share in implementing sustainable developments since they can build complete sustainable urban environments. However, several problems regarding the implementation of the innovations needed to attain this goal still remain.

This thesis focuses on three notable gaps in literature. (Gap 1) Literature suggests that there are different ways to characterise innovations. For instance, many scholars suggest a difference between radical and incremental innovations. Both types of innovations come with their own set of challenges that influence adoption. Similarly, there is a difference between the factors of sustainable and non-sustainable innovations that influence adoption. However, no literature exists on the combined factors of different research streams on this topic. Therefore, the first research question will be: *Which factors influence the adoption of radically new, sustainable innovations?*

(Gap 2) Literature has shown that the adoption of radically new, sustainable innovations can usually not be implemented without the support of key stakeholders (Nieto & Santamaría, 2007). However, different stakeholders have different reasons to adopt or reject an innovation. For instance, the government might be more interested in the environmental aspects, whereas the public might be more interested in cost savings. No literature seems to exist which distinguishes between these different kinds of stakeholders while using the same set of factors that influence adoption. Therefore, the second research question will be: *Which factors that influence the adoption of radically new, sustainable innovations are most important for which stakeholder?*

(Gap 3) Another finding in the literature review<sup>1</sup> is that there is a difference between perceived and actual adoption of the radically new sustainable innovations (Fuglie & Kascak, 2001; Lu, Yao, & Yu, 2005). Often initial adoption intentions seem high, but actual adoption is disappointing. This is problematic because this phenomenon makes it hard for firms to forecast whether or not their innovation will be successful. There has been research on this topic, but not specifically for radically new, sustainable innovations. Moreover, literature in this field does not make a distinction between the motivators or de-motivators that are normative for different stakeholders. Therefore, the third research question will be: *What are the motivators and de-motivators for B2B and B2G stakeholders to become a partner in implementing radically new, sustainable innovations?*

Before the main research is commenced, a pre research will be conducted to gain knowledge from people who are experienced with the implementation of radically new, sustainable innovations. This knowledge can be used to help determine what can be interesting questions to ask in the interviews for the actual research and it can help verify the pre-determined factors. Both the data gathering for the pre-research and the final research will be done by using semi-structured interviews. The interviews will be conducted in three stakeholder categories, as determined in the literature review. The stakeholder categories are the public, (potential) B2B partners and (potential) B2G partners. In each category five to ten interviews will be conducted. The data gathered in the main research will be coded using the template approach.

Analysing the data has revealed that the main goal for investing in radically new, sustainable innovations for most business partners is ultimately to ensure long term survival. However, the means of using such innovations for this goal differs among companies. Logically, most business partners expect to eventually generate a profit from their investments by selling the products,

finding a new market or simply filling production capacity. For other business partners, especially knowledge institutes, profit is not the main driver. These partners often are funded by the government, and their main goal is to create employment opportunities. They do this by trying to match different business partners and by providing knowledge to these partners. This knowledge can be used to help accelerate the development process and heighten the potential market success. Even though the means of achieving long term survival differ among business partners, they all seem to agree that radically new, sustainable innovations can be used to achieve this goal. Moreover, after analysing the data, it seemed that all types of business partners had consistent ideas about what factors influence the adoption of such innovations. Even though that throughout the interviews all factors were deemed important by some interviewees, there are clearly two sub-factors that seem to be most important for the adoption of radically new, sustainable innovations by business partners, i.e. socio-political acceptance and market structure.

Many companies do not have the means to achieve long term survival alone because they for instance lack the proper knowledge, capacity, or expertise to launch these innovations by themselves. Therefore many companies seek partnerships to be able to launch these kinds of innovations. Both knowledge institutes and other business partners seem to have similar thoughts on which factors influence partnership intention. Most pre-determined factors were deemed important in most interviews, however there were a few factors that were clearly most important. The factors that were mentioned as most important throughout the interviews were commitment, communication process and outcomes.

Analysing the data has revealed that the main reason for investing in radically new, sustainable innovations for most governmental partners is ultimately to ensure that they and their community are prepared for the future. Governmental parties use these innovations in different ways to attain this goal. They can for instance use these innovations to create an innovative or green image, which will attract businesses that want to invest and develop these innovations. In turn, this can lead to economic growth. It can be concluded that the interviewed governmental parties agree that radically new, sustainable innovations can help them reach their future goals. Analysing the data has revealed that the main factors that influence the adoption of these innovations by governmental parties are socio-political acceptance and firm image.

The main finding on partnership intention of governmental parties is that the factors that influence it most are the exact same as for B2B partners. This means that most local governments find the factors commitment, communication process and outcomes most important.

Analysing the data has revealed that most people (public) do not know or do not care about sustainable innovations. The people that do care are clearly the early adopters who are already interested in these kinds of innovations. These early adopters are intrinsically interested in sustainability or innovative technology. Evidently, most people need to be stimulated to adopt these kinds of innovations. Analysing the data has revealed that the factors that influence the adoption of these innovations are compatibility, complexity, observability, interaction problems, and instrumental attributes.

This research has contributed to the before specified gaps in the following ways. (Gap 1) This research has shown that all factors that have been identified during the literature review have been confirmed to be important to some extent. Some factors were obviously deemed more important than others, but even the less important factors were mentioned in several interviews. Therefore, it can be concluded that all factors that have been identified in the literature review influence the adoption of radically new, sustainable innovations. Moreover, the identified factors are very diverse. They range from observability and trainability, which are on a more product bases scale, to community acceptance and political acceptance which are concerned with behavioural changes and other ways of thinking.

(Gap 2) This research has shown that even though governmental and B2B partners have different goals (i.e. business partners want to achieve long term survival and profit while governmental partners want to prepare their community for the future), they still find the same factors important. Both governmental and B2B partners have selected socio-political acceptance and market structure as the most important factors that influence the adoption of radically new, sustainable innovations. The reason that governmental and B2B partners find the same factors important is because they both see that you need some big national and cultural changes to make such innovation the new standard. Conservative construction companies and outdated rules and regulations seem to be the biggest issues that prevent such innovations from being successful. However, public opinion differs from this view. The public uses more and other factors than B2B and governmental parties to adopt such innovations. The factors that are deemed most important for public adoption are compatibility, complexity, observability, interaction problems, and instrumental attributes. The public uses other criteria to select such innovations because they face other issues than governmental and B2B partners. They are only concerned with living their own life, which they do not want to complicate with such innovations. Therefore they value compatibility, do not like complexity and want easy and clear interaction with the companies that provide such innovations. Moreover, most people do not even know that such innovations exist, which makes observability important. Finally, since the public needs to invest in such innovations, they want to see benefits from them e.g. in the form of payback times, visual improvement, or higher comfort.

(Gap 3) This research has shown that there is an underlying problem that causes the difference between interest and investment (becoming a partner) in radically new, sustainable innovations. According to the results, there are three major causes for the difference between interest and investment, i.e. high investment costs, lack of believe and practical problems. The appliance and development of sustainable innovations often is accompanied with higher initial investment costs. A solution for this problem can be that companies form alliances to tackle the initial investment costs for the development of such innovations. A solution for the appliance of such innovations can be that companies can use the money they save on energy for the payment of the sustainable solutions. The second reason for the difference between interest and investment is the lack of believe in radically new, sustainable innovations. It is hard to make people believe in things they do not believe in themselves. Therefore the best solution is probably to just show them wat the benefits are of such innovations. When this group has proof of the possible success of such innovations, they should believe it automatically. The third problem is associated with practical problems like insufficient space or complex procedures that take too long, like energy distribution problems. Space related problems can probably be only resolved by the correct timing of the project introduction. For instance, when local governments already have plans to build or renovate a building or area, it is much easier to implement radically new, sustainable innovations. The energy distribution problems might be resolved by a third party who collects and distributes all energy, like an energy broker. According to this research, the most important factors that can counter these discrepancies between interest and investment for both government and B2B partners are high commitment and well aligned outcomes. When interests are aligned properly and parties are committed, they are more likely to see the success and gains of such innovations. Consequentially, they are more likely to make higher investments, and collectively find solutions for the practical problems. When such a project is successful in practice, other companies or governments are likely to start believing its possibilities.