

Managerial preference for open-innovation

The influence of regulatory focus and the capability gap



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Abstract

This research tries to explain the determinants of decision makers for the preference for open-innovation. This research does this by focussing on individual differences among managers and whether this is influenced by organizational factors. In order to identify the differences between managers this research used the regulatory focus theory and the capability gap theory to explain the individual- and organizational factors that could influence the preference for open-innovation. The value of the regulatory focus theory lies within its ability to help explain differences in decision making preference (Gamache et al., 2015). While the value of the capability gap theory lies within its ability to explain that individuals choose different forms of resource configuration depending on the complexity of the situation under which decisions need to be made. So it helps to explain difference in decision making under different organizational circumstances. The data for this study is collected in an experimental vignette study. The results of the study show that the chronic regulatory focus of an individual does have a relation with the preference for open-innovation. The more promotion focussed an individual is, the more preference for open-innovation there is. Also the capability gap shows to have an influence on the preference for open-innovation. The wider the capability gap gets, the more managers prefer to use open-innovation. This means that preference for open-innovation is influence by indeed the individual factors as well as organizational factors.

Preface and acknowledgements

When I finished my HBO in Automotive Management I started with the Pre-MSc in Business Administration at the Rijksuniversiteit Groningen with a specialization in Small business and Entrepreneurship. After that, I started with the MSc Business Administration and decided to specialize on Innovation and Entrepreneurship. In the course Building the Sustainability Index I became familiar with the concept Internet of Things, which draw my attention. Also during some innovation course I became more familiar with open-innovation and I found out it is a very popular topic of research these days. Because of that I became interesting in the fact why managers prefer to use open-innovation and why some don't. And because I see many developments in the Automotive industry and my back ground lies in the Automotive industry I decided to investigate why SME managers in the automotive industry would prefer to use open-innovation. Is it because their personal characteristics or is it depending on the type of scenario they're facing or maybe a combination of both?

At first I would like to thank dr. S. Khanagha. He helped me greatly in shaping my thoughts into a great concrete academic research. We had good discussions about my content and process and dr. S. Khanagha was able to do this regularly, which I found pleasant. His experience in research and large area of expertise helped me to get some extra relevant input necessary to conduct this study.

In the second place, I would like to thank dr. P.E.M. Ligthart for being my second reader and examining my master thesis. With his feedback on the proposal I was able to further improve my research.

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Table of Content

| | |
|--|-----------|
| Abstract | 2 |
| Preface and acknowledgements | 3 |
| Table of Content | 4 |
| 1. Introduction | 5 |
| 2. Theoretical framework | 8 |
| 2.1 <i>Open-innovation</i> | 8 |
| 2.3 <i>Drivers of strategy preference</i> | 10 |
| 2.3.1 Individual factors | 10 |
| 2.3.2 Organizational factors | 12 |
| 3. Methodology and Context | 15 |
| 3.1 <i>Research context</i> | 15 |
| 3.2 <i>Research strategy</i> | 16 |
| 3.3 <i>Data collection</i> | 17 |
| 3.4 <i>Data analysis</i> | 17 |
| 3.4.1 Data preparation | 17 |
| 3.4.2 Manipulation check | 18 |
| 3.4.3 Reliability analysis | 19 |
| 3.4.4 Factor analysis | 20 |
| 3.4.5 Normality of distribution | 20 |
| 3.4.6 Assumptions | 21 |
| 3.5 <i>Boundaries, scope of research and limitations</i> | 21 |
| 4. Results | 22 |
| 4.1 <i>Bivariate analysis</i> | 22 |
| 4.2 <i>Model of fit of the regression models</i> | 23 |
| 4.3 <i>Chronic regulatory focus and the preference for open-innovation</i> | 24 |
| 4.4 <i>The capability gap and the preference for open-innovation</i> | 25 |
| 4.5 <i>The interaction effect of the situational regulatory focus and capability gap</i> | 25 |
| 4.6 <i>Summary linear regression results</i> | 26 |
| 5. Conclusion and Discussion | 27 |
| 5.1 <i>Limitations and further research</i> | 29 |
| 5.2 <i>Theoretical implications</i> | 30 |
| 5.3 <i>Managerial implications</i> | 31 |
| References | 32 |
| Appendices | 36 |
| Appendix A <i>Capabilities needed for internet of things</i> | 36 |
| Appendix B <i>Vignettes</i> | 38 |
| Appendix C <i>Missing value analysis</i> | 41 |
| Appendix D <i>Manipulation check</i> | 42 |
| Appendix E <i>Reliability check</i> | 42 |
| Appendix F <i>Factor analysis</i> | 45 |
| Appendix G <i>Homoscedasticity</i> | 46 |
| Appendix H <i>Regression analysis</i> | 47 |

1. Introduction

A popular topic at the moment is open-innovation. Since open-innovation is important for those who wish to lead through innovation (Chesbrough & Appleyard, 2007). Open-innovation is about sharing ideas, resources and cooperating with other stakeholders to increasing the level of quality of the innovation. So organizations are more relying on external sources of innovation (Chesbrough, 2003). To my knowledge there is no research done about managerial preference for open-innovation. Even though managerial preference is an important topic, due to the fact that it influences decision-making (Gamache et al., 2015).

This study will investigate whether individual level factors and organizational level factors are of great importance in the preference for open-innovation. This is likely since organizations depend on the cognitive capabilities of a manager, which includes also the mental ability to make decisions (Helfat & Peteraf, 2014; Hodgkinson & Healey, 2011; Hough & Ogilvie, 2005). Differences in individual characteristics and decision making preference between managers could explain why some managers have more preference for open-innovation than others. This shows the importance of individual factors in the decision process. The regulatory focus theory is used for its ability to explain decision-making preference (Gamache et al., 2015). So the regulatory focus theory will help identify whether differences in individual factors will influence decision making and by that the preference for open-innovation. In order to identify the organizational factors the capability gap of Lavie (2006) is used. This theory makes a nice distinction between managers preference in general for capability evolution or capability substitution in certain innovation situations. The capability gap does this by making a distinction between the capabilities possessed by the company and the capabilities needed to successfully develop the innovation. Lavies (2006) research states that when a manager is facing a large capability gap, the manager is more likely to prefer to use capability substitution. Which means the manager is more likely to use external resources , which is what open-innovation is all about. So it would be interesting to investigate whether this relationship means that managers who face a large gap would also have more preference for open-innovation since this is a form of capability substitution.

Based on this knowledge the main research question is formulated. *“To what extent do organizational factors and individual characteristics explain the managerial preference for open-innovation”?*

To investigate why some managers have a higher preference for open-innovation than others, this study uses the capability gap theory of Lavie (2006) to identify the organizational factors. The capability gap theory of Lavie (2006) is helpful in explaining managerial preference for open-innovation because it includes the organizational capability gap faced by the company. Managers could have more preference for open-innovation when the capability gap is large since Lavie (2006) states that managers who face a large gap have more preference for capability substitution which means the capabilities will be acquired outside the organization. This theory focuses on the capabilities possessed by an organization and the capabilities needed to successfully implement the innovation. Lavie (2006) names this as the pre change capability configuration and the value maximizing capability configuration. The capabilities can be divided into two types of capabilities, organizational capabilities and individual capabilities.

When looking at the individual factors of managers that can influence open-innovation preference, this study uses the regulatory focus theory of Higgins (1997). Since this is a very recent and suitable theory for explain managerial decision making (Gamache, McNamara, Mannor and Johnson, 2015). This due to the fact that the regulatory focus theory will help explain the difference between managers in their decision making and thereby helps explaining whether this difference has an effect on the preference open-innovation through their decisions for certain external sources of information. This theory states that there are two types of people namely the promotion focus and the prevention focus. The promotion focus people are driven by the need to fulfil their ideals and aspirations for growth and advancement reasons and prevention focus people are driven by the need to fulfil duties and obligations to achieve safety and security (Higgins, 1997).

This study will be conducted among higher educated professionals and students within the context of automotive industry and an innovation related to the Internet of Things (IoT). The definition that will be used in this study will be the one from Domingue (2008), which formulates the IoT as: ‘a world where physical objects are seamlessly integrated into the information network and where the physical objects can become active participants in business processes’. The company Gartner expects a large growth in the IoT and the Dutch Ministry of Economic Affairs (2015) also pointed out the importance of the IoT to the automotive industry, so this is why this innovation context is chosen.

The key findings this research show that there is indeed a relation between the regulatory focus of an individual and their preference for open-innovation as well as a relation between the capability gap and the preference for open-innovation.

The study starts with chapter two in which hypothesis are formulized out of a theoretical framework. The third chapter captures the methodology part, which explains the context of the study, how the data is gathered and how the analyses are performed. In the fourth chapter the results are shown. The results will be discussed in chapter five, which is the conclusion and discussion part. At last there will be some theoretical and managerial implications and suggestions for future research.

2. Theoretical framework

2.1 Open-innovation

Open-innovation is about sharing ideas, resources and cooperation with other stakeholders and open innovation is important for those who wish to lead through innovation (Chesbrough & Appleyard, 2007). Open-innovation is also important since it helps to increase the level of quality of the innovation (Björk and Magnusson, 2009). So organizations are more relying on external sources of innovation (Chesbrough, 2003). Open innovation has also been proven to have many benefits for sustaining competitiveness. For instance the important benefit that open innovation improves the productivity of the R&D within the organization (Ili, Albers and Miller, 2010).

Many articles defined benefits and drawbacks of open-innovation. This study summarizes and presents these in an overview of what different researchers found to be the benefits and drawbacks of open-innovation.

Table 1

| Author(s) | Year | Benefits |
|---|------|--|
| Dahlander & Gan | 2010 | - Gaining interest of other parties - More focussed on bringing inventions into commercial applications |
| Van de Varde, De Jong, Van Haverbeke and De Rochemont | 2009 | - Meeting customer demands - Obtaining new knowledge |
| Jacobs and Waalkens | 2001 | - Market considerations - Knowledge creation - Reduce time-to-market - Better utilize internal creativity |
| Hoffman and Schlosser | 2001 | - Obtaining new knowledge - Obtaining resources - Sharing risk - Lowering costs |
| Mohr and Spekman | 1994 | - Obtaining new knowledge - Obtaining resources - Sharing risk - Lowering costs |
| Ili, Albers and Miller | 2010 | - Improves productivity of R&D within the organization |
| Koruna | 2004 | - Set the industry standard - Profit from infringements - Realize learning effects |

| Author(s) | Year | Drawbacks |
|-------------------------|------|---|
| Dahlander & Gan | 2010 | - Competitors can make better use of the technological advance |
| Hoffman and Schlosser | 2001 | - Lack of resources - Free-riding behaviour - Problems with contracts |
| Mohr and Spekman | 1994 | - Lack of resources - Free-riding behaviour - Problems with contracts |
| Chesbrough and Crowther | 2006 | - Not invented here syndrom (NIH) - Lack of internal commitment |
| Boschma | 2005 | - Cognitive, organizational cultural and institutional differences |

In Table 1 presented earlier there can be spotted some overlap between different researchers. Because of the overlap in benefits and drawbacks, they will be clustered. Many of the researchers in Table 1 mentioned knowledge as a benefit of open-innovation (Van de Vrande et al., 2009; Jacobs and Waalkens, 2001; Hoffman and Schlosser, 2001; Mohr and Spekman, 1994). So knowledge obtaining/creation will be the first benefit of pursuing in open-innovation. The second benefit will be market considerations, which is a clustered benefit of: Meeting customer demands (Van de Vrande et al., 2009), Market considerations, (Jacobs and

Waalkens, 2001), reduce time-to-market (Jacobs and Waalkens, 2001), more focus on bringing inventions to the market (Dahlander and Gan, 2010) and set the industry standard (Koruna, 2004). The third benefit that can be formulated based on the above table 1 is sharing risk (Hoffman and Schlosser, 2001; Mohr and Spekman, 1994). The fourth benefit also mentioned by Hoffman and Schlosser (2001) as well as Mohr and Spekman (1994) is the opportunity to reduce the cost of the innovation development. Koruna (2004) mentions the learning effects due to the open-innovation process as a benefit. The last benefit created through using open-innovation is that the R&D productivity increases (Ili, Albers and Miller, 2010).

When looking at the drawbacks associated with open-innovation Table 1 there is less overlap. Dahlander and Gan (2010) state that a drawback of open-innovation is that the partner makes better use of the technological advance due to its better production facility and complementary assets. Another possible drawback is the “Not invented here syndrome”, which has been found to be a barrier for external knowledge acquisition (Chesbrough and Crowther, 2006). There is also the drawback of lacking resources, such as knowledge spill over, of which the partner can take advantage (Hoffman and Schlosser, 2001; Mohr and Spekman, 1994). Besides this fact, open-innovation is collaboration between different companies. Therefore there are also risks associated with cognitive, organizational, cultural and institutional differences between the partners, which can lead to problems (Boschma, 2005). There is also the risk of freeriding behaviour of partners (Hoffman and Schlosser, 2001; Mohr and Spekman, 1994). Partners will put less resources and effort into the development of the innovation and profit from the resources and effort of the other partner. The last and very important drawback is that of the contracts between partners, which is an important factor of the alliance success (Hoffman and Schlosser, 2001; Mohr and Spekman, 1994).

These final drivers are going to be used to help identify which regulatory focus of managers has more preference for using open-innovation. The next chapter explains the drivers of strategy preference by focussing on the individual and organizational factors.

2.3 Drivers of strategy preference

In this chapter the individual and organizational factors are explained. The individual factors are explained via the regulatory focus theory mentioned briefly in the previous chapter. After that the organizational factors are explained via the capability gap theory of Lavie (2006).

2.3.1 Individual factors

Recent theory that helps to explain preference in decision-making is the regulatory focus theory (Gamache et al., 2015). The regulatory focus theory builds upon the idea that goals can be attained via different strategic means (Higgins, 1997). Therefore it controls for how individuals see these goals differently and why certain motivational and strategic tendencies are chosen to achieve these goals (Brockner, Higgins and Low, 2004). The regulatory focus theory divides the preferences into, the preference for “Eagerness” and the preference for “Vigilance”. The preference for eagerness is concerned with advancement, aspiration and accomplishment, which is associated with the “Promotion focus” (Higgins and Spiegel, 2004). The promotion focussed individuals are sensitive for the presence or absence of positive outcomes (Higgins, 1997). On the other hand the preference for vigilance is concerned with protection, safety and responsibility, which is associated with the “Prevention focus” (Higgins and Spiegel, 2004). The prevention focused individuals are sensitive for the presence or absence of negative outcomes (Higgins, 1997). These individual preference differences for a certain strategic mean are caused by the differences between the promotion and prevention focus and their effects on behaviour (Higgins and Spiegel, 2004; Lanaj, Chang, and Johnson, 2012).

Individuals form their preference for a regulatory focus by the way they interpret the specific task at hand, the context of the decision, their decision goal and their individual differences. This preference turns into a trade-off strategy of an individual (Wang and Lee, 2006). Wang and Lee (2006) created a list of how these individual trade-off strategies can differ. The trade-off strategies can differ in the extent of processing, the style of reasoning, the decision rule adopted, how some compares different options and the way of processing (Wang and Lee, 2006). Idson, Liberman, and Higgins (2000) state that individuals that use strategies that fit their regulatory focus, feel more positive and more motivated. So it's important to notify these difference in preference for strategic means, since the both focuses have different effects on the behaviour of that individual (Higgins & Spiegel, 2004; Lanaj, Chang, & Johnson, 2012). Since people have a preference for a certain mean, it is very likely that this

will influence the way of evaluating strategic options and which type of action they are willing to pursue (Gamache et al., 2015). So it is possible that a difference in regulatory focus will result in different mean preferences to develop an innovation, in this case open- or closed-innovation.

Some studies found that the regulatory focus can in fact influence decision-making (Crowe and Higgins, 1997; Gamache et al., 2015). According to Crowe and Higgins (1997) decision-making is influenced by the regulatory focus of an individual and is shown as a pattern in task performance and problem solving. Furthermore the results of Cantor, Blackhurst, and Cortes, (2014) as well as that of Bryant and Dunford (2008) state that there is a link between the regulatory focus of an individual and the decision-making behaviour of that person.

This suggests that managers make decision that are close to their regulatory focus and the regulatory focus in of great influence in their decision-making. When developing an innovation managers are in the position to choose the way of obtaining the capabilities necessary to develop a certain innovation. Since open-innovation requires managers to make decisions about developing and exploiting innovation activities (Huizingh, 2011).

Strong prevention focussed individuals do not respond quickly but take the time to make a careful systematic decision (Higgins and Spiegel, 2004). Due to their concern for security, safety and responsibility, because prevention focussed individuals value accuracy and quality. By adhering the rules and following routines, prevention focussed people try to avoid mismatches to the desired end-state (Higgins and Spiegel, 2004; Crowe and Higgins, 1997). To connect that to open-innovation, a high failure rate of open-innovations (Chesbrough, 2006) in combination with the risks associated with open-innovation mentioned in chapter 2.1. It is likely that prevention focussed individuals associate open-innovation with risk-taking and so find it not safe and responsible to use it.

H_{01a}: The higher the prevention focus of an individual, the lower the preference for open-innovation.

Individuals with a strong promotion focus on the other hand, will respond more quickly to opportunities that can result in gains (Gamache et al., 2015). Due to their concern for advancement, growth and accomplishment, promotion focused people value the speed and quantity of accomplishment and are willing to achieve this by experimenting and taking risk if it will help them reach their ideal state (Higgins and Spiegel, 2004; Crowe and Higgins, 1997). This would suggest that these type of managers are less concerned with risk associates with open-innovation and therefor are focus more on the benefits of open-innovation. Besides that it helps them to achieve a shorter time-to-market (Jacobs and Waalkens, 2001). This means open-innovation will help to speed up the development process, which is what promotion focussed individuals value.

H_{01b}: The higher the promotion focus of an individual, the higher the preference for open-innovation.

2.3.2 Organizational factors

The capability gap theory addressed by Lavie (2006) is about the misfit between the current configuration of organizational- and individual capabilities and the capabilities needed for the value-maximizing configuration. Here the value-maximizing configuration is the most valuable capability configuration possible in a post change environment (Lavie, 2006). The gap between the current capabilities possessed by the organization and the capabilities needed to implement an innovation is called the capability gap (Lavie, 2006). This theory is relevant for this study since it accounts for the fact that the gap is also based on cognitive biases of decision makers. This because not all decisions are completely made rational due to cognitive biases and limited information available for the decision maker (March, 1994; Simon, 1961). The cognitive part in this study is explained by the regulatory focus mentioned in the previous chapter. This study makes use of the two extreme forms of closing this gap namely substitution and evolution. In capability substitution, the capabilities needed are obtained via external sources like an acquisition or alliance with other parties but also via hiring new personnel with new sets of skills and knowledge (Lavie, 2006). On the other hand in capability evolution, the organization decides to develop the capabilities internally instead of externally (Lavie, 2006). Here capability substitution corresponds with open-innovation because both are about obtaining skills and knowledge externally whereas capability evolution corresponds with closed-innovation since they are both about developing skills and knowledge internally. The capability gap theory of Lavie (2006) could possibly influence the

relation between the regulatory focus of a manager and the preference of that manager to use open-innovation. Since the capability gap varies per situation. When the capability gap is small managers need to obtain less capabilities in order to successfully implement a certain innovation (Lavie, 2006). Whereas a large capability gap indicates that the organization at hand, does have none or little capabilities needed to successfully implement the innovation (Lavie, 2006). The study of Lavie (2006) states that managers who face a large capability gap are more likely to use capability substitution. Based on the fact that both capability substitution and open-innovation are about obtain skills and knowledge externally. This would suggest that if the capability gap a company is facing increases, the manager would likely have a higher preference for open-innovation.

H₀₂: When the capability gap is increases, the preference for open-innovation increases as well.

When relating the organizational capability gap to the conceptual model it could moderate the relation between the regulatory focus of someone and the preference to pursue in open-innovation. For instance when the capability gap is narrow, there are less capabilities that must be obtained in order to develop and implement an innovation. When this situation occurs, managers need to decide whether or not to use open-innovation. According to Lavie (2006) this means that managers in general are more likely to use capability evolution which is in line with closed-innovation, so it would suggest less preference for open-innovation. Promotion focus managers would have less preference in this situation because open-innovation, and by that collaborates with other parties, could reduce the revenue and competitive advantage created from this innovation. This due to the fact that the knowledge behind this innovation is shared and possibly the rights to use the innovation are shared, which means sharing the profits gained from the innovation. This reasoning comes from the fact that promotion focussed individual's respond to opportunities that can result in gains (Gamache et al., 2015), due to their concern for advancement, growth and accomplishment (Higgins and Spiegel, 2004). These personality aspects can influence the cognitive capabilities of an individual which can influence the decision maker in choosing the type of capability reconfiguration (Lavie, 2006). Developing the missing capabilities internally, could result in an increase in risk of resource commitment. But promotion focussed individuals are willing to take risks if it will help them reach their ideal state (Crowe and Higgins, 1997).

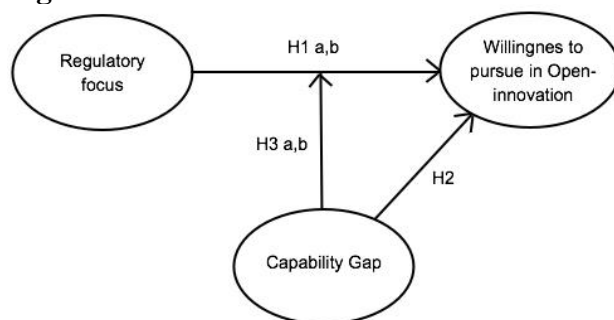
H_{03a}: A narrow capability gap weakens the relationship between promotion focussed individuals and the preference for open-innovation.

When having a large capability gap Lavie (2006) states that managers in general would prefer to use capability substitution, which is in line with open-innovation. Having a large capability gap could increase the risk of not being able to successfully develop and implement an innovation, which would lead to failure. In this case it could be that a prevention-focussed managers, that in general would not prefer to use open-innovation, could prefer to use open-innovation. This because he/she evaluates the risk of developing the innovation internally higher, than the risks (drawbacks) associated with open-innovation. The reason for this is that prevention focussed individuals are concerned with security, safety and responsibility (Higgins and Spiegel, 2004).

H_{03b}: A wide capability gap strengthens the relationship between prevention focussed individuals and the preference for open-innovation.

Based on these knowledge and the hypotheses presented a conceptual model has been constructed, which is presented in Figure 1 below.

Figure 1



The hypotheses H1a and H1b are presenting the expectation that there is a relation between someone's regulatory focus and their willingness/preference for using open-innovation. Hypothesis 2 states that there is a relation between the size of the capability gap at hand and the willingness/preference to use open-innovation. At last the capability gap theory is expected to influence the relationship between someone's regulatory focus and their willingness/preference to use open-innovation.

3. Methodology and Context

3.1 Research context

Internet of Things (IoT) is a growing topic these days. There are many definitions out there of what IoT is. The definition used in this study will be the one from Domingue (2008), which describes the IoT as: ‘a world where physical objects are seamlessly integrated into the information network and where the physical objects can become active participants in business processes’.

The IoT is growing according to Gartner to 20.8 billion connected things in 2020. But this asks for systems that are capable of processing the amount of that produced by these connected objects, which at this time is not possible yet (Rijksoverheid, 2015). A blogging company Ideapoke (2015) states that the combination of IoT and open-innovation could start a revolution of opportunities from the brightest innovators, which results in game-changing ideas and it will shape the future of the IoT. Also Nexcom (2016) states that make innovation more open could result in a faster growth of IoT. Also the automotive and transport industry is active in developing innovations based on the Internet of Things. The industry innovates in application for the logistics and the management of vehicles (Ministry of Economic Affairs, 2015). Cars and transport vehicles are becoming more intelligent through the increase of sensors and wireless systems that are built into the vehicles.

But many companies do not have the expertise and knowledge in IT to develop IoT based services on their own. That’s why this study searches to find out what the drivers for a managers preference are for pursuing in open-innovation or not, and whether this is moderated by the fact that the organization does not have the IoT related capabilities needed to successfully develop IoT based services.

3.2 Research strategy

The researcher conducted an experimental vignette study with managers in the automotive industry in the Netherlands. An experimental vignette study allows a controlled manipulation and has contextual realism, acknowledging that meaning and cognition are situationally specific (Raaijmakers et al, 2015). The respondents are presented a brief hypothetical scenario and are asked to make a decision based on the knowledge presented. The description of the scenario contains the independent variables and the respondents are answering the dependent variable (Cooper and Schindler, 2011). The use of vignettes is especially useful when the respondents are asked what they would do in that particular situation (Moore and Chang, 2006). Also while using vignettes, the respondents are more likely to provide honest and reliable answers due to the fact that it is not about their own previous actions (Bendoly and Eckerd, 2013; Rungtusunatham et al., 2011). Since there is no vignette to be found that suits this study, the researcher needed to formulate the vignette himself.

Four scenarios were created. One in which the company the respondent needs to make a decision for has a small capability gap so does not need to obtain much capabilities in order to successfully implement the IoT based services/ solutions into their business model. The second company will be having a larger capability gap so does need to obtain a large amount of capabilities in order to make the implementation of IoT based services/ solutions a success. After that each of these two scenarios will be written with words that influence promotion focussed individual and the other two scenarios are written with words that influence prevention focussed individuals.

At first respondents are asked to answer some questions regarding their personality to identify whether this individual is more promotion or more prevention focussed. After that the respondent was asked to fill in four questions about using external knowledge sources to see how they thought about using open-innovation. In the next part the respondents were randomly presented one of the four vignettes in which a brief scenario was explained. The respondents were asked to fill in which external sources they would like to use to develop the innovation presented and to which degree they would prefer to use these sources. This builds on the theory of Laursen and Salter (2006), who defined a theory to measure the preference for open-innovation via BREATH (the amount of sources) and DEPTH (the intensity of using these sources). At last the respondents were presented with some manipulation check question

to make sure the respondent understood the case correctly. The vignettes are shown in appendix B.

3.3 Data collection

The survey was conducted through the quantitative research tool Qualtrics (Qualtrics LLC., 2015). This online-based tool allows the researcher to design the survey in a professional manner. It allows the researcher to write scenarios, include control questions, manage the surveys filled-in and in the end transport the results directly into SPSS. The survey could only be filled out when the person in question had received a URL by e-mail from the researcher.

3.4 Data analysis

This chapter will present the data preparation, manipulation check, reliability analysis and the univariate analysis. After that a normality check of the distribution is presented which is followed by the regression assumptions. The α used in the statistical tests are .05, when significant at .01, it is indicated as well.

3.4.1 Data preparation

Before being able to test the hypotheses, the data must be of great quality. To prepare the data the researcher used a two-step process. At first the qualitative data was reviewed to check the internal validity of the data (Evans et al., 2015). In the second step the quantitative data was cleaned and after that tested to ensure there was an acceptable amount of missing values and they were completely random (MCAR).

The qualitative data analysis was checked by looking at the motivations of the respondents on the intensity and time of the innovation decision. When looking at the data, there was one respondent who only filled in the questionnaire for 50%. According to Field (2013), a criterion for exclusion is answer rate of 50% or below. So this respondent was deleted for the data. After checking this, the respondents were checked if they had filled in the manipulation check. It appeared all of the participants filled in the manipulation questions regarding the regulatory focus and the capability gap that was included in the vignettes. The third qualitative data check was to determine whether or not the respondents filled in a motivation for choosing a particular intensity and timing for developing the innovation at hand. At last there was checked whether this motivation was sufficient. The data regarding the motivations was evaluated as being sufficient so none of the participants was excluded based on the criteria.

After the qualitative analysis were conducted there were 99 respondents remaining. These were then checked for missing values. As the Missing Value Analysis (MVA) shows, there were no missing values, see appendix C. The options selected that provided these results in SPSS were: <5% missing omitted, cases sorted by missing pattern. Also a T-test and cross-tabulations were provided and an EM procedure was used.

3.4.2 Manipulation check

In order to confirm the manipulation in the vignette's worked two control questions were added in which respondents were asked about how they perceived the capability gap and the situational regulatory focus. The respondent filled in if he/she perceived the vignette to have a narrow or a wide capability gap and whether the vignette was written in a way to avoid a failure or to achieve great success. To identify whether the respondents correctly perceived the vignettes an independent sample T-test has been done. When the independent sample T-test shows a significant result this means that there is a significant difference in mean between the vignettes and there can be assumed the respondents perceived the vignettes correctly. The null-hypothesis in this analysis is that there is no significant mean difference between the manipulation in the perceived by the respondent with an alpha of .05. The alternative hypothesis states that there is a significant difference between the manipulation in the vignette perceived by the respondent also with an alpha of .05. At first the capability gap manipulation was checked. The respondents were asked in this statement to evaluate the gap between the existing capabilities of the company and the required capabilities to do the innovation on a 7 point Likert scale. The Levene's test of equal variance turned out to be insignificant at $\alpha .282$, this means that equal variance between the two groups can be assumed. The independent samples T-test showed that $t(97) = -20.45$, $p < .01$. This indicates that there is a significant difference between the narrow ($M = 1.55$, $SD = 1.458$) and wide ($M = 6.50$, $SD = .886$) capability gap perceived by the respondents. The mean difference between the two groups is found to be -4.949 and found significant at a confidence interval of 95%. At last the manipulation check has been done on the regulatory focus text of the vignettes. The respondent was asked to identify the main goal presented in the vignette on a 7 point Likert scale. The Levene's test of equal variance was found to be insignificant at $\alpha .157$, this means equal variance between the two groups can be assumed. The independent samples T-test showed that $t(97) = 33.374$, $p < .01$. This indicates that there is a significant difference between the promotion ($M = 6.59$, $SD = .574$) and prevention ($M = 1.48$, $SD = .909$) focus

perceived by the respondents. The mean difference between the two groups is found to be 5.111 and significant at a confidence interval of 95%. The SPSS output can be found in appendix D.

3.4.3 Reliability analysis

In order to identify internal consistency between related items within a construct, a reliability analysis is needed. Besides that, a factor analysis identifies the underlying structure that explain correlations among the items. The items under the construct prevention focus, promotion focus, use external sources promotion focus stimulant, use external sources prevention stimulant and use external vs internal sources were tested on their internal consistency.

The construct of promotion focus consisted of four items. Cronbach's Alpha (α .901) is very good since in the rule of thumb it is perceived as excellent, and by that the items are internally consistent. Looking at the Item-Total statistics, the Cronbach's Alpha could not be increased by deleting items. When looking at the construct prevention focus the Cronbach's Alpha (α .872) among the four items is perceived as good since it lies between .9 and .8. This means that also these items have an internal consistency. As with the promotion focus construct, the internally reliability could not be improved by deleting items, see Item-Total statistics. Besides that the internal consistency of the two items that form the construct "use external sources promotion focus tricker" was checked and showed a Cronbach's Alpha of α .882, which is good since it lies between .8 and .9. Also the construct "use external sources prevention focus tricker" consistent of also two items was checked and had a Cronbach's Alpha of α .816, which is also good. Furthermore the two items of the construct "use external vs internal sources" were checked and resulted in a Cronbach's Alpha of α .782. This Cronbach's Alpha is evaluated as acceptable/good since its value is between .7 and .8 but close to a α .8 so very acceptable to combine. At last the six items of the preference for open-innovation construct were checked and found to have an α .886, which again is very good and allows to combine the items to describe preference for open-innovation. The SPSS output can be found in appendix E.

3.4.4 Factor analysis

In order to identify the underlying structure of dimensions that explain the correlations between variables a factor analysis is used. In order to determine which items load on which factors an exploratory factor analysis is used. When it occurs that some items load on different factors, have low factor loadings or have low communalities these items should be deleted. The items selected were those regarding promotion focus, prevention focus, use of external sources with promotion manipulation, the use of external sources with prevention manipulation.

In appendix F, the factor analysis can be found and the decision that were followed due to the analysis. Based on the analysis there were no items deleted, due to the fact that it would not increase internal validity. The Table 2 below shows an overview of how the items are related to the factors and how the factors can be interpreted.

Table 2

| Items | Factor interpretation |
|--|---|
| Reg_1 I often think about the person I would ideally like to be in the future | These items relate to promotion focus. |
| Reg_2 I typically focus on the succes I hope to achieve in the future | |
| Reg_3 My major goal in my job right now is to achieve my career ambitions | |
| Reg_4 I see myself as someone who is primarily striving to reach my "ideal self" - to fulfil my hopes, wishes and aspirations | |
| O-I+R_1 I think the benefits of using external information sources to develop an innovation outweigh the risks | |
| O-I+R_2 I think using external information sources to develop an innovation increases my chances of achieving my goals | These items relate to prevention focus. |
| Reg_5 I'm anxious that I will fall short of my responsibilities and obligations in life | |
| Reg_6 I often think about the person I am afraid I might become in the future | |
| Reg_7 I often worry that I will fail to accomplish my professional goals | |
| Reg_8 I often imagine myself experiencing bad things that I fear might happen to me | |
| O-I+R_3 I think using external information sources to develop an innovation is to big of a risk | These items are focussed on the concern for advancement, growth and accomplishment. |
| O-I+R_4 I think using external information sources to develop an innovation will increase my chance of failling | |

3.4.5 Normality of distribution

To understand the nature of the variables used a normality check has been done in which the skewness and kurtosis of the metric variables were checked. The rule of thumb here is that the skewness as well as kurtosis should have an absolute value of less than 3.0. If this is not the case there can be concluded that the variable is not normally distributed. Based on table 4 below all of the variables are normally distributed.

Table 4

| Variable | Type | Skewness/std. error | Kurtosis/ std. error |
|---------------------------------------|-----------|---------------------|----------------------|
| Preference for open-innovation | Dependent | -100/243 | -1.41 / .481 |
| Chronic promotion focus | Control | -.444 / .243 | -1.158 / .481 |
| Chronic prevention focus | Control | -.431 / .243 | -.239 / .481 |

3.4.6 Assumptions

Before making the regression analysis, several assumptions should be met. The regression model is built before the assumptions and afterwards. This way the researcher is able to see if changes as result of the assumption checking improved the regression model.

The first assumption is that all variable that are used in the regression model are: metric, dichotomous categorical or a dummy variable. All variables met the assumption since the variables that will be used are all metric or dichotomous.

The second assumption is already checked in the previous paragraph. The assumption is that the metric variables should be normally distributed. Table 4 shows that all variables that will be used are indeed normally distributed. So also the second assumption has been met.

The third assumption says that there must be homoscedasticity. Unfortunately the test of homogeneity of variance is found significant between chronic promotion focus and preference for open-innovation. This means homogeneity cannot be assumed, but it could be the fact there is something wrong with the quality of the data. The test of homogeneity of variance of between the chronic prevention focus and the preference for open-innovation on the other hand has indeed found to be insignificant, which means homogeneity of variance can be assumed. This also makes it likely there is a data quality issue. The SPSS output can be found in appendix G.

3.5 Boundaries, scope of research and limitations

This research focussed on the difference in managers regulatory focus as an indicator for open-innovation preference. Besides that the capability gap theory was include to see if this also had an influence on the managerial preference for open-innovation. This research also investigated whether the capability gap also had an moderating effect on the relation between the regulatory focus and the preference for open-innovation.

This research did not take into account other personality traits nor did it take into account other organizational and environmental factors. Since this vignette study only asked individual participants to make an decision, group decision making was not included in this study. A vignette study could be very difficult task for the respondents since the respondents could be influenced by experience and their own way of interpreting.

4. Results

The duty of this chapter is to show the bivariate analysis, the regression analysis and at the end an overview is shown of all found results. To identify the correlations between the variables an bivariate analysis is used. After that a linear regression model was used to test the hypothesis. The regression analysis will show the relationships between the dependent variable and the independent variables of which an overview is given at the end of the chapter.

4.1 Bivariate analysis

In table 5 below the bivariate analysis is shown. Here the correlation between the variables are shown. The analysis has been done with the use of the Pearson's correlation coefficient.

Table 5

| | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------------------------|-------|------|--------|-------|------|------|---------|---|
| Dependent variable | | | | | | | | |
| 1. Preference for open-innovation | 14.26 | 7.10 | 1 | | | | | |
| Independent variable | | | | | | | | |
| 2. Capability gap | 4.05 | 2.76 | .653** | 1 | | | | |
| 3. Regulatory focus | 4.01 | 2.68 | -.030 | -.026 | 1 | | | |
| Control variables | | | | | | | | |
| 4. Gender | | | .004 | .082 | .020 | 1 | | |
| 5. Chronic promotion focus | 4.61 | 1.33 | .201* | -.068 | .008 | .041 | 1 | |
| 6. Chronic prevention focus | 3.84 | 1.08 | -.230* | -.027 | .131 | .057 | -.501** | 1 |

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

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

Based on the bivariate analysis shown in Table 5, there can be concluded that there are some significant correlations. The first correlation is between the preference for open-innovation and the capability gap and is shown to be a positive correlation ($r = .653$, $n = 99$, $p < 0.01$). This means when the capability gap increases, the preference for open-innovation increases also. The next significant correlation is between preference for open-innovation and the chronic promotion focus. The positive correlation between these two variables ($r = .201$, $n = 99$, $p < 0.05$) is not very strong but significant. In contrast, The correlation between the preference for open-innovation and the chronic prevention focus is shown to be negatively correlated ($r = -.230$, $n = 99$, $p < 0.05$). The last correlation that Table 5 shows the be significant is the correlation between the chronic promotion focus and the chronic prevention focus ($r = -.501$, $n = 99$, $p < 0.01$). This is a negative correlation and means that when the promotion focus increases, the prevention focus decreases.

4.2 Model of fit of the regression models

Before presenting the results the models were tested if they were suitable. The hypothesis are: H_0 : The model is not suitable, H_1 : The model is suitable. The model is tested suitable when it is shown to be significant at an alpha of .05. When looking at Table 6 the statistics of the first model, $F(6,92) = 15.573$, $p < .05$, $R^2 = .504$, show that the model is good to explain the effect of the independent variables on the dependent variable. The independent variables are explaining 50.4% of the total variance of the dependent variable preference for open-innovation.

Table 6 Regression analysis

| | Model 1 | | | Model 2 | | |
|-----------------------------------|----------|------------|---------|----------|------------|---------|
| | B | Std. Error | β | B | Std. Error | β |
| (Constant) | 8.362 | 4.732 | | 8.320 | 4.776 | |
| Independent variables | | | | | | |
| Capability gap | 1.711** | .191 | .665** | 1.692** | .266 | .558** |
| Regulatory focus | .029 | .200 | .011 | .047 | .271 | .018 |
| Control variables | | | | | | |
| Gender | -.842 | 1.077 | -.059 | -.836 | 1.077 | -.058 |
| Age | -.053 | .069 | -.059 | -.053 | .069 | -.058 |
| Chronic promotion focus | 1.027* | .459 | .192* | 1.029* | .462 | .192* |
| Chronic prevention focus | -.826 | .581 | -.125 | -.836 | .593 | -.127 |
| Capability gap X Regulatory focus | | | | .201 | 2.011 | .013 |
| Model statistics | | | | | | |
| R^2 | .504 | | | .504 | | |
| F-value (DF) | F (6,92) | = 15.573** | | F (7,91) | = 13.206** | |

* Coefficient is found to be significant at the .05 level

** Coefficient is found to be significant at the .01 level

4.3 Chronic regulatory focus and the preference for open-innovation

The first hypotheses are focussed on the direct relationship between the regulatory focus of an individual and the preference for open-innovation. As mentioned earlier the H_{01b} is stated: “*The higher the promotion focus of an individual, the higher the preference for open-innovation*”. So it is expected that when an individual is promotion focussed, this individual has preference for open-innovation. A linear regression calculation has been done to predict the relationship between the chronic promotion focus and the preference for open-innovation. Chronic promotion focus significantly predicted the preference for open-innovation, $B = 1.027$, $t(6/92) = 2.237$, $p < .05$. In model 1 where the total variance explained was, $R^2 = .472$, $F(6/92) = 15.573$, $p < .001$. In model 2 the chronic promotion focus also significantly predicted the preference for open-innovation, $B = 1.029$, $t(6/92) = 2.227$, $p < .05$. The total variance explained in this model was, $R^2 = .466$, $F(7/91) = 13.206$, $p < .001$. This means that if the chronic promotion of an individual is increases with 1.000, the preference for open-innovation of that person increases between 1.027 and 1.029.

The H_{01a} states: “*The higher the prevention focus of an individual, the lower the preference for open-innovation*” So it is expected that when an individual is more prevention focussed, this individual has less preference for open-innovation than an promotion focussed individual. A linear regression calculation has been done to predict the relationship between the chronic prevention focus and the preference for open-innovation. Chronic prevention focus did not significantly predict the preference for open-innovation, $B = -.826$, $t(6/92) = -1.422$, $p > .05$. In model 1 where the total variance explained was, $R^2 = .472$, $F(6/92) = 15.573$, $p < .001$. In model 2 the chronic prevention focus also did not significantly predict the preference for open-innovation, $B = -.836$, $t(6/92) = -1.410$, $p > .05$. The total variance explained in this model was, $R^2 = .466$, $F(7/91) = 13.206$, $p < .001$. So there is no significant relationship between the chronic prevention focus and the preference for open-innovation. But there can be stated that the chronic prevention focus seems to have a negative influence on the preference for open-innovation when looking at the B-coefficient (model 1 = $-.826$, model 2 = $-.836$).

4.4 The capability gap and the preference for open-innovation

The second hypothesis (H_{02}) is stating that: “The higher the capability gap, the higher the willingness of managers to use open-innovation”. This means, there is expected a positive relation between the capability gap and the preference for open-innovation. So it is also expected that the B-coefficient of the scenario’s with the narrow capability gap is lower than the B-coefficient of the scenario’s with the wide capability gap. The reasoning style behind the hypothesis is that, if a managers knows that the company does not have the required capabilities to develop a certain innovation, the managers is more likely to use external sources to help developing the innovation as if the company would already have the required capabilities.

A linear regression calculation has been done to predict the relationship between the capability gap and the preference for open-innovation. The capability gap significantly predicted the preference for open-innovation, $B = 1.711$, $t(6/92) = 8.964$, $p < .01$. In model 1 where the total variance explained was, $R^2 = .472$, $F(6/92) = 15.573$, $p < .001$. In model 2 the capability gap also significantly predicted the preference for open-innovation, $B = 1.692$, $t(6/92) = 6.369$, $p < .01$. The total variance explained in this model was, $R^2 = .466$, $F(7/91) = 13.206$, $p < .001$. This means that if the capability gap increases with 1.000, the preference for open-innovation of that person increases between 1.722 and 1.692.

4.5 The interaction effect of the situational regulatory focus and capability gap

The last two hypothesis (H_{03a} and H_{03b}) are focussed on the interaction effect between situational regulatory focus and the capability gap on the preference for open-innovation. H_{03a} States: “Promotion focussed individuals have a negative moderated relation with the preference for open-innovation when the capability gap is small”. Which means that when a situational promotion focus is presented, the narrow capability gap will reduce the positive relation towards the preference for open-innovation or even make it a negative relation. H_{03b} states: “Prevention focussed individuals have a positive moderated relation with the preference for open-innovation when the capability gap is large”. This means that when a situational prevention focus is presented, the wide capability gap will increase the negative relation towards the preference for open-innovation or even make it a positive relation.

In Table 7 we can see that, in model 2, the interaction effect between the regulatory focus and the capability gap is included. As mentioned in the previous paragraph the capability gap has found to have a significant positive predictor for preference for open-innovation.

A linear regression calculation has been done to predict the relationship between the situational regulatory focus and the preference for open-innovation. Situational regulatory focus did not significantly predict the preference for open-innovation, $B = .047$, $t(7/91) = .174$, $p > .05$. In model 2 where the total variance explained was, $R^2 = .472$, $F(6/92) = 15.573$, $p < .001$. So the situational regulatory focus is no significant predictor for the preference for open-innovation when the interaction effect is included.

Also in this linear regression calculation, the interaction effect has been included to predict the relationship between the situational regulatory focus and the preference for open-innovation moderated by the capability gap. The interaction effect did not significantly help to predict the preference for open-innovation, $B = .201$, $t(7/91) = .100$, $p > .05$. In model 2 where the total variance explained was, $R^2 = .472$, $F(6/92) = 15.573$, $p < .001$. So the capability gap does not significantly strengthen the relation between the regulatory focus and the preference for open-innovation.

4.6 Summary linear regression results

This paragraph gives a brief summary of the results to quickly see which hypothesis are found to be significant and which hypothesis were rejected. The predictive power in general to explain the preference for open-innovation was average when looking at the adjusted R^2 's of model 1 and 2. The entire regression output of SPSS can be found in appendix H.

Table 7

| Hypothesis | Statement | Result |
|------------------|--|------------------|
| H _{01a} | <i>The higher the prevention focus of an individual, the lower the preference for open-innovation</i> | <u>Supported</u> |
| H _{01b} | <i>The higher the promotion focus of an individual, the higher the preference for open-innovation</i> | Rejected |
| H ₀₂ | <i>The capability gap has a positive direct relationship with the preference for open-innovation.</i> | <u>Supported</u> |
| H _{03a} | <i>Promotion focussed individuals have a negative moderated relation with the preference for open-innovation when the capability gap is small</i> | Rejected |
| H _{03b} | <i>Prevention focussed individuals have a positive moderated relation with the preference for open-innovation when the capability gap is large</i> | Rejected |

5. Conclusion and Discussion

This research started with importance of innovation because it helps organizations to gain and sustain competitive advantage (Bettis and Hitt, 1995) and through that became more focused on the popular topic regarding open-innovation. Due to the absence of studies that investigate the managerial preference for open-innovation the researcher decided to focus on managerial preference for open-innovation. In order to be able to explain the preference for open-innovation two theories were used. To investigate if the preference for open-innovation depends on the different personalities between managers, the regulatory focus was used. But the managerial preference for open-innovation can not only be explained by the individual factors, also environmental factors could affect the managers preference for open-innovation. That's why the capability gap theory was used. This theory has been used to identify if the preference for open-innovation is affected by the gap the manager is facing during the decision making. But also if it moderates the effect between the personality of an individual and their preference for open-innovation.

In order to explain if there is a relation between the regulatory focus of an individual, the capability gap a manager is facing and the preference for open-innovation, a main research question was formulated: *“Do organizational factors and individual characteristics explain the managerial preference for open-innovation?”*

Based on the results of this research there can be concluded that there is at least one significant relation between regulatory focus of and individual and their preference for open-innovation. The results in the previous section show that individuals that are more promotion focussed have a high preference for open-innovation. This can be explained by the more quickly respond to opportunities that can result in gains (Gamache et al., 2015). This is due to their concern for advancement, growth and accomplishment. Also the promotion focused people value the speed and quantity of accomplishment and are willing to achieve this by experimenting and taking risk if it will help them reach their ideal state (Higgins and Spiegel, 2004; Crowe and Higgins, 1997). The positive relation with preference for open-innovation also lines up with the theory since open-innovation can help to speed up the development of an innovation. But on the other hand, there is no significant relation between the individuals that are more prevention focussed and the preference for open-innovation. The results show that there is a negative relation but unfortunately not found significant. But since the B-

coefficients of the promotion and prevention focussed individuals differ a lot there can be assumed that promotion focussed individuals are likely to have a higher preference for open-innovation. To be sure this is in fact the case, more extensive research is necessary.

The results show that there is indeed a significant relation between the capability gap a company is facing and the managers preference for open-innovation. There can be concluded that the wider the capability gap is between the current set of capabilities and the ideal set of capabilities needed to successfully develop the innovation, the more managers prefer to use open-innovation. This can be explained by the fact that the wider the capability gap, the more capabilities there are needed to be obtained, the more time it will take to obtain these capabilities, the more expensive the innovation will be and there will be more risks. Open-innovation is known for the exchange of knowledge so you don't need to develop all the capabilities in house (Van de Vrande et al., 2009; Jacobs and Waalkens, 2001; Hoffman and Schlosser, 2001; Mohr and Spekman, 1994). This will reduce developing time and decrease time to market (Jacobs and Waalkens, 2001). Since the innovation is developed together with other parties, the cost of the innovation are shared among these parties, which reduces the costs of the innovation (Hoffman and Schlosser, 2001; Mohr and Spekman, 1994). At last the parties that are working together also share the risks regarding the innovation together, which results in a risk reduction (Hoffman and Schlosser, 2001; Mohr and Spekman, 1994).

At last there is examined whether the capability gap has an influence on the relation between the regulatory focus and the preference for open-innovation. It turned out that there was no interaction effect. The reason for this can be explained by the fact that there is no significant difference between the situational regulatory focusses and the preference for innovation. As mentioned in the hypotheses there was expected that there would be no difference between the promotion- and prevention focus individual. The reason for this expectation was that the main driver would be the capability gap the individual is facing. There was expected that when the capability gap is wide, a prevention focussed individual would prefer open-innovation based on the fact that it would help reduce risks, making sure the companies has the right capabilities and were able to share the cost of the innovation. On the other hand the promotion focussed individuals would prefer open-innovation in the situation that the capability gap is wide because it helps reduce time to market and it increases the chance of a success.

So because the direct relation between the regulatory focus and the preference for open-innovation was not significant, the interaction effect could not be either. Which means that the capability gap does not strengthen or weaken the relation between the regulatory focus and the preference for open-innovation.

5.1 Limitations and further research

This section will discuss the main limitations of this research. Besides that it will suggest future research based on the results of the research and the view of the researcher.

The first limitation of the research is regarding the absence of other organizational, environmental and individual factors to explain managerial preference for open-innovation besides the regulatory focus and the capability gap. The results of the regression analysis showed that 47,2% of the total variance was explained by the model. This means that there are other factors that help explain the preference for open-innovation. So there is still some interesting room for future research on this topic.

The second limitation found is regarding the sample size and type of respondents used. Due to the lack of time, the researcher decided to use student and relatives to be respondents. There was encounter for the fact that these people needed to have at least a college or university degree and mastered the English language. But this is still not ideal since these people have little to none prior knowledge regarding open-innovation nor the context of the internet of things except for the information in the vignettes. Therefore this is considered a limitation since it would improve the validity and practicality of this research if the respondents were indeed all managers in the automotive industry with prior knowledge about open-innovation and the internet of things phenomenon. Also when increasing the sample size a more realistic data set will be generated which would better be able to reflect the rest of the population.

The third and last limitation builds on the previous limitation due to the fact that it could help explain why some hypothesis turned out to be insignificant. Since most of the respondents were not well experienced managers of in the automotive industry, it could be the case that some respondents did not possess the necessary prior knowledge to evaluate the vignette in the way a professional automotive manager would. This could cause problems in the data which result in insignificant results. So the same recommendation for future research, use

respondents that are indeed managers in the automotive industry and have preferably have prior knowledge about open-innovation and the internet of things.

5.2 Theoretical implications

The first theoretical implication this research has is that a difference in the capability gap size explains the preference for open-innovation. When managers are faced with a wide capability gap it is very likely the manager has more preference for open-innovation in comparison to a narrow capability gap. When connecting this to the capability gap theory of Lavie (2006), it means that managers prefer capability evolution more when the capability gap is narrow. When the capability gap increases, the managers preference to use capability substitution also increases. So the capability gap is an important organizational factor in determining the preference for open-innovation.

The second implication was that there is a direct relation between the chronic promotion regulatory focus and the preference for open-innovation. It seems that the more promotion focussed an individual is, the more preference for open-innovation this person tend to have. It's a shame the prevention focus relation is not found significant but the bivariate analysis showed a correlation with preference for open-innovation and the B-coefficient turned out to be negative. Which looks like that prevention focus does to some extent influence the preference for open-innovation in a opposite direction of the promotion focus. Which would suggest the more prevention focussed an individual is the less preference for open-innovation. This contributes to the decision making research due to the fact that there seems to be a difference in decision making between the promotion and prevention focussed individuals. It also strengthens the theories that suggest that the regulatory focus theory influences decision-making. At last in contributes to the fact to open-innovation research due to the fact that individual factors play a role in why managers do not use open-innovation. But this is not the fact with situational regulatory focus since neither the promotion nor the prevention focus turned out to have a significant relation with the preference for open-innovation. Which would indicate that the chronic regulatory focus could be a stronger indicator for managerial preference for open-innovation than the situational regulatory focus.

5.3 Managerial implications

The first managerial implication would be that there is indeed a difference between the chronic regulatory focus and the preference for open-innovation. This means that when a promotion focussed individual has to make the decision whether to use open-innovation or not, is person is more likely to use open-innovation than a prevention focussed individual. So if you as a business owner or CEO estimate, that to develop a certain innovation, there is a great need for open-innovation. It's is probably best to have a manager/project manager that is more promotion focussed. This way the manager would share the ideas of the business owner/ CEO and is also more comfortable with use open-innovation. This implication could help with making decisions regarding the selection of manager who are responsible for leading the innovation development. Besides that it could help with training individuals to be aware of the chronic traits that influence their decision making regarding open-innovation activities.

Another implication is about the fact that this studies shows the importance of effect the capability gap has on the preference for open-innovation. When managers face a large capability gap the chance the manager will use open-innovation increases. So it's smart as a business owner/ CEO to look at the capability gap the company is facing. This since the preference for open-innovation is bias and when assigning a manager with a not suitable regulatory focus could lead to counter productivity and managers should avoid this situation.

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Appendices

Appendix A Capabilities needed for internet of things

This study focuses on the organizational capability gap that occurs due to the unfamiliarity with open-innovation and the IoT. Many researchers discussed the capabilities needed to make open-innovation a success. For instance Jaruzelski and Holman (2011) state that the company needs a strong technology scouting practice and cross boundary collaboration. On the other hand managing and coordinating external knowledge are capabilities necessary to be successful in open-innovation (Tidd, Bessant and Pavitt, 1997; Ritter and Gemünden, 2003). Zahra and George (2002) mention the dynamic organizational capability, which is formed by the routines and processes of an organization to acquire, assimilate, transform and exploit knowledge. “A dynamic capability is the capacity of an organization to purposefully create, extend, or modify its resource base” (Helfat et al., 2007).

When looking at the capabilities of the phenomenon the Internet of Things, there is research done by academics. But there is also much said by companies focussing on strategy and consulting since the IoT is a trend that is accelerating quickly and cannot be ignored. Capabilities like cloud computing, data analytics and mobile communication are needed in order to successfully implement and use IoT to its full potential and by that improve their internal operations and services (Strategy+Business, 2014). When companies possess these capabilities, they are able to move beyond cutting cost and creating efficiency and are in the position to use the IoT to develop new digital services and experiences because the IoT enables these companies to really get to know the customers more intimately (Strategy+Business, 2014). Strategy+Business (2014) also mentions that the companies who are most successful in IoT do not necessarily need to have the best technology or biggest cloud but it's all about having the right capabilities at hand. It's more about using the data of the IoT to create insight in what customers' expectations are and what their needs are and via this use human-centered designs to create services that change the way the customers behave (Strategy+Business, 2014). So the competitive advantage of a company no longer lies only in the product itself but also very much in the great customer experience because of the great amount of additional services the company can offer. The large amount of additional services also helps building loyalty and locking in customers (Strategy+Business, 2014). Since automobile companies' core competencies do not lie in IT, automobile companies are viewed by Strategy+Business (2014) as Engagers and Enhancers. These types of companies

use the endpoint, hub, platform, and service offerings developed by the Enablers to create integrated services. These new services will disrupt the conventional business models of companies today according to Strategy+business (2014). In order to be prepared for the future of the IoT, especially the Enhancers, should develop strong innovation capabilities that focus on the development of new IoT based services and improving existing ones. In order to do so these companies need capabilities such as: the ability to manage and analyse huge quantities of data. Many companies today lack the skills set need to do so and employee's skills and knowledge is the biggest obstacle in this (Gunnarsson et al., 2014).

The research of Gunnarsson et al. (2014) and Strategy+Business (2014) both address the importance of alliance building. Since nearly 60% of the companies developing IoT solutions/ services create partnerships in order to make in a viable service. This is because many companies do not possess the capabilities like data storage and management, to handle big amounts of data. In addition Gunnarsson et al. (2014) also mentions that many organizations lack stream-processing capabilities. This capability is very important for the collection, integration, analysis and visualization of data in real time. Another very important capability is the security of internet-connected devices and also data privacy risks.

Companies are currently product-centric and therefore lack capabilities needed for developing and marketing services related to IoT (Gunnarsson et al., 2014). Companies nowadays need to be able to develop new services, commercial models and create services contracts to create a steady revenue stream. There for these companies need new capabilities in developing and selling these IoT based services (Gunnarsson et al., 2014).

In addition new demands and customer support capabilities are necessary since the increase of complexity (Gunnarsson et al., 2014). This is also due to the real time management option which makes customers expect a faster response time. Customers expect to be immediately informed when problems occur so the expectations of customers are raised (Gunnarsson et al., 2014).

Furthermore the sales capabilities are important and often need to be changed. The sales people need to be to convince the customer of purchasing the new services via convincing them it is a very good value proposition and that the new service has many potential benefits (Gunnarsson et al., 2014).

At last Burns et al. (2015) mentions capabilities more focussing on the IT part of the IoT. They state the core capabilities of a company that uses the IoT should be software development, security, data analytics and data science.

Miorandi et al. (2012) especially points out the importance of basic computing capabilities. This are abilities for instance to match incoming data to a given footprint, service discoveries and network management.

Appendix B Vignettes

There are developed four vignettes based on the follow conditions:

- ☐ Vignette 1: Mentions words that are associated with advancement, growth and accomplishment, which strengthens the influence on individuals with a promotion focus and it has a small capability gap.
- ☐ Vignette 2: Mentions words that are associated with advancement, growth and accomplishment, which strengthens the influence on individuals with a promotion focus and has a large capability gap.
- ☐ Vignette 3: Mentions words that are associated with security, safety and responsibility, which strengthens the influence on individuals with a prevention focus and it has a small capability gap.
- ☐ Vignette 4: Mentions words that are associated with security, safety and responsibility, which strengthens the influence on individuals with a prevention focus and has a large capability gap.

Vignette texts

Vignette 1. The company Automobile is car dealership with 200 employees. They would like to use the new smart car key of their brand to **increase** revenue and **achieve** more customer intimacy. This means they would like to innovate on additional services that are based on large amounts of data that is gather from the great amount of sensors and wireless-systems that are available in cars today, to **grow** the organization and to **gain** competitive advantage. In order to do so there are certain competences needed associated with the IoT like: Cloud computing, data analytics, mobile communication skills, building innovation capabilities which focus on developing IoT based services, employees need skills and knowledge for handling big amounts of data, data storage and management, stream-processing, security of interconnected things and customer support on IoT services.

Since the company Automobile is a large organization with also a small IT department, it already possesses a large amount of these competences. The competences they do not already possess are: Developing IoT based services, Data storage and management and customer support on IoT services.

You are a business manager at Automobile and have to decide how you will obtain those missing competences in order to be able to **accomplish** a successful development and implementation of the innovation.

Vignette 2. The company Automobile is car dealership with 200 employees. They would like to use the new smart car key of their brand to **increase** revenue and **achieve** more customer intimacy. This means they would like to innovate on additional services that are based on large amounts of data that is gathered from the great amount of sensors and wireless-systems that are available in cars today, to **grow** the organization and to **gain** competitive advantage. In order to do so there are competences needed associated with the IoT like: Cloud computing, data analytics, mobile communication skills, building innovation capabilities which focus on developing IoT based services, employees need skills and knowledge for handling big amounts of data, data storage and management, stream-processing, security of interconnected things and customer support on IoT services.

Since the company Automobile has no IT department, Automobile does not possess any of the competences needed. But still the founder wants you to implement this innovation since otherwise the competitors could get this competitive advantage over Automobile.

You are a business manager at Automobile and have to decide how you will obtain those missing competences in order to be able to **accomplish** a successful development and implementation of the innovation.

Vignette 3. The company Automobile is car dealership with 200 employees. They would like to use the new smart car key of their brand to **prevent** a decrease in revenue and the **loss** of customer intimacy. This means they would like to innovate on additional services that are based on large amounts of data that is gathered from the great amount of sensors and wireless-systems that are available in cars today, to **protect** the organization and to **secure** competitive advantage. In order to do so there are certain competences needed associated with the IoT like: Cloud computing, data analytics, mobile communication skills, building innovation capabilities which focus on developing IoT based services, employees need skills and knowledge for handling big amounts of data, data storage and management, stream-processing, security of interconnected things and customer support on IoT services.

Since the company Automobile is a large organization with also a small IT

department, it already possesses a large amount of these competences. The competences they do not already possess are: Developing IoT based services, Data storage and management and customer support on IoT services.

You are a business manager at Automobile and have to decide how you will obtain those missing competences in order to **avoid failure** in the development and implementation of the innovation.

Vignette 4. The company Automobile is a car dealership with 200 employees. They would like to use the new smart car key of their brand to **prevent** a decrease in revenue and **loss** of customer intimacy. This means they would like to innovate on additional services that are based on large amounts of data that is gathered from the great amount of sensors and wireless-systems that are available in cars today, to **protect** the organization and to **secure** competitive advantage. In order to do so there are competences needed associated with the IoT like: Cloud computing, data analytics, mobile communication skills, building innovation capabilities which focus on developing IoT based services, employees need skills and knowledge for handling big amounts of data, data storage and management, stream-processing, security of interconnected things and customer support on IoT services.

Since the company Automobile has no IT department, Automobile does not possess any of the competences needed. But still the founder wants you to implement this innovation since otherwise the competitors could get this competitive advantage over Automobile.

You are a business manager at Automobile and have to decide how you will obtain those missing competences in order to be able to **avoid failure** in the development and implementation of the innovation.

Appendix C Missing value analysis

| Univariate Statistics | | | | | |
|-----------------------|----|---------|--------------------|---------------|-----------------|
| | N | Mean | Standard Deviation | Missing Count | Missing Percent |
| QID30_1 | 99 | ,3636 | ,81384 | 0 | ,0 |
| QID30_2 | 99 | ,7071 | 1,34204 | 0 | ,0 |
| QID30_3 | 99 | ,1919 | ,76501 | 0 | ,0 |
| QID30_4 | 99 | ,3030 | ,91979 | 0 | ,0 |
| QID30_5 | 99 | ,3232 | 1,09571 | 0 | ,0 |
| QID30_6 | 99 | ,6061 | 1,20219 | 0 | ,0 |
| QID32_1 | 99 | ,8384 | 1,53002 | 0 | ,0 |
| QID32_2 | 99 | 1,0909 | 1,94354 | 0 | ,0 |
| QID32_3 | 99 | ,5152 | 1,18118 | 0 | ,0 |
| QID32_4 | 99 | ,5960 | 1,23651 | 0 | ,0 |
| QID32_5 | 99 | ,6667 | 1,35526 | 0 | ,0 |
| QID32_6 | 99 | ,9798 | 1,81816 | 0 | ,0 |
| QID34_1 | 99 | ,3232 | ,75361 | 0 | ,0 |
| QID34_2 | 99 | ,7374 | 1,45396 | 0 | ,0 |
| QID34_3 | 99 | ,1818 | ,64466 | 0 | ,0 |
| QID34_4 | 99 | ,2626 | ,70834 | 0 | ,0 |
| QID34_5 | 99 | ,2929 | 1,03266 | 0 | ,0 |
| QID34_6 | 99 | ,6263 | 1,32931 | 0 | ,0 |
| QID36_1 | 99 | ,8283 | 1,47108 | 0 | ,0 |
| QID36_2 | 99 | 1,0404 | 1,85670 | 0 | ,0 |
| QID36_3 | 99 | ,4747 | 1,09118 | 0 | ,0 |
| QID36_4 | 99 | ,6667 | 1,32480 | 0 | ,0 |
| QID36_5 | 99 | ,7475 | 1,43814 | 0 | ,0 |
| QID36_6 | 99 | ,9495 | 1,77496 | 0 | ,0 |
| QID46_1 | 99 | 61,4949 | 19,49326 | 0 | ,0 |
| QID48_1 | 99 | 6,0606 | 8,68592 | 0 | ,0 |

| Univariate Statistics | | | |
|-----------------------|----|-------|-----------------|
| | N | Count | Missing Percent |
| QID14_1 | 99 | 0 | ,0 |
| QID14_2 | 99 | 0 | ,0 |
| QID14_3 | 99 | 0 | ,0 |
| QID14_4 | 99 | 0 | ,0 |
| QID14_5 | 99 | 0 | ,0 |
| QID14_6 | 99 | 0 | ,0 |
| QID14_7 | 99 | 0 | ,0 |
| QID14_8 | 99 | 0 | ,0 |
| QID50_1 | 99 | 0 | ,0 |
| QID50_2 | 99 | 0 | ,0 |
| QID50_3 | 99 | 0 | ,0 |
| QID50_4 | 99 | 0 | ,0 |
| QID31_1 | 99 | 0 | ,0 |
| QID31_2 | 99 | 0 | ,0 |
| QID33_1 | 99 | 0 | ,0 |
| QID33_2 | 99 | 0 | ,0 |
| QID35_1 | 99 | 0 | ,0 |
| QID35_2 | 99 | 0 | ,0 |
| QID37_1 | 99 | 0 | ,0 |
| QID37_2 | 99 | 0 | ,0 |
| QID49_TEXT | 99 | 0 | ,0 |
| QID47_TEXT | 99 | 0 | ,0 |
| QID38_1 | 99 | 0 | ,0 |
| QID42_1 | 99 | 0 | ,0 |
| QID2 | 99 | 0 | ,0 |
| QID10_TEXT | 99 | 0 | ,0 |
| QID51_TEXT | 99 | 0 | ,0 |

Appendix D Manipulation check

Regulatory focus

Group Statistics

| | Re_Fo | N | Mean | Std. Deviation | Std. Error Mean |
|----------|-------|----|--------|----------------|-----------------|
| Re_Fo_Mn | 0 | 49 | 6,5918 | ,57440 | ,08206 |
| | 1 | 50 | 1,4800 | ,90891 | ,12854 |

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|----------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|---------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| Re_Fo_Mn | Equal variances assumed | 2,034 | ,157 | 33,374 | 97 | ,000 | 5,11184 | ,15317 | 4,80784 | 5,41583 |
| | Equal variances not assumed | | | 33,521 | 83,003 | ,000 | 5,11184 | ,15250 | 4,80852 | 5,41515 |

Capability gap

Group Statistics

| | C_Gap | N | Mean | Std. Deviation | Std. Error Mean |
|----------|-------|----|--------|----------------|-----------------|
| C_Gap_Mn | 0 | 49 | 1,5510 | 1,45861 | ,20837 |
| | 1 | 50 | 6,5000 | ,88641 | ,12536 |

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|----------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|----------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| C_Gap_Mn | Equal variances assumed | 1,169 | ,282 | -20,447 | 97 | ,000 | -4,94898 | ,24203 | -5,42935 | -4,46861 |
| | Equal variances not assumed | | | -20,352 | 78,907 | ,000 | -4,94898 | ,24317 | -5,43301 | -4,46494 |

Appendix E Reliability check

Promotion focus

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|--|------------|
| ,900 | ,901 | 4 |

Item-Total Statistics

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item- Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|-------|-------------------------------|-----------------------------------|--------------------------------------|------------------------------------|--|
| Reg_1 | 14,02 | 15,443 | ,772 | ,671 | ,873 |
| Reg_2 | 13,85 | 15,842 | ,847 | ,741 | ,845 |
| Reg_3 | 13,91 | 16,682 | ,724 | ,548 | ,889 |
| Reg_4 | 13,79 | 16,768 | ,769 | ,600 | ,874 |

Prevention focus

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---------------------|---|------------|
| ,871 | ,872 | 4 |

Item-Total Statistics

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item- Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|-------|-------------------------------|-----------------------------------|--------------------------------------|------------------------------------|--|
| Reg_5 | 11,32 | 11,621 | ,676 | ,491 | ,855 |
| Reg_6 | 11,74 | 10,893 | ,681 | ,473 | ,853 |
| Reg_7 | 11,52 | 10,458 | ,804 | ,654 | ,804 |
| Reg_8 | 11,70 | 10,087 | ,749 | ,578 | ,827 |

Use external sources promotion focus tricker:

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---------------------|---|------------|
| ,882 | ,882 | 2 |

Use external sources prevention focus tricker:

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|--|------------|
| ,813 | ,816 | 2 |

Use external vs Internal sources:

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|--|------------|
| ,781 | ,782 | 2 |

Preference for open-innovation:

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|--|------------|
| ,885 | ,886 | 6 |

Item-Total Statistics

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|--------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| Q1.2_1 | 11,9192 | 36,157 | ,783 | ,623 | ,854 |
| Q1.2_2 | 10,6970 | 39,724 | ,575 | ,446 | ,884 |
| Q1.2_3 | 12,9091 | 34,492 | ,770 | ,643 | ,853 |
| Q1.2_4 | 12,4444 | 35,494 | ,716 | ,603 | ,862 |
| Q1.2_5 | 12,2323 | 31,609 | ,773 | ,664 | ,854 |
| Q1.2_6 | 11,1111 | 37,345 | ,600 | ,394 | ,881 |

Appendix F Factor analysis

KMO and Bartlett's Test

| | | |
|--|--------------------|---------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | ,896 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 830,031 |
| | df | 66 |
| | Sig. | ,000 |

Total Variance Explained

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings ^a |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|--|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total |
| 1 | 6,677 | 55,642 | 55,642 | 6,677 | 55,642 | 55,642 | 5,728 |
| 2 | 1,599 | 13,328 | 68,970 | 1,599 | 13,328 | 68,970 | 5,019 |
| 3 | ,893 | 7,439 | 76,410 | | | | |
| 4 | ,536 | 4,470 | 80,879 | | | | |
| 5 | ,460 | 3,833 | 84,713 | | | | |
| 6 | ,418 | 3,484 | 88,197 | | | | |
| 7 | ,332 | 2,767 | 90,964 | | | | |
| 8 | ,314 | 2,619 | 93,583 | | | | |
| 9 | ,223 | 1,860 | 95,443 | | | | |
| 10 | ,201 | 1,673 | 97,116 | | | | |
| 11 | ,197 | 1,639 | 98,755 | | | | |
| 12 | ,149 | 1,245 | 100,000 | | | | |

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Matrix^a

| Communalities | | | Component | |
|---------------|---------|------------|-----------|-------|
| | Initial | Extraction | 1 | 2 |
| Reg_1 | 1,000 | ,728 | ,730 | ,442 |
| Reg_2 | 1,000 | ,792 | ,746 | ,486 |
| Reg_3 | 1,000 | ,728 | ,827 | ,210 |
| Reg_4 | 1,000 | ,689 | ,702 | ,443 |
| Reg_5 | 1,000 | ,687 | -,625 | ,544 |
| Reg_6 | 1,000 | ,647 | -,733 | ,332 |
| Reg_7 | 1,000 | ,766 | -,682 | ,549 |
| Reg_8 | 1,000 | ,697 | -,719 | ,425 |
| O-I+R_1 | 1,000 | ,650 | ,800 | ,098 |
| O-I+R_2 | 1,000 | ,669 | ,817 | ,040 |
| O-I+R_3 | 1,000 | ,646 | -,794 | ,126 |
| O-I+R_4 | 1,000 | ,576 | -,751 | -,109 |

Extraction Method: Principal Component Analysis.

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

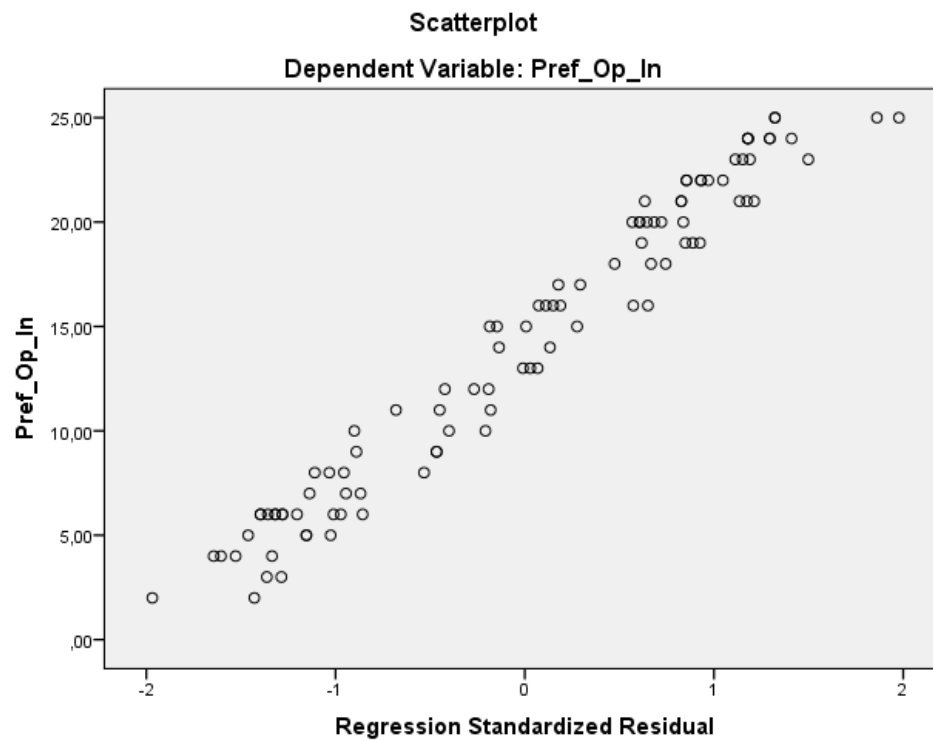
Appendix G Homoscedasticity

Promotion focus vs Preference for open-innovation

Test of Homogeneity of Variances

Pref_Op_In

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 1,887 | 14 | 77 | ,041 |

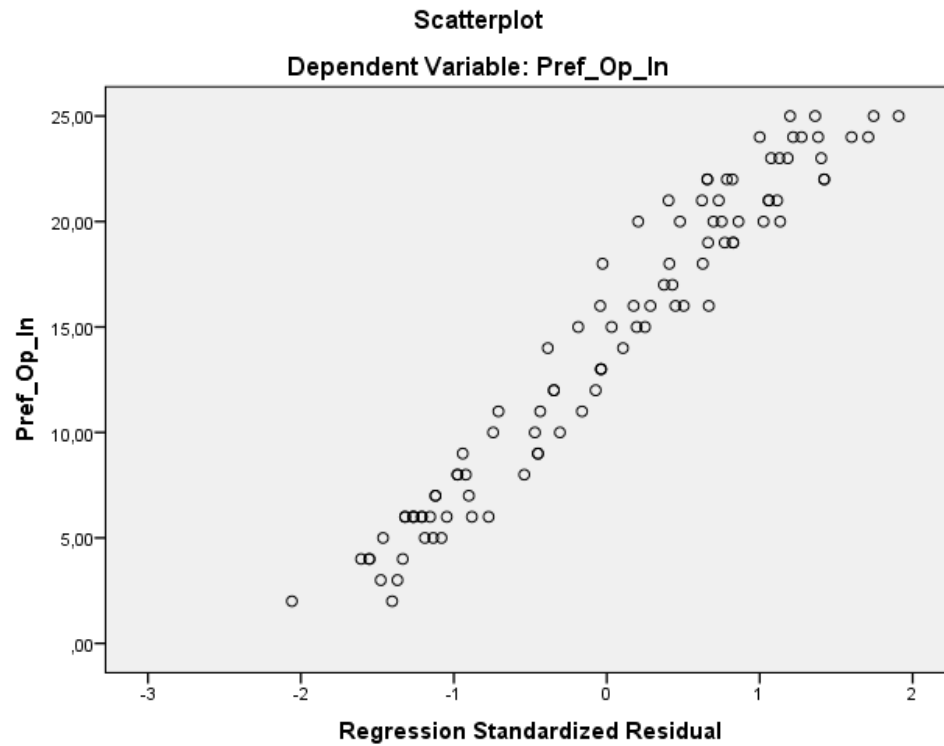


Prevention focus vs Preference for open-innovation

Test of Homogeneity of Variances

Pref_Op_In

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 1,726 | 16 | 79 | ,058 |



Appendix H Regression analysis

Descriptive Statistics

| | Mean | Std. Deviation | N |
|------------|---------|----------------|----|
| Pref_Op_In | 14,2626 | 7,09928 | 99 |
| Gender | 1,41 | ,495 | 99 |
| Age | 28,59 | 7,888 | 99 |
| Prom_tra1 | 4,6103 | 1,32709 | 99 |
| Prev_tra1 | 3,8418 | 1,07641 | 99 |
| C_Gap_Mn | 4,0505 | 2,76041 | 99 |
| Re_Fo_Mn | 4,0101 | 2,67831 | 99 |
| GapxReg | ,2626 | ,44230 | 99 |

Correlations

| | | Pref_Op_In | Gender | Age | Prom_trai | Prev_trai | C_Gap_Mn | Re_Fo_Mn | GapxReg |
|---------------------|------------|------------|--------|-------|-----------|-----------|----------|----------|---------|
| Pearson Correlation | Pref_Op_In | 1,000 | ,004 | -,041 | ,201 | -,230 | ,653 | -,030 | ,361 |
| | Gender | ,004 | 1,000 | -,120 | ,041 | ,057 | ,082 | ,020 | ,011 |
| | Age | -,041 | -,120 | 1,000 | ,096 | -,197 | -,051 | ,128 | -,162 |
| | Prom_trai | ,201 | ,041 | ,096 | 1,000 | -,501 | -,068 | ,008 | -,137 |
| | Prev_trai | -,230 | ,057 | -,197 | -,501 | 1,000 | -,027 | ,131 | ,056 |
| | C_Gap_Mn | ,653 | ,082 | -,051 | -,068 | -,027 | 1,000 | -,026 | ,582 |
| | Re_Fo_Mn | -,030 | ,020 | ,128 | ,008 | ,131 | -,026 | 1,000 | -,554 |
| | GapxReg | ,361 | ,011 | -,162 | -,137 | ,056 | ,582 | -,554 | 1,000 |
| Sig. (1-tailed) | Pref_Op_In | . | ,486 | ,342 | ,023 | ,011 | ,000 | ,383 | ,000 |
| | Gender | ,486 | . | ,118 | ,343 | ,287 | ,211 | ,422 | ,458 |
| | Age | ,342 | ,118 | . | ,173 | ,026 | ,308 | ,104 | ,055 |
| | Prom_trai | ,023 | ,343 | ,173 | . | ,000 | ,251 | ,470 | ,089 |
| | Prev_trai | ,011 | ,287 | ,026 | ,000 | . | ,394 | ,099 | ,291 |
| | C_Gap_Mn | ,000 | ,211 | ,308 | ,251 | ,394 | . | ,398 | ,000 |
| | Re_Fo_Mn | ,383 | ,422 | ,104 | ,470 | ,099 | ,398 | . | ,000 |
| | GapxReg | ,000 | ,458 | ,055 | ,089 | ,291 | ,000 | ,000 | . |
| N | Pref_Op_In | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | Gender | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | Age | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | Prom_trai | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | Prev_trai | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | C_Gap_Mn | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | Re_Fo_Mn | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| | GapxReg | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |

Variables Entered/Removed^a

| Model | Variables Entered | Variables Removed | Method |
|-------|--|-------------------|--------|
| 1 | Re_Fo_Mn, Prom_trai, Gender, C_Gap_Mn, Age, Prev_trai ^b | . | Enter |
| 2 | GapxReg ^b | . | Enter |

a. Dependent Variable: Pref_Op_In

b. All requested variables entered.

Model Summary^c

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | Change Statistics | | | Sig. F Change |
|-------|-------------------|----------|-------------------|----------------------------|-----------------|-------------------|-----|-----|---------------|
| | | | | | | F Change | df1 | df2 | |
| 1 | ,710 ^a | ,504 | ,472 | 5,16090 | ,504 | 15,573 | 6 | 92 | ,000 |
| 2 | ,710 ^b | ,504 | ,466 | 5,18889 | ,000 | ,010 | 1 | 91 | ,921 |

a. Predictors: (Constant), Re_Fo_Mn, Prom_trai, Gender, C_Gap_Mn, Age, Prev_trai

b. Predictors: (Constant), Re_Fo_Mn, Prom_trai, Gender, C_Gap_Mn, Age, Prev_trai, GapxReg

c. Dependent Variable: Pref_Op_In

ANOVA^a

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1 | Regression | 2488,762 | 6 | 414,794 | 15,573 | ,000 ^b |
| | Residual | 2450,410 | 92 | 26,635 | | |
| | Total | 4939,172 | 98 | | | |
| 2 | Regression | 2489,030 | 7 | 355,576 | 13,206 | ,000 ^c |
| | Residual | 2450,141 | 91 | 26,925 | | |
| | Total | 4939,172 | 98 | | | |

a. Dependent Variable: Pref_Op_In

b. Predictors: (Constant), Re_Fo_Mn, Prom_trai, Gender, C_Gap_Mn, Age, Prev_trai

c. Predictors: (Constant), Re_Fo_Mn, Prom_trai, Gender, C_Gap_Mn, Age, Prev_trai, GapxReg

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | | Collinearity Statistics | |
|-------|------------|-----------------------------|------------|---------------------------|--------|------|--------------|---------|-------|-------------------------|-------|
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 8,362 | 4,732 | | 1,767 | ,081 | | | | | |
| | Gender | -,842 | 1,069 | -,059 | -,788 | ,433 | ,004 | -,082 | -,058 | ,970 | 1,031 |
| | Age | -,053 | ,069 | -,059 | -,770 | ,443 | -,041 | -,080 | -,057 | ,923 | 1,083 |
| | Prom_trai | 1,027 | ,459 | ,192 | 2,237 | ,028 | ,201 | ,227 | ,164 | ,731 | 1,367 |
| | Prev_trai | -,826 | ,581 | -,125 | -1,422 | ,158 | -,230 | -,147 | -,104 | ,695 | 1,439 |
| | C_Gap_Mn | 1,711 | ,191 | ,665 | 8,964 | ,000 | ,653 | ,683 | ,658 | ,980 | 1,021 |
| | Re_Fo_Mn | ,029 | ,200 | ,011 | ,145 | ,885 | -,030 | ,015 | ,011 | ,951 | 1,052 |
| 2 | (Constant) | 8,320 | 4,776 | | 1,742 | ,085 | | | | | |
| | Gender | -,836 | 1,077 | -,058 | -,776 | ,440 | ,004 | -,081 | -,057 | ,967 | 1,034 |
| | Age | -,053 | ,069 | -,058 | -,758 | ,450 | -,041 | -,079 | -,056 | ,919 | 1,088 |
| | Prom_trai | 1,029 | ,462 | ,192 | 2,227 | ,028 | ,201 | ,227 | ,164 | ,730 | 1,369 |
| | Prev_trai | -,836 | ,593 | -,127 | -1,410 | ,162 | -,230 | -,146 | -,104 | ,674 | 1,483 |
| | C_Gap_Mn | 1,692 | ,266 | ,658 | 6,369 | ,000 | ,653 | ,555 | ,470 | ,511 | 1,958 |
| | Re_Fo_Mn | ,047 | ,271 | ,018 | ,174 | ,863 | -,030 | ,018 | ,013 | ,521 | 1,919 |
| | GapxReg | ,201 | 2,011 | ,013 | ,100 | ,921 | ,361 | ,010 | ,007 | ,347 | 2,879 |

a. Dependent Variable: Pref_Op_In