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Master Thesis

UNDERSTANDING THE IMPLICATIONS OF BUSINESS MODEL INNOVATION IN SMALL AND MEDIUM ENTERPRISES

Measurement Development and Face Validation

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"If you cannot measure it, you can not improve it"

- Lord Kelvin (William Thompson), Physicist

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Preface

This Master Thesis is the result of my graduation research project, conducted to fulfill the requirements of Master of Science degree in Management of Technology program. This research was also carried out as part of a larger project called Envision. This larger project gave me the opportunity to conduct a research based on their objectives and enabled me to use their resources, such as knowledge of the members. The whole process of making this thesis and my involvement in the project has given me invaluable experience that would be very useful in the future.

First and foremost, I would like to express my gratitude to my first supervisor, Mark de Reuver, who has been very helpul in giving hands-on feedbacks and critical insights for this thesis. I would also like to thank Harry Bouwman for giving me the chance to be involved in this project, for giving me full support, and for giving valuable feedbacks. My gratitude also goes to my second supervisor, Zenlin Roosenboom-Kwee, for giving me insights from different perspective which have enriched the overall content of the thesis. I would also like to convey my gratitude to Robert Verburg for chairing the graduation committee. Next, I am also very thankful for the inputs and feedbacks given by Alexia Athanasopoulou as the additional supervisor.

Furthermore, this thesis would not have been done without the continuous support of my family, especially from both of my parents. I would also like to extend my gratitude to all of my friends in the Netherlands for making the whole journey exciting.

Members of the Envision project were also involved in the process of the making of this thesis, especially in giving feedbacks to the deliverables. Without undermining the contribution of other members of Envision project, special recognition should go to Frank Molina, which has constantly giving constant feedbacks during questionnaire development.

One important note is that even though this research is part of Envision project, not all aspect of the project were incorporated into this research. The planning of Envision project was not parallel with this research, thus some of the activities and its timing were not exactly the same. Members of Envision project have already set their own schedule before the planning of this research was made, and not all of them matched with this research's timeline.

Hence, having longer lead time was inevitable to produce the deliverable. The deliverable was then limited only to a face valid measurement instrument (in a form of a questionnaire), and has not yet assessed for its construct validity. In the end, it can be said that the incomplete procedure conducted in this research was not solely due to this research limitation, but also on the Envision project limitation. Despite the limitations, the involvement of Envision members in this research was deemed necessary as the deliverable will be used as the basis for the achievement of Envision objectives.

Delft, 24 August 2015

Andri Caesartama Madian

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Executive Summary

Innovation has been regarded by European Commission (EU) as the important factor for economic growth. Small and Medium Enterprises (SMEs) are known as the source of these innovations, thus the source of economic growth. SMEs role during economic crisis is crucial as they can create employment. But they are still have pressing problems in finding customers and access to financial capital. Innovations can help them in solving these problems, but it should go beyond the typical product or process innovation.

In order to capture the value from innovations, a new and innovative business model is needed by SMEs. Thus in a sense, the business model should undergo innovation itself. Business model innovation (BMI) can improve business performance, and it might be moderated by the turbulence in the surrounding environment. Moreover, before SMEs can capture the value of innovation, they require the willingness and the ability to adopt it, or in other word, innovativeness.

Policies that support BMI in SMEs are needed. These policies can further enhance the Small Business Act (SBA) that was already implemented. BMI policies should be made based on facts and empirical evidences, but unfortunately, a unified measurement instrument to assess them does not exist, which making it impossible to provide empirical evidence. Being aware of the situation described above, a project called Envision was made to help addressing the problem, and this research is part of the project.

While there are several previous studies that have investigated the relationship between business model innovation (BMI) with business performance, less research were focusing on the relationship between BMI and innovativeness. The moderating effect of environmental turbulence was also more commonly found in studies about product innovation, not specifically on business model innovation. Moreover, most of these previous studies were not focusing on Small & Medium Enterprises (SMEs) but rather on a mix of large firms and SMEs. In addition, the definition and measurement of BMI is still not clear and have not gain common acceptance, which yield the primary research question:

What are the new face validated measurements that can be used to measure the implication of BMI to both business performance and innovativeness of SMEs, with the moderating effect of Environmental Turbulence?

Extensive literature survey, meta-analysis, and secondary research were conducted to find the relationship between the concepts and their existing measurements. From these research strategy, some hypothesized relationship were supported by qualitative meta-analysis and some existing measurement scales (summative scale) were found. Gaps were then identified from this summative scales based on a measurement instrument criteria or blueprint in this research and the feedback were used to construct new measurements (formative scale).

Based on the comparison between measurement instrument blueprint and existing measurements, 153 new items were developed out of the total 176 initial items. Face validation was conducted to provide evaluation on the clarity and relevancy of the items by judges. The face validation procedure consists of two stages where six judges were involved in the first stage and only one judge was involved the second stage. There were 21 items deleted, 104 items modified, and 3 items newly created based on this face validation. The result is 158 items that can be used for further validation in future research.

The objective of the research has been achieved, as the research has genereated measurements that are face valid. As the theoretical validity assessment procedure was not completed yet in this research (especially in assessing construct validity), the measurements that were generated cannot be said to be completely reliable and valid. Further research should be aimed primarily on continuing the validation procedure. The most important validation procedure that needs to be taken in the future is factor analysis. It can help in assessing the scales reliability and also the construct validity. After reliability and construct

validity has been assessed, then additional constructs can be added into the conceptual model to further develop the BMI theory.

In addition to contributing to the Envision project, this research has made significant contribution to the BMI literatures.As BMI is considered new in the field of innovation, exisiting BMI literatures were mainly exploratory in nature and used more qualitative methods instead of quantitative. Most BMI literatures were also only focusing on the relationship between BMI and business performance and there were no meta-analysis that can support this relationship. This research has extended the relationship of BMI beyond business performance, but also by including environmental turbulence as the moderator. Testable hypotheses were formulated and constructed into a conceptual model. Qualitative meta-analysis was done to find support for these hypotheses and relevant variables.

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1 Introduction

1.1.Research Background

Sustainable economy growth is one of the goals of European Commission as reflected in the Europe 2020 growth strategy (European Commission, 2014a). A great emphasis is being put in innovations as they are seen as one of the drivers of economic growth (European Commission, 2014a). There are several type of commonly known innovations (Abernathy & Clark, 1985; Henderson & Clark, 1990; OECD, 2005). They can be in a form of technological or non-technological innovations such as products, processes, organization, and business models. They are becoming more relevant in a time of economic crisis (European Commission, 2014a), like what the European countries are experiencing since 2008 (Muller, Gagliardi, Caliandro, Bohn, & Klitou, 2014). The way firms approach, develop and adopt these innovations can be varied, depending on the size of the firm (Acs & Audretsch, 1988; Cohen & Klepper, 1992).

There are trade-offs between small and large firms in terms of innovation approach (Cohen & Klepper, 1992). Large firms can reach economy of scale because they can sell or capitalize their innovations in larger scale than small firms, thus giving more returns on their R&D investments. Furthermore, large firms have the advantage of bigger financial and technological resources (Rothwell, 1989). Meanwhile Small & Medium Enterprises (SMEs) can offer entrepreneurial attitude and flexibility to respond to external environment changes (Rothwell, 1989). With these advantages, SMEs can offer various innovation approaches, thus giving diversity in the innovation and accelerate technological change (Cohen & Klepper, 1992). In other words, large firms have material advantages, while SMEs have behavioural advantages (Rothwell, 1989). From an ecosystem perspective, large firms and SMEs are playing complementary roles for each other (Moore, 1993; Zahra & Nambisan, 2012).

In the relation to supporting economic development, it was believed in early studies that large firms are the main contributor to economy growth, but more recent studies shows that SMEs are the actual engine of economy growth (Brannback, Carsrud, & Kiviluoto, 2014). They are seen as the source of innovations, aside from entrepreneurial skills and employment (European Commission, 2005; OECD, 2009; Thurik & Wennekers, 2004; Wong, Ho, & Autio, 2005), especially when they embrace entrepreneurial behavior (Stevenson & Jarillo, 1990). The emergence of SMEs can help in increasing employment which eventually contribute to a stable economic condition through social and political stability (Thurik & Wennekers, 2004). SMEs can help in maximizing labors in the market as they are able to utilize secondary, less attractive resource such as first time employees, employees with low educational levels, immigrants, etc (Robbins, Pantuosco, Parker, & Fuller, 2000).

A study reported that SMEs cover 99% of the number of business in European Union (EU) industry and contributed to 70% of employment (Nieto & Santamaría, 2010). Approximately two thirds of total employment in the non-primary private sectors in Europe were created by SMEs (European Commission, 2000). Another study also revealed that around 23 million SMEs provided 75 million jobs in European Union countries (European Commission, 2005). Within SMEs itself, we can see from the comparison between three different large economies (EU28, USA, Japan), shown in **figure 1** and **figure 2**, the number of micro-size SMEs are significantly larger than small-medium size SMEs but most employments still came from small-medium size SMEs (Muller et al., 2014).

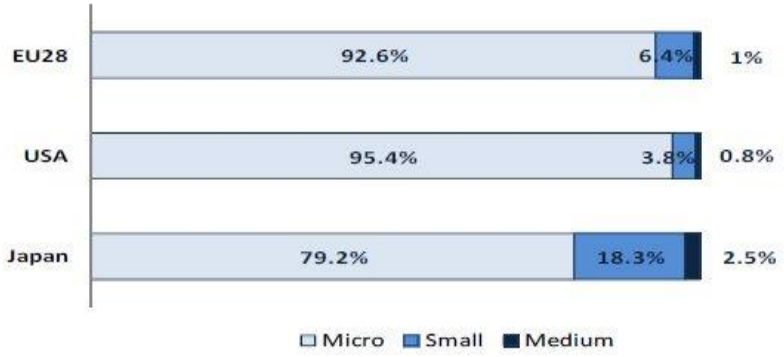

Figure 1 - Enterprise Distribution by Size Class (Muller et al., 2014)

Figure 2 - Employment Distribution by Size Class (Muller et al., 2014)

During the Euro Crisis that started in 2008-2009, SMEs showed their importance and central role in the economy. They endured the situation more resiliently than larger firms and mitigated the potential decline in employment (Gagliardi et al., 2013; Muller et al., 2014). The entrepreneurial activity in SMEs that constantly guides them in seeking new opportunity (Stevenson & Gumpert, 1985; Stevenson & Jarillo, 1990) and their flexibility in adapting to environmental changes (Cohen & Klepper, 1992) are some of the key factors that can help SMEs in enduring the economic crisis. Another benefit of having SMEs is they can create market equilibrium for market price when they enter the market (Audretsch, 2001).

Despite SMEs taking the lead role during the economic crisis, recently after the crisis situation is slightly better, larger firms led the recovery due to their capability to fulfill foreign demand through exports (Gagliardi et al., 2013). Most of SMEs, especially small firms, are depending on domestic demand. The problem of finding customers is the most pressing problem for SMEs of all size, more than the problem of access to financial capital (Muller et al., 2014) as it can be seen in **figure 3** below.

This can be a problem, knowing the importance of SMEs in the economy. These firms can be induced to enter the market based on the prospect of having excess profitability (Audretsch, 2001). Profitability is the most important indicator of business performance for startups or SMEs, as they can be the fuel to the firm's growth (Brannback et al., 2014). If they cannot find customers then they might have difficulties in entering the market or surviving the competition from larger firms because they cannot have enough profit.

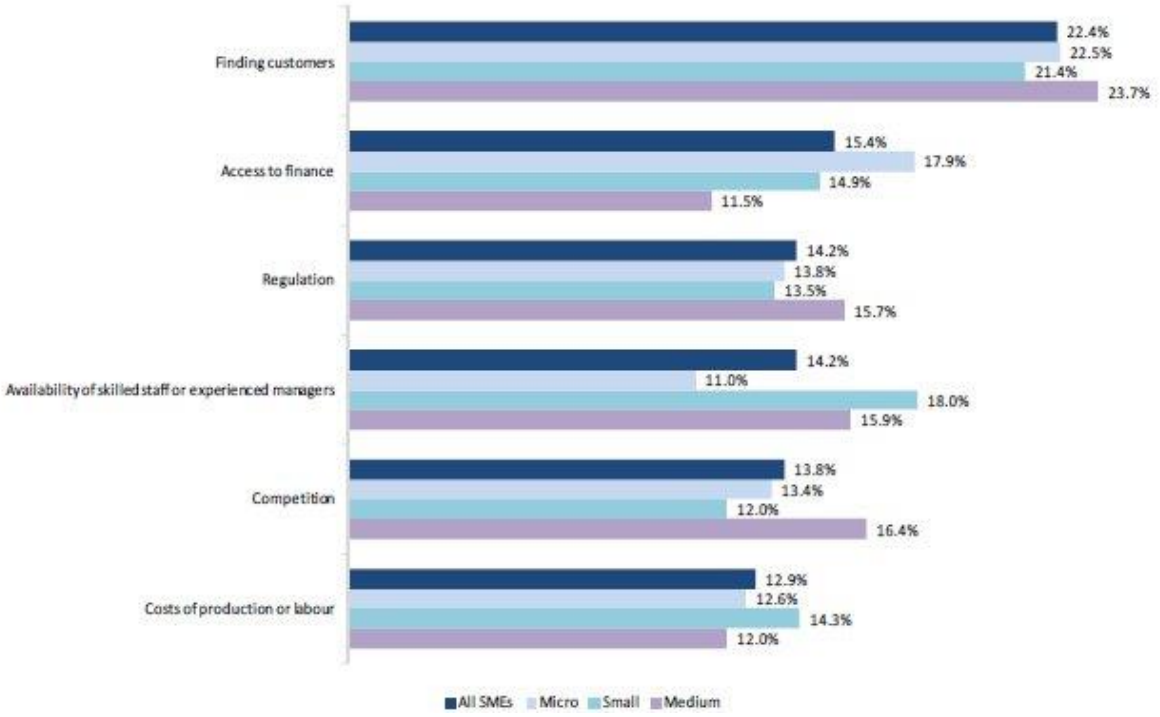

Figure 3 - Most Pressing Problem facing SMEs in the EU28 in 2013 (Muller et al., 2014)

The problems faced by SMEs indicate the existence of a performance gap. It is the "*discrepancies between what the organization could do by virtue of goal-related opportunity in its environment, and what it actually does in terms of exploiting that opportunities*" (Zaltman, Duncan, & Holbek, 1973). Naturally, SMEs will try to find solutions to close this performance gap, which can be found internally or externally, in a form of an innovation (Zaltman et al., 1973).

Innovations can help these SMEs, depending on the way they develop and use these innovations (Rosenbusch, Brinckmann, & Bausch, 2011). Heterogeneous actors are typically involved in the success of an innovation development (Powell, Koput, & Smith-Doerr, 1996), and it caused a distributed nature of innovation which needs to be coordinated by a device, typically a business model (Doganova & Eyquem-Renault, 2009).

Business model acts as a communication tool for entrepreneurial SMEs that want to commercialize their innovations to the market, addressing both customers and investors (Doganova & Eyquem-Renault, 2009), as it can explain the value created by the firm (Amit & Zott, 2001). Better communication about value creation in the firm to investors can improve their chances in getting the access to financial capital. Furthermore, new business models can arise because this nature of heterogeneous actors in the innovation environment. Ideas and capabilities required for innovation can come from these heterogeneous actors, which is the external part of the firm.

The paradigm that assumes that firms are combining both internal and external ideas for innovation is called *open innovation* (Chesbrough, 2003). It emphasize on the willingness of the firm to accept external ideas for innovation. Collaborating with other firms, possibly larger firms, can also give access to required expertise, which can influence innovation approaches (Cohen & Klepper, 1992). These collaboration with external partners are part of the element of a business model, which is *value network* (Chesbrough & Rosenbloom, 2002; Osterwalder, 2004). Firms and their partners will have a particular role in the value network as they can exchange resources such as knowledge and ideas. Openness to external ideas shows the willingness to innovate and is also commonly known as innovativeness (Hurley & Hult, 1998).

In turn, this *tendency to innovate* can affect the firm's ability to innovate with the changes in the firm's processes and resources (Garcia & Calantone, 2002; Hult, Hurley, & Knight, 2004; Hurley & Hult, 1998). These processes and resources are some of the elements of business model (Osterwalder, 2004). Hence changes in business models can be crucial in order to innovate or capturing the value of innovations (Casadesus-Masanell & Ricart, 2010; Chesbrough & Rosenbloom, 2002; Chesbrough, 2007, 2010; Teece, 2010).

Furthermore, the innovation in business model can potentially help SMEs in addressing their most pressing problem, which is finding customers, as disruptive innovation in business model can help firms in serving unfulfilled demand in the market (Christensen & Raynor, 2003; Johnson, Christensen, & Kagermann, 2008). Innovative business models may also emerge during the period of economic crisis because it is the time for industrial renewal (Giesen, Riddleberger, Christner, & Bell, 2010; OECD, 2009). Firms that were focusing on business model innovation outperformed the one that did not, in terms of business performance (Pohle & Chapman, 2006).

Emerging trends such as globalization, technology intensity, technology fusion, and knowledge leveraging also supported open innovation and the development of new business models (Gassmann, 2006). Policy makers should also support this business model innovation (BMI) , which can strengthen economic development, by making policies and funding mechanisms (Brannback et al., 2014).

Innovation is already being recognized as one of the methods that policy makers look into in order to achieve sustainable economic growth (OECD, 2009). A massive number of policy measures under the umbrella of Small Business Act (SBA) were crucial in helping SMEs in European Union (EU) countries during the time of crisis (Gagliardi et al., 2013). Some of the policies supporting innovation can be found in several existing studies (European Commission, 2009; Jaumotte & Pain, 2005; Lilischkis, 2011; van Cruysen & Hollanders, 2008).These policies must continue to support five foundation of SBA*: responsive administration, access to finance, access to markets (or internationalization), entrepreneurship*, and *skills & innovation* (Muller et al., 2014), as seen in **figure 4** below. The support of entrepreneurship and innovation in EU was also reflected in the Lisbon Treaty and EU2020 strategy (Brannback et al., 2014).

Policies created by policy makers can reinforce the innovation in SMEs, especially by providing access to financial capital, access to market and competencies, thus it must be properly guided by facts and evidence (OECD, 2009). Unfortunately the lack of empirical evidence is one of the challenges that policy makers are facing to support SMEs (Lilischkis, 2011). Consequently, policy makers also have difficulties in making policies that are specifically designed for SMEs (Lilischkis, 2011).

If not being managed properly, policies and regulation might hamper the flexibility of SMEs (European Commission, 2000), thus decreasing their contribution to economic growth. Statistical indicators, which are provided by Eurostat, are some of the facts and evidences used by European Commission to monitor the progress of their goals, including innovation and sustainable growth (European Commission, n.d., 2014b).

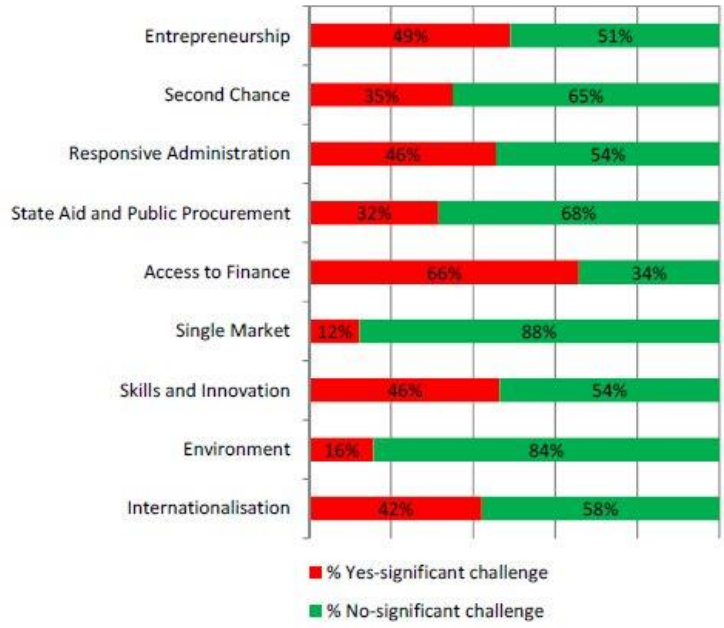

Figure 4 - Most Challenging SBA principles to SMEs at National Level - EU28 (Muller et al., 2014)

The whole argument in the previous paragraphs highlighted several important points that can served as the background for this research. **First**, SMEs can be the major contributor to innovation as source of sustainable economic growth. **Secondly**, to capture the value of innovations, new and innovative business models should be developed by these SMEs. **Third,** business model innovations (BMI) can potentially improve business performance and affect the ability of SMEs to adopt innovations, or their level of innovativeness**. Lastly**, policy makers need to reinforce the innovation in SMEs, including business model innovation, based on empirical evidences and facts, perhaps from surveys or research.

1.2.Research Problem

Based on the research background described in the previous section, this research will try to formulate the research problem in this section. Looking at existing literatures, there are several problems that have been identified and will be elaborated further in the subsequent paragraphs.

The **first problem** that this research would like to tackle is regarding the understanding of the BMI. The lack of empirical research in the field of BMI related to business performance and innovativeness of SME might also because of the lack of BMI understanding (George & Bock, 2011), which leads to also the lack of measurement that can operationalize BMI. Measurement is important for measuring past and current performance which will support future planning activities and decision making in order to achieve the pre-determined objectives (Lebas, 1995; Parker, 2000). Furthermore this measurement should be valid and reliable to produce a high quality measuring instrument (Bacharach, 1989; Kimberlin & Winterstein, 2008).

Without this valid and reliable measures, it is hard for policy makers to acquire empirical evidences to formulate policies that can support BMI. This empirical evidences are needed as policy makers are often also do not understand what is needed by SMEs (Brannback et al., 2014). It would be difficult to improve something if it cannot be measured.

A study (Barjak, Bill, & Perrett, 2014) aims to make a operationalization of BMI concept based on different type of innovation definitions (OECD, 2005) and business model elements (Chesbrough & Rosenbloom, 2002; Chesbrough, 2007; Giesen et al., 2010; Lindgren, 2012; Osterwalder, Pigneur, & Tucci, 2005;

Osterwalder & Pigneur, 2010; Shafer, Smith, & Linder, 2005), but this operationalization is still relatively new and still not widely used. Thus, this operationalization might need further investigation.

The **second problem** is related to the relationship between BMI and innovativeness of a firm. Despite the importance of innovativeness to firm, there is still little research that can show the relationship between BMI and innovativeness. This is a contrast with the relationship between BMI and business performance, as more research already explicitly indicated that BMI can positively influence business performance (Giesen, Berman, Bell, & Blitz, 2007; Hartmann, Oriani, & Bateman, 2013; Pohle & Chapman, 2006; Zott & Amit, 2007).

A study showed that the use of parallel business models at the same time can help SMEs in improving their innovativeness (Clausen & Rasmussen, 2012). While this use of parallel business model is a way of serving multiple different market segments (Chesbrough, 2007), it might be more related to business strategy instead of innovation in business model, as strategy indicates the choice of business model that a firm will use (Casadesus-Masanell & Ricart, 2010). The use of multiple business models can also be seen as the process of BMI experimentation (Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). Therefore, this research would like to focus on investigating the relationship between BMI and innovativeness in order to provide understanding how they can affect each other.

The **third problem** would be in the term of the scope of research. Empirical research of BMI in the scope of SME is also still lacking as most of the previous studies were mixed between SME and large firms (Desyllas & Sako, 2013; Pauwels & Weiss, 2008; Rosenbusch et al., 2011; Zott & Amit, 2007, 2008). While it is good to have the combination of small and big firms to provide more generalization, it might give little insights on how to specifically boost the performance of SMEs. The tendency and capacity to innovate and other innovation activities may differ between small and large firms (Acs & Audretsch, 1988; Cohen & Klepper, 1992), due to the degree of resources that they possess (Freel, 2000; Nieto & Santamaría, 2010), thus previous studies might not be enough to reflect the effect of BMI in SMEs. This is problematic considering the importance of SME's BMI to business performance and innovativeness, which eventually leads to economic growth.

Fourth problem, the surrounding environment is known to affect the innovation processes and its outcome (Teece, 1996). It is also known to have moderating effect on the relationship between innovation and business performance (Siguaw, Simpson, & Enz, 2006), but it is mostly on product innovations.. Because BMI is relatively new, compared to other type of innovations, there is still little research that empirically examine the moderating effect of environment to the relationship between BMI and business performance. Furthermore, this research would also to see this moderating effect in the context of SMEs, as existing study also have shown that small firms that show entrepreneurial behavior will thrive in a hostile environment (Covin & Slevin, 1989).

The **fifth problem** would be the comprehensiveness of previous studies. Previous studies were investigating BMI, innovativeness, business performance and moderating effect of environmental turbulence in a fragmented way. Research of BMI were usually related to business performance, as it is one of the motivations of firms in doing innovation (Damanpour, 1991). Innovativeness, which can affect BMI and also business performance, were not mainly discussed in those studies. Environmental turbulence was investigated as moderator between innovation and performance, but not specifically in BMI. Perhaps if innovativeness can be discussed in the same research of BMI and business performance, together with the potential moderating effect of environment turbulence, it can give additional valuable insights for firms.

The first four problems are related to some different concepts which will can provide more insights if the relationship between them are studied in a comprehensive way, stated in the fifth problem. According to Kerlinger (1986), as cited in Malhotra & Grover (1998), a set of interrelated concept can formed a theory which explains and predicts some phenomenon. Thus these problems are pointing to a research gap, which is:

There is no well known comprehensive relationship between BMI, business performance, innovativeness, and environmental turbulence in the context of SME.

One of the well known method for theory development is survey research (Malhotra & Grover, 1998). It is a quantitative method that involves information collection processes from a representative sample. It can explain the causal relationships between variables due to its explanatory nature, aside from exploratory. The information can be collected via various methods, including questionnaire as the most common method (Malhotra & Grover, 1998). This measurement instrument should be validated to determine the true relationship between independent and dependent variables of this research through pretesting.

This research looked for existing valid and reliable measurement instruments that can be used to assess these relationship, but could not find a suitable instrument. One of the measurement instrument used in EU to assess innovation is the Community Innovation Survey (CIS) 2008-2010 that was published by central statistical office in Dublin, Ireland. This measurement instrument did not include BMI as the subject of innovation and did not assess innovativeness as part of the assessment. Barjak and colleagues (2014) tried to operationalize and combine the four type of innovation in CIS 2008-2010 to study BMI in his research. Their study might be useful for this research, but it is still not a complete specific assessment for BMI as it only measure the degree of innovation for two out of four type of innovations using CIS questionnaire.

Furthermore, empirical quantitative studies in BMI (Abd Aziz & Mahmood, 2011; Hartmann et al., 2013; H.-C. Huang, Lai, Kao, & Chen, 2012; Kim & Min, 2015; Velu, 2015; Zott & Amit, 2007, 2008) , innovativeness (Cheng, Shiu, & Dawson, 2014; Clausen & Rasmussen, 2012; Hult et al., 2004; Subramanian & Nilakanta, 1996) and performance (Hult et al., 2004; Venkatraman & Ramanujam, 1986) are fragmented or partially connected, thus the scales from the instrument are not integrated.

Thus, the lack of comprehensive, valid, and reliable measurement instrument in existing studies leads to a more specific research gap:

There is no reliable and valid measurement instrument that can measure the relationship between BMI, business performance, innovativeness, and environmental turbulence, in the context of SME.

1.3.Research Objective

After we have described the research background, research problems and research gap, next we need to formulate the goal of this research project by formulating a research objective.(Verschuren & Doorewaard, 2010). It has to be useful, realistic, feasible, clear and informative. To provide more understanding on the research objective, some general definition of related concepts should be described to provide better understanding to the research objective.

This research is related to business model innovation (BMI), business performance, and innovativeness in small-medium enterprises (SMEs), with the potential moderation effect of environmental turbulence. BMI is the innovation that which involves the change in the elements of a business model (Barjak et al., 2014). Business performance is the typical goal of a firm (Hult et al., 2004) and also the motivation for a firm in adopting innovation (Damanpour, 1991). Innovativeness were commonly have dual interpretation, the capacity or tendency of a firm in adopting innovation (Garcia & Calantone, 2002; Hult et al., 2004; Hurley & Hult, 1998). SME are being defined as a firm or an enterprise that employs no more than 250 people and has an annual turnover/balance sheet no more than 50 million (European Commission, 2005). Meanwhile environmental turbulence is related to the uncertainties that exist in the firm's external environment (Zahra & Bogner, 2000)

Next, after the background, problem and general definition of concepts have been identified, the research objective of this research can be formulated as follow:

> *To help measuring and understanding the implication of Business Model Innovation (BMI) to business performance and innovativeness of SMEs,with the moderating effect of environmental turbulence, by developing a face validated measurement instrument in a form of a questionnaire.*

From the research objective stated above, the final deliverable would be a questionnaire that has been face validated. This face validation step involves several judges that will evaluate the questionnaire clarity and relevancy. It is a necessary preliminary step that can help ensuring construct validity of the questionnaire (Hinkin, Tracey, & Enz, 1997). Construct validity should have also assessed using subsequent validation steps, but it would take longer time than the time that was available for this research.

The deliverable will be the foundation of a valid measurement instrument that can used by Eurostat, European Commission and SMEs, thus indicating the *usefulness* aspect. It is also indicating *realistic* and *feasibility* of the research as having a face validated questionnaire is only part of a larger and time-consuming procedures. This realistic and feasible aspect will be further supported by the research strategy used. The objective is also *clear* because it is already indicating measurements as key contribution to the effort of understanding and measuring SME's BMI, business performance, innovativeness, and environmental turbulence. Lastly, it is also *informative* in the sense that it limits the scope only for measuring SMEs, not larger firms.

This research can be accounted as theory-developing type of research. This type of research can give clarification or addition to existing theory or introduce new relationships to form a new theory (Colquitt & Zapata-Phelan, 2007). This research will introduce new moderator to the known relationship between BMI and business performance, which is categorized as moderate level of theory building by Colquitt & Zapata-Phelan (2007). In addition, unexplored relationship between BMI and innovativeness will be investigated, which accounts for a high level of theory building (Colquitt & Zapata-Phelan, 2007).

Furthermore most previous studies were not specifically focusing on SMEs, which is the focus of this research. New measurement instrument to investigate these relationships will also be developed, especially for measuring BMI, as it is a relatively new concept and still lacking in valid measurements. The concept of business performance and innovativeness are more widely discussed in previous studies, thus this research can use measurements that have been validated in previous studies, if applicable.

A good theory is also practical because it can give guidance to related professions (Van de Ven, 1989). In the future, with further development, the result of this research can also be used for practical application. Annual BMI survey by European Commission can be conducted and the result can guide the policy making process. Like what Lewin (1945) said, "*nothing is so practical as a good theory*", as cited by Van de Ven (1989).

1.4.Research Framework

To achieve the Research Objective stated above, all necessary information needs to be identified. A set of research questions will be useful in identifying the required information, but it is often hard to extract these questions out of the research background and objective. One method to bridge research objective and research question is by drawing up a research framework (Verschuren & Doorewaard, 2010).

For theory-developing research, research perspective needs to be derived from existing relevant literatures (Verschuren & Doorewaard, 2010). These literatures will help in further specifying BMI concept and providing theoretical perspective/frameworks. BMI measurement criteria will be set as research perspective, derived from related key concepts and theoretical frameworks.

Formulation of the research framework shown in **figure 5**:

(a) An extensive literature review will be conducted on BMI, Innovation, Entrepreneurship, Organizational Performance, and Environmental Turbulence Theory to find criteria that can help in formulating valid and reliable measurements for BMI. This measurement criteria can be used to **(b)** analyze and confront the existing measurements of BMI that have existing causal relationship with Business Performance and Innovativeness in previous studies. The analysis can provide insights whether there should be new measurements to be introduced in order to accurately measured BMI and other related concepts. This step will also include a face validation step and the result will be **(c)** the set of face validated measurements incorporated in a questionnaire. These blocks from (a) to (c) are also reflecting the order of which this research will be conducted (Verschuren & Doorewaard, 2010).

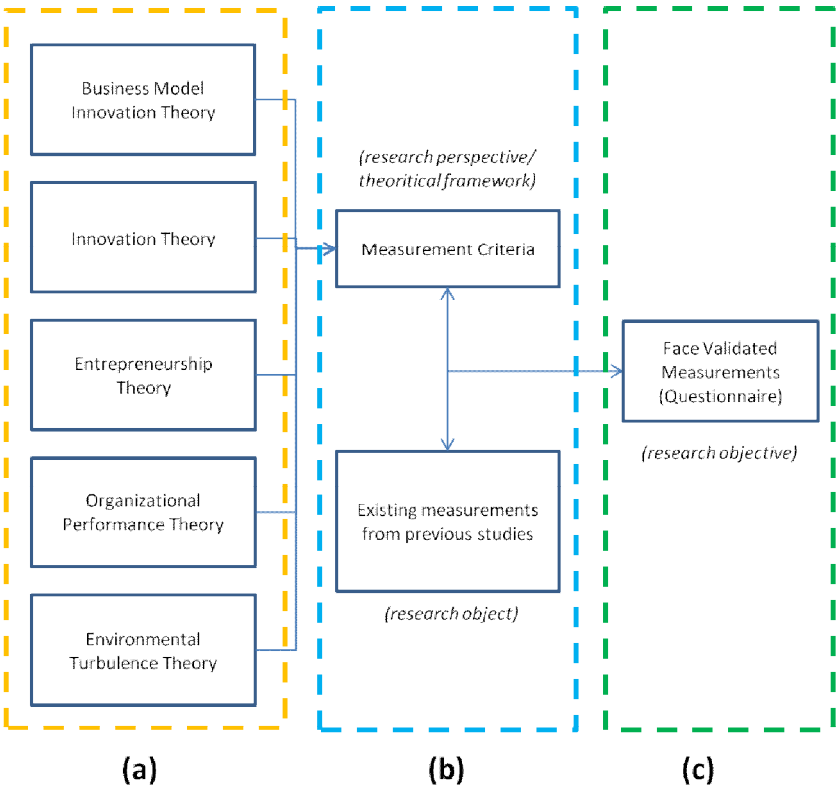

Figure 5 - Research Framework

Existing measurements can also be considered as a summative scales or summative assessment (Sadler, 1989; Taras, 2009). When a gap in the summative scales has been identified and the feedback was used to formed a new scale, it can be said that a formative assessment or scale has been formed (Sadler, 1989). Making sure the formative scales are valid is more important than focusing on its reliability, as reliability will follow later on when the scales are valid (Sadler, 1989). Thus, this research will check what are the existing (and tested) measurements, identify the gaps, form new (untested) measurements, and assess its validity and reliability.

1.5.Research Questions

After knowing the big picture of the research, as illustrated by the research framework, we need to formulate research questions in order to achieve the research objective. The requirement that a set of research questions must have are efficiency and steering function (Verschuren & Doorewaard, 2010). Efficiency is related to the research objective, while steering function is related to research activities.

One method to formulate the research questions is to subdividing the research framework into identifiable components (Verschuren & Doorewaard, 2010). From the research framework above, we have three

components, ranging from (a) to (c). Each of these components can act as guidance for formulating research questions. As a result, this research will have two main/central research questions instead of one.

First Central Research Questions related to component (a):
What are the suggested initial measurement instrument criteria for assessing the existing measurements from previous studies?

It is clear that we have to do extensive literature review and collaborating with other researchers to provide the answer, thus it fulfills the efficiency and steering function criteria. The answer would *descriptive* in nature, particularly with knowledge from the past (Verschuren & Doorewaard, 2010).

Second Central Research Questions will be related to component (b):
What are the new face validated measurements that can be used to measure the implication of BMI to both business performance and innovativeness of SMEs, with the moderating effect of Environmental Turbulence?

This second central question cannot be answered without answering the first question first. This second central question is aiming in generating *descriptive knowledge*. This *descriptive knowledge* in second central research question will be based on the *descriptive knowledge* generated by the first central research question. Furthermore, the second central research question will be supported by five sub-questions that can help guiding the process in finding the answer.

From our research objective and second central research question, this research would like to provide better understanding regarding relationship between BMI, business performance, innovativeness, and environmental turbulence. It can only be done if the reliable and correct measurements for all of the concepts are available. While the measurements for BMI is going to be developed in this research, the measurements of business performance, innovativeness, and environmental turbulence can be taken from previous studies. All of the three concepts are more well-known compared to BMI, thus there would be more studies that have measured them. Hence, we formulate the first three sub-questions as follow:

Sub-question 1, 2, and 3:

- *What are the measurements for Business Performance?*
- *What are the measurements for Innovativeness?*
- *What are the measurements for Environmental Turbulence?*

Afterwards, this research would have answered the first research questions based on literature review. This literature review will yield the initial suggested set of measurements for BMI based on larger concepts and theories, and it can be compared to existing BMI measurements that are available from previous empirically researched studies about BMI. Thus this research formulate the fourth sub-question as follow:

Sub-question 4:

- *What is the result of the comparison between existing BMI measurements and suggested BMI measurements?*

Last but not least, the result of the comparison will generate a set of measurements that will have to be tested for its reliability and validity. This test is important for this research to be able to deliver measurements that is not only measuring the right concept but also can be used consistently across different time and research. Therefore, we formulate the following fifth and sixth sub-questions:

Sub-question 5 & 6:

- *What is the result of the reliability testing of the suggested measurements?*
- *What is the result of validity testing of the suggested measurements?*

In summary, first and second sub-questions can help identifying existing measurements for Business Performance and Innovativeness concept that have been validated in previous studies. Third sub-question can help in identifying new BMI measurements that might have not been identified in previous studies and all of them will be tested for reliability and validity in fourth and fifth subquestion.

The output of the research sub-questions will help in answering the second central research question, and this in turn will help in achieving *research objective* which is in block (c) in the research framework.

1.6.Research Approach

1.6.1. Research Strategy

For this research, the strategy that will be used is **Desk Research**. Main characteristics of this type of research are the use of existing materials, absence of direct contact with research object, and material will be used from a different perspective than at the time it was produced (Verschuren & Doorewaard, 2010). This research will mainly use two out of three types of existing material as suggested by Verschuren and Doorewaard (2010): literature and secondary data. Statistical data that is directly related to BMI may not be available, thus it is good to have but not a compulsory material. Two variants of Desk Research will be used: Literature Survey and Secondary Research.

First variants of Desk Research that will be conducted in this research is **extensive literature survey**, as knowledge source, that will be used in order to fully understand the related concepts in this research and to find connections between them. This literature review consists of journal articles, books, conference proceedings and other scientific source. Secondly, this research will also refer to empirical data or empirically tested hypotheses collected by other researchers by the means of **secondary research,** as data source. It can be the result of an existing survey, experiment, case study and statistical data (Verschuren & Doorewaard, 2010).

In extensive literature survey, aside from finding definitions of the concepts, the relationship between concepts will also be investigated. Empirical findings about these relationships might be found from existing studies and analyzed to gain insights for this research. A **meta-analysis** can be used to statistically integrate these empirical findings (DerSimonian & Laird, 1986; Glass, 1976). The use of meta-analysis is very useful especially for topics that have huge literature (Glass, 1976) and heavily relies on the availability of all relevant information (Burns & Burns, 2008).

Because the focus of this research is BMI, the meta-analysis will focus on searching existing empirical quantitative studies in BMI area that are related to innovativeness, business performance, and environmental turbulence. Due to the "newness" nature of BMI topic, the availability of such papers might be limited, thus statistical result of meta-analysis might have low significance. Thus, another type of meta-analysis, which is **qualitative meta-analysis** (van de Wijngaert, Bouwman, & Contractor, 2012) can also be used. This method uses network analysis to visually represent the empirically validated relationships in existing studies and can provide the initial support for hypothesized relationships in this research.

For secondary research, this research will mainly use data from existing survey/studies to see existing BMI measurements and use them as reference to build set of initial suggested measurements. This strategy offers the advantage of survey research while accommodating the disadvantage of time-consuming data gathering (Verschuren & Doorewaard, 2010). Extensive literature survey and secondary research are

suitable for specifying the domain of core concepts and generating sample of items / set of initial items in the process of developing new measures, as suggested by Churchil Jr. (1979). After the set of initial items are generated, the measurement instrument will be pre-tested, purified and assessed for their reliability and validity before it can be used (Churchill Jr., 1979).

1.6.2. Assessing Measurements Reliability and Validity

After indicators/measures were identified from literatures, previous studies and documents, it will be pre-tested for *reliability* and *validity* using **questionnaire** as measurement instrument. *Validity* is related to the issue of whether this measurements are measuring the right concept while *reliability* is concerned with stability and internal consistency of the measurement (Forza, 2002; Sekaran & Bougie, 2013). Assessing the "goodness" of measures will ensure more accuracy, increase the quality of the research (Sekaran & Bougie, 2013) and help reducing measurement error (Malhotra & Grover, 1998).

There are several types of validity that can be tested as suggested by Cook and Campbell (1979), as cited by Calder, Phillips, and Tybout (1982), but this research are putting emphasize on construct validity. Although the assessment of construct validity will not be done in this research, the result of face validation can lay the foundation for it. Meanwhile, external validity is not the focus of this research, as it deemed less important than construct validity (Calder, Phillips, & Tybout, 1982). It will be hard to provide external validity in this research due to the specificity of the target respondents (SMEs in Europe). Furthermore, it is possible to achieve construct validity without achieving external validity (Calder et al., 1982).

As a guideline, this research will follow the procedure from another studies (Churchill Jr., 1979; Gatignon, Tushman, Smith, & Anderson, 2002): (1) Do Face Validity with experts as initial validation of the measurement items, (2) Purification of items using Exploratory Factor Analysis, (3) Confirming the "purified" items with Confirmatory Factor Analysis, and (4) Test Discriminant Validity and Convergent Validity of the items (5) Nomological Validity to check if causal theoretical relationship between concepts is consistent with other studies.

1.7.Scientific and Practical Relevance

This lack of knowledge about how to measure BMI can be problematic for statistical bodies such as Eurostat in providing valid and reliable statistical data. By having valid and reliable measurement of BMI, Eurostat can then conduct annual surveys to track the current BMI level of SMEs and how it affects SME's business performance and innovativeness from time to time. The relational statistics, as the outcome of this annual survey from Eurostat, can help European Commissions to measure the impact of a policy on a certain outcome (May, 2004). Furthermore, reliable measurements can act as common language for different users, such as different SMEs, to see where they are among the competition in terms of BMI (Kimberlin & Winterstein, 2008). These valid and reliable measurements can also be used in other studies that are related to BMI, thus it also have academic relevance.

1.8.Relation to Envision Project

This research is part of a larger project, namely Envision Project. This project aims to support the goal of Europe 2020, which to achieve sustainable economic growth in the European region. Envision will try to empower SME's productivity and profitability through the innovation in their business model. This project consists of members from various countries, forming a consortium, which will have collaboration with strategic partners such as statistical offices and national chambers of commerce.

Envision has several objectives, and this research will particularly support the achievement of the fourth objective of the Envision project: "*Examine quantitatively how and to what degree BM ontologies and tools as used by SMEs contribute to their innovativeness and competitiveness".* This objective will provide further

understanding about BMI by conducting annual survey using a measurement instrument (in a form of a questionnaire). The activities are described as Work Package 4.

This research mainly contributed in the development of the measurement instrument. This instrument is a vital piece of Work Package 4, because without this instrument, the Work Package 4 cannot be conducted. As previously mentioned in the research problem, due to the newness of the concept of BMI, there are still no reliable and valid measurements of BMI that are widely used. These measurements were developed in this research by looking at the existing definitions and theories and will follow a systematic procedure. Some variables, especially to measure BMI, were also suggested by Envision project that were initially not the scope of this research.

Series of iterations of the questionnaire design were conducted in the process of the measurement instrument development. The questionnaire design were frequently discussed with the members of the project to check if the items are relevant to the concepts and clear enough for the respondents. Some of the project requirements, which are not included in the objective of this research, were included such as the required components or variables of BMI.

1.9.Report Outline

Following the introduction chapter will be the description of definitions of core concepts in **Chapter 2**. This chapter will also discuss the findings regarding hypothesized relationships of concepts from previous empirically researched studies. These studies would not only involve specific BMI concepts but can involve broader concepts as empirical studies in BMI are still limited. **Chapter 3** will discuss the detail of the measurement instrument development, which followed a rigor procedure suggested by other studies. Afterwards, the analysis of the face validation and discussion on the suggested measurements will be done in **Chapter 4.** A relatively detail future validation plan will be elaborated in **Chapter 5**. The conclusion whether the objective of this research has been achieved or not will be presented in **Chapter 6**. This last chapter will also discuss the limitation of this research and the direction for future research.

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2 Definitions, Operationalization, and Meta-Analysis

2.1.Definitions of Concepts

The following subsections are the critical foundation for item generation in this research as this research is following a deductive measurement development method (Hinkin et al., 1997). Definitions will be given for the main concepts in this research (business model innovation, innovativeness, business performance, and environmental turbulence) and also other supporting concepts that will be helpful (SME, Entrepreneurship, Business Model, Enterprise Architecture, Operating Model, Learning Orientation, Market Orientation, and Entrepreneurial Orientation).

2.1.1. Small-Medium Enterprise and Entrepreneurship

Key concepts in this research need to be defined and elaborated as it may have major influence on the progress of the research (Verschuren & Doorewaard, 2010). These concepts were identified from preliminary literature research. First, since this research is focusing on how to improve economic growth through innovation in Small Medium Enterprises (SMEs), we need to take a further look at the concepts of Small-Medium Business and Entrepreneurship.

These concepts are related but they have different meaning (Thurik & Wennekers, 2004). While entrepreneurship is defined as *"a process by which individuals-either on their own or inside organizations-pursue opportunities without regard to the resources they currently controlled"* (Stevenson & Gumpert, 1985; Stevenson & Jarillo, 1990), small-medium enterprises (SMEs) is more of a vessel that facilitates entrepreneurs in making innovations (Wennekers & Thurik, 1999).

The role of entrepreneurs in the economy can be seen from the two contrasting theories by Schumpeter and Kirzner, as discussed by Brannback, Carsrud, and Kiviluoto (2014). Schumpeter argued that entrepreneurs in SMEs can introduce innovations in the market, while Kirzner argued that the most important thing for entrepreneur is alertness to opportunity of profit-making situation, not innovation. Schumpeter's approach is more radical because the innovation can create market disequilibrium, while Kirzner's approach is more incremental because the profit-situation alertness can cause the economy to move gradually to equilibrium. The thing they have in common is their focus on profit as the main driver of entrepreneurship (Brannback et al., 2014).

Characteristics of entrepreneurship can be found also in other studies. Creating new entry in the market is the essence of entrepreneurship (Lumpkin & Dess, 1996), either by entering totally new market or entering established market with new products or services. The timing of entry should also be the consideration of entrepreneurs as it can give first-mover advantages (and disadvantages) (Golder & Tellis, 1993; Lieberman & Montgomery, 1988). Furthemore, entrepreneurship can characterizes management style in terms of their propensity to make risk-taking decisions, innovation and their proactiveness (Miller, 1983). This entrepreneurship activity need something as facilitator, which can be found in a form of an enterprise.

An enterprise is defined as *"any entity engaged in an economic activity, irrespective of its legal form"* (European Commission, 2005). According to previous study, a small-medium enterprise in Europe can be defined as a firm where there are between 5 to 500 person that is engaged within the firm (Nooteboom, 1994). This number was also applied in other studies, which also defined small businesses as firms with 500 employees or less (Audretsch, 2001; Robbins et al., 2000).

But there is a new definition of SMEs according to European Commission, based on several threshold: staff headcount, annual turnover, and/or annual balance sheet (European Commission, 2005). Micro enterprises consists of 10 or fewer employees and have annual turnover/annual balance sheet that does not exceed 2 million euro. Small enterprises have 50 or fewer employees and an annual turnover/annual balance sheet of maximum 10 million euro. While Medium enterprises employ 250 or fewer employees with annual turnover/annual balance sheet that is no more than 50 million euro. Thus, in this research we will define SMEs as "*enterprises or firms that employ a maximum of 250 employees with an annual turnover/annual balance sheet that does not exceed 50 million euro."* (European Commission, 2005).

Some of these SMEs can be family businesses (Brannback et al., 2014; Carsrud & Brannback, 2012). One of the definition of family business is " *two or more extended family members influence the direction of the business through the exercise of kinship ties, management roles, or ownership rights*", as cited by Carsrud & Brannback (2012) from another study (J. A. Davis & Tagiuri, 1989). These enterprises would most likely use family norms and family values as the guidance to run the business (Carsrud & Brannback, 2012).

Some say that family business cannot be accounted as entrepreneurship because it was inherited, not founded. But even it was inherited, as long as it still pursue new opportunities, it can still be accounted as entrepreneurship (Brannback et al., 2014). Aside from family business, women entrepreneurs are also being given special attention because many people assume that entrepreneurs are usually male (Brannback et al., 2014).

Regardless of the ownership type of the SMEs, one thing for sure is that resources controlled by firms can be a competitive advantage (Barney, 1991). Different resources controlled by firms created interdependencies among them (Pfeffer & Salancik, 2003). These different resources were categorized by Barney (1991): physical capital resource, human capital resource, organizational capital resource. SMEs usually have lack of access to these resources (Freel, 2000; Nieto & Santamaría, 2010), especially financial resource that can be barrier to innovation (European Commission, 2000; Freel, 2000; Teece, 1996).

This also shown in previous studies which emphasizes the fact that different size of a firm can have an effect on their innovation activities (Acs & Audretsch, 1988; Audretsch, 2001; Cohen & Klepper, 1992). Thus, SMEs needs to adopt entrepreneurial mindset to be able to actively search for resources that cannot be provided internally. According to research, the SMEs that outperform the competition usually make use of external resource in their network (Bretherton & Chaston, 2005; Jarillo, 1989).

Crucial resource such as financial capital required for developing and commercializing new products can be met with means of collaboration (Teece, 1996). Knowledge, as input to economic activity (Thurik & Wennekers, 2004), is also a resource that firms pursue, typically through R&D (Cohen & Klepper, 1992). The incentive for collaboration would be to avoid duplicating innovation costs and to have collective profit through joint R&D program, especially in a market where monopoly is absent (Cohen & Klepper, 1992; Powell et al., 1996; Verhees & Meulenberg, 2004).

However, despite having the disadvantage in terms of resources, there are also several advantages that SMEs possess, such as internal flexibility and responsiveness to rapidly changing situations (Cohen & Klepper, 1992; Verhees & Meulenberg, 2004). This can be the result of a less bureaucratic internal process as the decision maker is often the business owner itself (Nooteboom, 1994; Verhees & Meulenberg, 2004). The way SMEs access external resources from their partners and maximizing these resources by offering unique value propositions for their customers can be explained by their business models, which can be very different from large companies. Having a sound business model and how it can be adapted over time is one of the important determinants for the performance of SMES, along with environment and strategy (Balboni, Bortoluzzi, Tivan, Tracogna, & Venier, 2014; Song, Podoynitsyna, Van Der Bij, & Halman, 2008).

The need to develop a sound business model might depend on the stage of the organization lifecycle they are in at that particular moment. The need of the firm will be different when they are in startup, growth, mature, and decline/transition phase (Jawahar & McLaughlin, 2001). Developing a new and sound business model would be crucial in startup phase to be able to enter the market, and the firm will be striving for its survival. When firms are in growth and mature stage, they might overlook the need to develop a new business model as they would still feel comfortable with the current one. In the decline/transition stage, the need to survive will emerge, just as in the startup phase, which might the right time to think about a new business model.

2.1.2. Innovation

Before we can understand business model innovation, we need to understand what is innovation itself (Velu, 2015). Innovation is a way for firms to change themselves in response to the change in their environment (Hult et al., 2004). Innovation also has several definitions based on previous studies. There can be three different context in the definition of innovation (Zaltman et al., 1973). First context is that innovation is synonym with invention, where there would be a new configuration which not previously known, based on the combination of existing products or processes. Second context would be that innovation would be more of a process of adoption of existing innovation which is new to the firm. Third context is the new item itself that has been invented and has attributes and dimensions of innovation.

Definitions of Innovation can also be made broader. According to Abernathy and Clark (1985), innovation can affect two domains: market and technology/competence, which categorized innovation in four different ways: architectural, niche, regular and revolutionary. These categorization was made based on whether the innovation would conserve or disrupt existing market and competence (Abernathy & Clark, 1985). These conservation/disruption of existing market, competence or technology can also be defined as incremental or radical innovation (Henderson & Clark, 1990; Tushman & Anderson, 1986). While incremental innovation only shows minor changes to the established design, radical innovation can introduce a new set of product, market, or technology that might require new set of skills and capabilities in the firm (Henderson & Clark, 1990).

Radical innovations do not necessarily introducing product, technology or competence that are better in terms of performance, but it can be something that has a need that is unfulfilled in the market or even created a new need in the market (Christensen & Raynor, 2003). This kind of radical innovation is called disruptive innovation, which introduced products or services that are underperforming compared to existing products or services but can be simpler, cheaper or more convenient for customers. (Christensen & Raynor, 2003). Disruptive innovations is also a broader term compared to disruptive technology (Christensen, 1997) because it introduced another dimension to the definition, which is value networks (Christensen & Raynor, 2003). The innovation that is disruptive is new to the market, because it can "shake" the existing market and the existing value network (Christensen & Raynor, 2003).

Based on the subject of innovation, there were four types of innovations that are widely recognized: product innovations, process innovations, organizational innovations, and marketing innovations (OECD, 2005). Product innovations are innovations that are related to the new capability offered by products or services, process innovations concern about changes in the method of production and delivery, organizational innovations cover the changes in business practices, and marketing innovations are related to new way of promotions, promotion channels, or pricing (OECD, 2005). Business model innovation is a relatively new subject of innovation as it is not covered in the OECD (2005).

To better understand innovation, we can see its characteristics which were derived from the properties of technological innovation (Teece, 1996). This research will be focusing on innovation in business model, which is a non-technological innovation, thus some characteristics of technological innovation might be too narrow. Some of the characteristics that are more general and relevant to non-technological innovations are *Uncertainty*, *Path Dependency*, and *Tacitness*.

The process of developing something new that has never been developed before can be full of risks and uncertainties, for example, would there be a sufficient demand or will it be able to compete in the market (Audretsch, 2001). Thus, it is uncertain whether an innovation can generate profits for the firm (Cohen & Klepper, 1992). It is a situation where there would be only variables that are known but not the probabilities (Hall & Wagner, 2012). The type of uncertainty that can be influenced by the firm is secondary uncertainty, which can arises from lack of communication (Teece, 1996).

Innovation also follows a certain paradigm or a path that was developing accordingly based on decisions made in the past (Dosi, 1982). That is why, it is sometimes hard to change the path of innovation radically as it already has legacy systems, processes or investments attached to it. The knowledge required to do innovation can sometimes embedded in the employees in the firm, thus it is a tacit knowledge which can be hard to transfer. It is the result of organizational routines in the firm (Teece, 1996).

The rate and direction of innovation can also be determined by several factors which can come from the internal firm or from external environment (Teece, 1996). Internally, it can be determined by technological competences, organizational structure, human resources and culture (Cohen & Klepper, 1992; Teece, 1996; Vega-Jurado, Gutiérrez-Gracia, Fernández-de-Lucio, & Manjarrés-Henríquez, 2008). The internal factor can also be classified into tangibles, intangibles, and strategies (Galende & De La Fuente, 2003). A different kind of innovations can be determined from different internal level of the firm. The management level might proposed administrative innovation, while lower level of the hierarchy might proposed technical innovation (Daft, 1978).

2.1.3. Environmental Turbulence

The external determinant of innovation, which is business environment, can be further broken down into customers, competitors, government, external source of innovation (external linkages), and market structure (Teece, 1996). This external determinant is especially important, especially because a firm is part of an ecosystem, which co-evolution is important (Moore, 1993). When other firms innovate, the focal firm might need to innovate also so it will still have a role in the ecosystem. It also applies on the other way around, when the focal firm innovate, it must also think about the challenges that might hamper the innovation in their suppliers or complementors (Adner & Kapoor, 2010). This shows that changes in external environment can create a situation where firms should respond to survive in the ecosystem (Zaltman et al., 1973).

External networks can also provide important resources (such as ideas or expertise) and market information (Zahra & Nambisan, 2012). When firms are combining both internal and external factor, especially on knowledge, they can be said to be following a common paradigm known as 'Open Innovation' (Chesbrough, 2003).

Understanding the characteristics and determinants of innovation is important to understand the innovation in SMEs. In terms of conducting innovation, SMEs might experience more difficulties as they have limited resources and capabilities (Verhees & Meulenberg, 2004) and external linkages can be crucial for them. A set of small firms can formed a network and conduct a joint R&D program.

Although firms can potentially access scarce resource or ideas from external partners in a form of joint innovation collaboration, it can also bring disadvantages in a form of complexity and speed (Rosenbusch et al., 2011). That is why joint collaboration should be planned thoroughly, especially for SMEs with lack of bargaining power. Nevertheless, SMEs can reap more benefits from an innovation compared to large firms due to its flexibility to respond to the changes in the environment (Rosenbusch et al., 2011). This flexibility, coupled with entrepreneurial orientation can give SMEs a bigger chance of survival in a hostile environment, which characterizes by harsh competition, harsh industry setting (regulation), and lack of investment & marketing opportunities (Covin & Slevin, 1989; Teece, 1996).

The uncertainty in the environment is also known as the environmental turbulence (Siguaw et al., 2006). A turbulence can occur because the innovation created or adopted in the firm is being resisted by the environment (Zaltman et al., 1973). Hence, environmental turbulence may serve as a moderator between innovation and performance of a firm (Calantone, Schmidt, & Di Benedetto, 1997; Siguaw et al., 2006; Zahra & Bogner, 2000), especially technological turbulence, market turbulence, and competitive intensity (Barnett, 1997; Jaworski & Kohli, 1993; Moorman & Miner, 1997). Technology and market turbulence can be considered as environmental dynamism, while competitive intensity can represent environmental hostility (Zahra & Bogner, 2000). This environmental turbulence is a contextual factor that can facilitate a firm's growth (Balboni et al., 2014) .

Innovation such as product innovation can burden the firm with high cost which rarely give return on investment, especially in a stable environment (Miller, Droge, & Toulouse, 1988). But when the environment change is unpredictable and has a lot of uncertainties, then innovation can be the way to survive, especially for small firms (Miller et al., 1988; Siguaw et al., 2006). That is why, in a hostile environment, firms will more likely to use "prospector" strategy, which emphasizes on finding opportunities and innovation (Calantone et al., 1997; Miles & Snow, 1978).

2.1.4. Business Model (BM)

To innovate a business model, it is imperative to understand the concept itself first (Chesbrough, 2007). Business model is important for an organization that are constantly seeking new opportunities due to its nature of opportunity-centric, different from a strategy that is more competitor or environment-centric (George & Bock, 2011). Organization itself can be defined as "*a system of consciously coordinated activities or forces of two or more persons*" (Selznick, 1948). Every organization can have a strategy, which by definition is *"the act of aligning company and its environment"* (Porter, 1991). It can also be defined as *"the creation of a unique and valuable position, involving a different set of activities"* (Porter, 1996). Other studies also relate strategy to the plans for achieving the firm's goal (Casadesus-Masanell & Ricart, 2010; Deloitte, 2012) and how firm's can acquire competitive advantage (Miles & Snow, 1978; Slater & Mohr, 2006).

A business strategy may optimize the use of a business model because it adapts the configuration described in the business model according to the change in the business environment (George & Bock, 2011). The choice of a business model that firms are using reflects the strategy that they are following in order to compete in the market (Casadesus-Masanell & Ricart, 2010). Therefore they act as a complement to each other, not as substitutes (Zott & Amit, 2008). In a way, a business model can be considered as a comprehensive tool for the management to make decisions in different dimensions such as organizational design and market positioning (Balboni et al., 2014).

Various definitions of Business Model

There is no widely accepted definition of business model (Morris, Schindehutte, & Allen, 2005) as there are different definitions that have been used in previous studies (Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Chesbrough & Rosenbloom, 2002; Fielt, 2011; Johnson et al., 2008; Osterwalder et al., 2005; Shafer et al., 2005; Teece, 2010). Furthermore, there were several studies that have tried to categorize and analyze these definitions based on taxonomy (Baden-Fuller & Morgan, 2010), based on theme (George & Bock, 2011), principal emphasis (Morris et al., 2005) and based on its strategic relevance (Zott, Amit, & Massa, 2011). Some of the definitions can be found on **table A1 on Appendix A**.

Early definition of business model from Chesbrough & Rosenbloom (2002) shows that a business model defines how a firm creates, delivers, and captures value. However, they still saw that capturing value is less central to business model and more strongly related to strategy (Chesbrough & Rosenbloom, 2002). Another study (Afuah & Tucci, 2003) made a more comprehensive, yet, more complex definition.

A similar definition of business model to Chesbrough & Rosenbloom (2002) was also defined in other study: *"a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network"* (Shafer et al., 2005). While this definition acknowledged the component of value capture, but it did not implicitly mention the component of value delivery. Another definition emerged with the rise of internet startups, which focused on the value creation in e-business: "*A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities"* (Amit & Zott, 2001).

The definitions mentioned above have similarities but still missing some elements in each of them. Definition from Afuah and Tucci (2003) is comprehensive but it is too complex. One of the most comprehensive definition, but less complex, can be found in another study by Osterwalder, Pigneur & Tucci (2005) which defines business model as:

"a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams".

Although it is similar to the definition suggested by Chesbrough & Rosenbloom (2002), value capture is being recognized by Osterwalder & Pigneur (2010) as internal part of business model and not a part of strategy. It also recognized the role of networks in value creation, delivery and capture. This definition was later on being simplified in another study which described business model as *"the rationale of how an organization creates, delivers, and captures value"* (Osterwalder & Pigneur, 2010).

There are several considerations that have to be put into account when selecting the definition. First, the definition should be relevant for SMEs which relies on external network to access scarce resource and competence. Second, it should also be applicable not only on a strategic level, but also in an operational level for SME. From these criteria, this research will adopt the definition from Osterwalder, Pigneur, and Tucci (2005). It covers the network partners required by SMEs, and it includes the architectural aspect of the firm which can be useful in determining operational business process and information system design in the future.

Elements of Business Model

From the studies, aside from the definitions, there are also different set of elements of business model that have been identified. In the early study, elements of business model are market segment, clear value proposition, elements of value chain, defined cost and profit, positioning in value network, and formulated competitive strategy (Chesbrough & Rosenbloom, 2002). Another studies also defined nine blocks or elements of business model: value proposition, target customer, distribution channel, relationship, value configuration, core competency, partner network, cost structure, and revenue model (Osterwalder et al., 2005; Osterwalder & Pigneur, 2010).

Further studies tried to define a different term but it consists of similar elements inside them: resource structure, transactive structure and value structure (George & Bock, 2011). Due to the emergence of internet that shaped the dotcom industry, elements of business model were also described and adjusted accordingly to e-businesses: transaction content, transaction structure, and transaction governance (Amit & Zott, 2001). Business Model elements for e-business can also be varied based on their themes (Zott et al., 2011). List of elements defined by various authors can be found on **table A2 on Appendix A.**

From the list of elements mentioned, *value network* can be considered as an important element in the business model. Every firm can only play a part in a *business ecosystem* (Moore, 1993) and it created interdependencies between the firm and other actors (Pfeffer & Salancik, 2003). These interdependencies are most likely in resources (Pfeffer & Salancik, 2003) and it might be acquired by participating in the

ecosystem (Powell et al., 1996). Resources combined with processes and priorities can create capabilities in the firm (Christensen & Kaufman, 2006). Thus, these external network might presented new opportunities for the firm (C. Lee, Lee, & Pennings, 2001).

Furthermore, value network is different from *value chain* due to the dynamic nature of an ecosystem (Peppard & Rylander, 2006). Value chain only focus on the product and the sequential activities that are needed to produce it (Peppard & Rylander, 2006). In the past, it was considered a way for a firm to gain a competitive advantage in terms of cost or differentiation (Porter, 1985). Meanwhile, value network activities are not sequential but rather simultaneous (Peppard & Rylander, 2006). The action taken by a firm in a value network will affect others, thus it is important to identify the role of each firm in a value network. There will be more complex relationships in value network as the actors are not exchanging goods/services only, but also information and ideas. Thus in the end, all actors in the value network have to focus on how they can co-produce the value (Peppard & Rylander, 2006).

2.1.4.1. Business Model Ontologies and Tooling

From the paragraphs above, business model as a concept were explained by identifying its definitions and elements. Business model can be explained further, more than just definitions and elements, but from a context of ontologies (Gordijn, Osterwalder, & Pigneur, 2005). The evolution of how business model concept can be explained can be found in **figure 6** below.

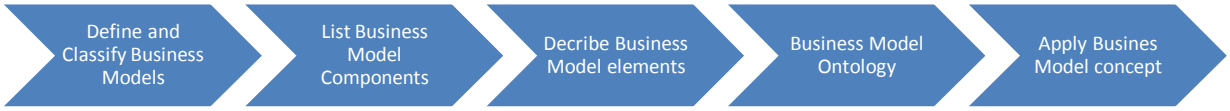

Figure 6 - Evolution of Business Model Concept (Gordijn et al., 2005)

Before business model ontology can be defined, a definition of ontology itself must be provided. An ontology can be defined as *"an explicit specification of a conceptualization*" (Gruber, 1995) or *"a formal specification of shared conceptualization"* (Borst, 1997). These two definitions mentioned the notion of conceptualization, which means *"a structured interpretation of a part of the world that people use to think and communicate about the world"* (Borst, 1997).

A business model ontology can be defined as "*a set of elements and their relationships that aim at describing the money earning logic of a firm*" (Osterwalder, 2004). Ontologies are often used in information system domain and it may not be an existing theory, but rather something that is believed to exist by community of practices (Gordijn, 2002). For business model, there can also be some different ontologies. Some of them are Canvas (Osterwalder, 2004) ,e^3 value, AIAI Enterprise (AIAI EO), Toronto Virtual Enterprise (TOVE), Resource Event Agent (REA) (Gordijn & Akkermans, 2003), STOF (Bouwman, De Vos, & Haaker, 2008), CSOFT (Heikkilä, Tyrväinen, & Heikkilä, 2010), and VISOR (El Sawy & Pereira, 2013).

Each ontology is intended for specific settings (Jarvelainen, Li, Tuikka, & Kuusela, 2013), thus it cannot be directly compared. Although there are many different business model ontologies, each with their specific uses, but they have similar purposes (Gordijn et al., 2005). Looking at the notion of "shared conceptualization" from the definition of ontology mentioned above, we can see that ontology's main purpose is to serve as a communication tool between stakeholders and explain what exactly is in the business model (Gordijn, 2002).

Next, based on business model ontologies, business model tooling can be used to analyze the viability and feasibility of the business model in the implementation stage (Solaimani, 2014). Business model tooling can be seen as the tool to visualize the abstract concept (of business model ontologies) into a more concrete and visible action. Some of these tooling are CSOFT, Canvas, BEAM, Operating Model, e^3 alignment method, Value Network Analysis, Strategy Activity System, and Four elements Framework (Solaimani, 2014). Each of them have their different purposes, from measuring the performance of a business model to translating strategic direction into operational activities.

On a separate study, business model tooling based on STOF ontology can have four uses (Bouwman et al., 2012). It can help in making the transition/road-mapping from product to service, provide scenario for stress-testing, providing analysis for agile development approach, and providing decision support tools for selecting alternative business models based on financial performance (Bouwman et al., 2012).

As far as this research concerned, business model tooling concept is still not a common term as there are not that many paper that discuss this topic. That is why the form of this tooling is slightly vague. Hence, this research also consider the usage of paper templates or software based on the business model ontologies can be considered business model tooling. As long as it can help communicating the principles in business model ontologies for analyzing and implementing the business model, then it can be considered a tooling.

2.1.4.2. The relationship between Business Model, Operating Model, Enterprise Architecture, and Business Process

Aside from reflecting the choice of strategy, business model can also serve as a foundation for operational business process and its information system (IS) (Al-Debei & Avison, 2010). **Figure 7** shows business model role as an intermediate between strategy and business process.

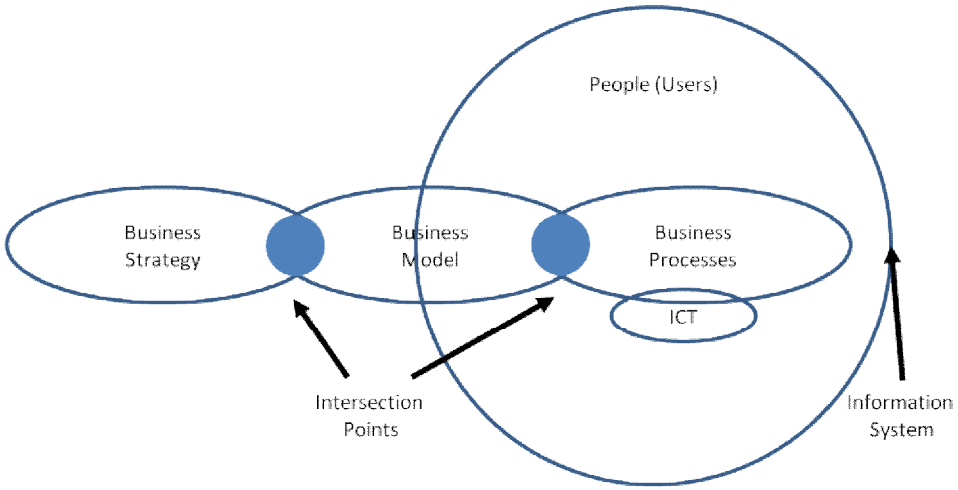

Figure 7 - Business model Intersection (Al-Debei & Avison, 2010)

Business process is a "*collection of activities that takes one or more kinds of input and creates an output that is of value to the customer. A business process has a goal and is affected by events occurring in the external world or in other processes"* (Solaimani, 2014). These collection of activities can be supported by information system (IS) which also derived from business model (Al-Debei & Avison, 2010). Information system is considered a valuable resource that can support activities defined in business model, because it can help lowering costs or raises the price of the product/service (Hedman & Kalling, 2003), for example it can help in improving connectivity between focal firm with its suppliers and customers in the ecosystem (Gossain & Kandiah, 1998).

There can be two things that can be derived from the intersection between business model and business process. First, although business model is the basis for business process and it's IS, it does not specify how they are executed but only giving overview of options in designing them (Al-Debei & Avison, 2010). The second point is that there should be an alignment between business model and business process (Solaimani, 2014). This alignment can be defined as " *the extent to which a business model supports/enables and is supported/enabled by the underlying operational activities, processes and systems of the business model executor(s), as a single or networked enterprises"* (Solaimani, 2014)

The alignment between business model and business process need the operational translation of the business model. This can be covered by part of the business model, which also known as the operating model. It can be defined as "*the necessary level of business process integration and standardization for delivering goods and services to customers*" (Ross, Weill, & Robertson, 2006). It can also be defined as "*a high-level design of the organization that defines the structure and style which enables it to meet its business objectives*" (Slack, Chambers, Johnston, & Betts, 2009). Operating model consists some of the elements of business model, which are value chain, cost model, and organization (Lindgardt, Reeves, Stalk, & Deimler, 2009). A business model sets the overall purpose and objectives for operating model, while operating model itself defines how the business model will be achieved (Slack et al., 2009) as can be seen in **figure 8** below.

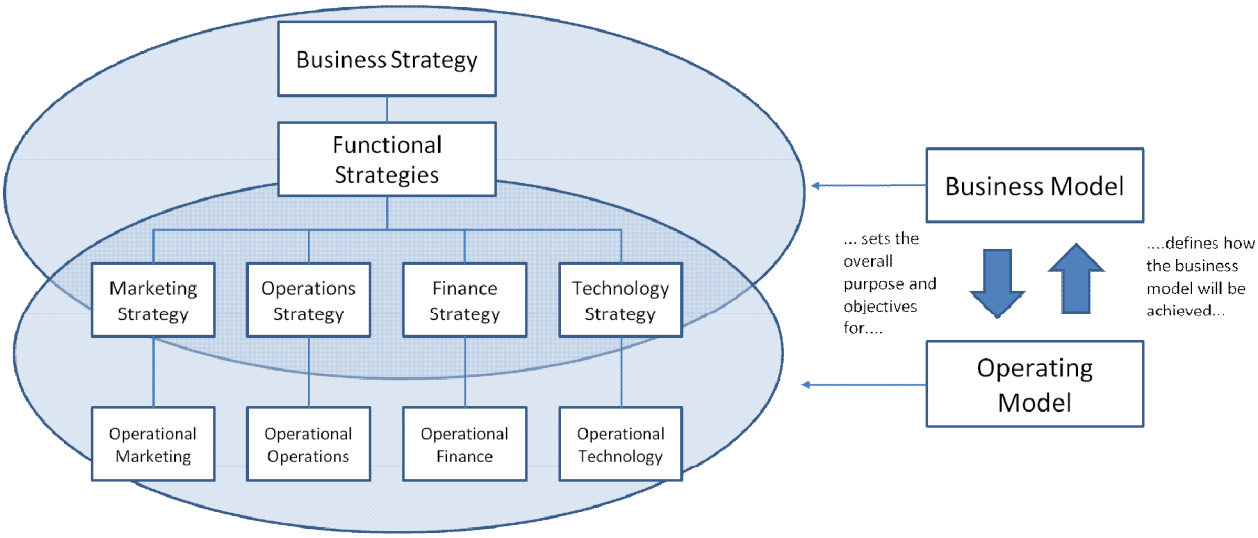

Figure 8 - The relationship between Business Model and Operating Model (Slack et al., 2009)

Standardization is one of the dimensions of operating model, which help delivering efficiency and predictability in the firm (Ross et al., 2006). Another dimension of operating model is integration, which emphasizes the sharing of data to link the organizational units in the firm (Ross et al., 2006). The combination between these two dimensions can generate four different type of operating models: diversification, coordination, replication, and unification (Ross et al., 2006).

The implementation of the operating model can be achieved through the use of Enterprise Architecture (EA), as it helps in implementing organizational structure, business process, information system and its infrastructure (Bernus, Nemes, & Schmidt, 2003; Solaimani, 2014). EA can be defined as "*the organizing logic for business processes and IT infrastructure, reflecting the integration and standardization requirements of the company's operating model*" (Ross et al., 2006). Another definition of EA implies that it is related to control and governance of the business process: "*a coherent set of descriptions, covering a regulations-oriented, design-oriented and patterns-oriented perspective on an enterprise, which provides*

indicators and controls that enable the informed governance of the enterprise's evolution and success" (Op̂ Land, Proper, Waage, Cloo, & Steghuis, 2009).

Enterprise architecture is also placed on a more strategic and higher level than IT architecture, which the latter focuses addresses four levels of architecture below EA (Ross et al., 2006). It is also different from Business Architecture (BA) as BA can be used in many range of level, starting from supply chain level, enterprise level or business unit level (Versteeg & Bouwman, 2006). BA is also a top-down business oriented view, different from EA that has bottom-up IT oriented view (Solaimani, 2014; Versteeg & Bouwman, 2006).

From the definition of EA from Ross and colleagues (2006) above, it can be directly understood that EA is located on a more operational level than operating model. While the operating model sets the expectation of a standardization and integration across the firm, EA is the one that specify the key processes, systems, and data from the firm's core operations (Ross et al., 2006). The firm's business and IT leaders define the EA based on the vision about how the firm operates from operating model. In other words, EA helps in translating operating model from just a vision into a reality (Ross et al., 2006).

Furthermore, this EA will affect business processes and IT infrastructure via IT engagement model. This model can be define as *"the system of governance mechanisms that ensure business and IT projects achieve both local and companywide objectives"* (Ross et al., 2006). It coordinates three levels that exist within the firm (company, business unit, project) and provide alignment between business and IT activities, with governance and project management as the main ingredients (Ross et al., 2006). It can help to create solutions that support the firm's goal as a whole, not only on project or business unit goal. The relationship between operating model, EA, and business processes can be found on **figure 9** below.

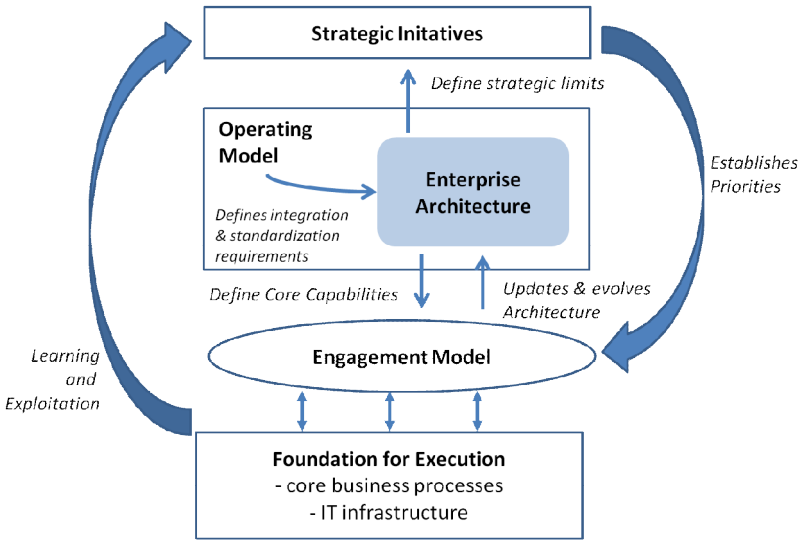

Figure 9 - Creating the foundation of execution (Ross et al., 2006)

In the end, business model, operating model, EA, IT engagement model will define the foundation of execution, which are IT infrastructure and business processes, to support firm's strategy (Ross et al., 2006). The comprehensive relation between Environment, Strategy, Business Model, Operating Model, Enterprise Architecture, Business Model Ontology, Business Model Tooling, Business Process, and IT Infrastructure can be seen on **figure 10**.

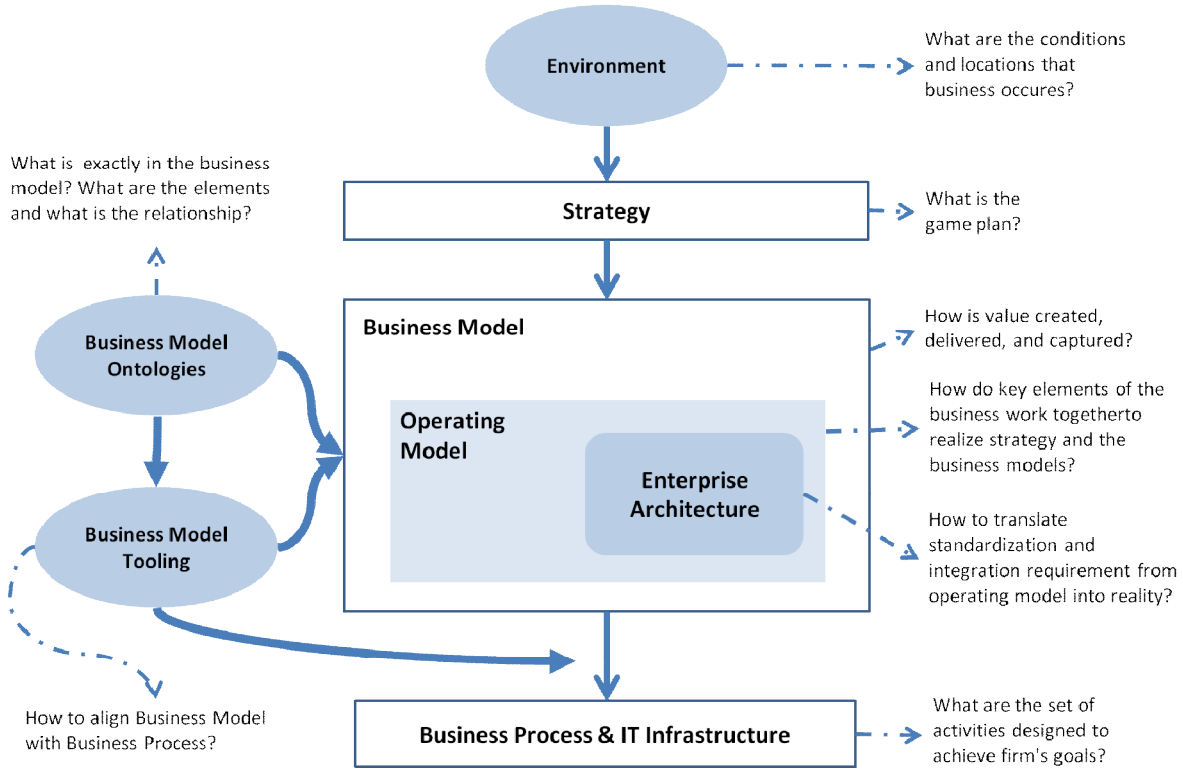

Figure 10 - Relation between Strategy, Business Model, BM Ontologies, BM Tooling, Operating Model, EA, Business Process, and IT Infrastructure based on several studies (Al-Debei & Avison, 2010; Casadesus-Masanell & Ricart, 2010; George & Bock, 2011; Gruber, 1995; Lindgardt et al., 2009; Osterwalder, 2004; Ross et al., 2006; Slack et al., 2009; Solaimani, 2014)

2.1.5. Business Model Innovation (BMI)

2.1.5.1. Internal and external drivers of BMI

From the previous section, it has been identified that business model is important for firms, especially for SMEs in creating and capturing value. This business model might need to be changed, though, over time. The drivers of this change can come from the internal part of the firm or from the external environment.

The urgency to change business model may came from poor or decreasing business performance and the discovery of new uses of resources in the firm, which is internal to the firm (Demil & Lecocq, 2010). The product or service innovation in the firm can also trigger the need to change the business model (Giesen et al., 2010). These innovations might need new components from new suppliers or should target a different market segments, which can change the business model.

The need for SMEs to innovate their business models can also came from the dynamics and uncertainty in their surrounding environment. Technological change, new market condition, competitor's behavior, and regulation induced the need in business model innovation (Teece, 2010). Technological change can offer new and more efficient ways in solving various problems, which eventually formed the foundation of a new business model (Teece, 2010). The rapid change in customer preferences can also provide new opportunities that can only be catered by changing business models, especially when competitor did not act on it or do not have the capability to understand and fulfill these new market needs (Teece, 2010).

This external driver can also be explained by looking from an ecosystem perspective. First, as mentioned before, a firm is part of an ecosystem which will constantly develop and change (Gossain & Kandiah, 1998; Moore, 1993). In an ecosystem, there can be a symbiosis and co-evolution between the actors (Bosch-

Sijtsema & Bosch, 2015; Moore, 1993). A symbiosis is formed when the output of a firm can be the input for other actors (Pfeffer & Salancik, 2003), thus every actors will get the benefit from the ecosystem (Li, 2009). This symbiosis interdependencies can also supported the notion of 'co-opetition' which acknowledges the importance of cooperation among actors in the ecosystem, on top of the competition (Nalebuff & Brandenburger, 1997).

The relationships within an ecosystem will be constantly changed (Gossain & Kandiah, 1998) and this symbiosis might also be affected. When a firm evolves or made innovations, other actors might also have to evolve so they still have a role in the ecosystem (Moore, 1993). This might present some challenges because every other actors might encounter constraints to evolve themselves (Adner & Kapoor, 2010). Thus, if the other actors cannot cope with the evolution then the relationships between firms and the other actors might changed.

Second, because there can be changes in the relationship and the interdependencies, the business model of the firm can also be affected and needs to be changed as well (Zahra & Nambisan, 2012). Defining which customers that the firm targets and determining which suppliers and complementors that the firm cooperates with are crucial for the process of creating and capturing value in the business model. Component and complement challenges can arise due to this interdependencies (Adner & Kapoor, 2010). To overcome these component and complement challenges, a firm might need to change its business model.

The changes in business model that was driven by internal and external drivers are the indication of lack of internal and external fit of business model (Morris et al., 2005). Business model elements can affect each other, thus when one element is not relevant, then it will trigger the change in other element, indicating the lack of internal fit. In the other hand, when the choices made for each of the element do not suit the environment, then the business model should also be adapted accordingly, indicating a lack of external fit. A sound model is a business model that can endure internal and external drivers (Morris et al., 2005).

2.1.5.2. BMI as a subject of innovation

The period of economic turmoil or rapid economic growth are considered the best time to think about re-inventing the firm's business model (Giesen et al., 2010; Lindgardt et al., 2009). Firms must think about how to gain competitive advantage in these situations, either in terms of having lower cost or making differentiation (Porter, 1985). This implies that there is an opportunity seeking behavior in the process of innovating business model (Ireland, Hitt, & Sirmon, 2003). When BMI is used to gain competitive advantage for the firm, it means that the firm is also putting strategic perspectives in it, making BMI as a strategic entrepreneurship decision (Ireland, Covin, & Kuratko, 2009; Ireland et al., 2003).

The reinvention or radical change of business model can also be seen as another type of innovation (Mitchell & Coles, 2003) as it is a separate component of innovation commercialization (George & Bock, 2011). It is the new ways or changes in the actions such as distribution or generating revenues that made the innovation can also be considered in business model (Rajala, Westerlund, & Rajala, 2004). BMI is considered more systemic in nature than product or process innovation because it involves the alignment of internal perspective of the firm with external perspective (Velu, 2015). Product innovation has market focus which being driven by customers, process innovation has internal focus which being driven by efficiency (Gopalakrishnan, Bierly, & Kessler, 1999), while BMI can be regarded as the combination of both.

From the perspective of business ecosystem mentioned above, it has been identified that relationships between actors will constantly changed and the way firms behave to these changes will also be different. Business model can be considered as a recipe that provides general way to understand different behaviors of firms (Baden-Fuller & Morgan, 2010). As a recipe, it needs ingredients such as resources and

capabilities. The recipe can be changed, depending on what dish that the customer wants or what dish that has value in the market.

When the recipe is changed, then it will affect the required ingredients as well. The chef that 'cook' and re-arrange the ingredients must also be capable in making the new dish so that it will have a value in the market. It might need to re-arrange the combination of existing ingredients or even might need new ingredients. These new ingredients might only be acquired from new suppliers that the chef has never worked with before. Maintaining relationships with external networks can be useful in order to have the information on where to acquire these new ingredients.

A different customer or market may prefer different 'dishes', thus different 'recipes'. This implies that a change in business model may be required to fulfill new demands and stay competitive, which indicates a requirement for different set of resources and capabilities. In other words, the business model itself has to go through an innovation to cope with the competition (Casadesus-Masanell & Ricart, 2010; Chesbrough, 2007; Teece, 2010).

Customers might not always prefer better products or services, in fact they might actually prefer less performing products or services but it is more convenient for them to use or cheaper for them to buy. Thus, it is important for firms to know the customer preferences and adapting to them, instead of dictating them, especially in today's information intensive and demand-driven economy (Gossain & Kandiah, 1998). A disruptive innovation in business model for SMEs can be helpful in serving these neglected market, because it can offer what larger firms cannot (Christensen & Raynor, 2003). Disruptive innovation put emphasis on value networks dimension, thus co-creation of value together with the customers, suppliers, and complementors can be the result of this disruptive innovation (Gossain & Kandiah, 1998).

There are some definitions of Business Model Innovation, as can be seen in **table A3 on Appendix A**. Before deriving the BMI definition that can be used in this research, it is necessary to look at the factors or characteristics in BMI. One of the factors that can contribute to BMI is external collaboration (Giesen et al., 2007, 2010; Pohle & Chapman, 2006) which to some extent is related to value network, a component of business model (Chesbrough, 2007). This collaboration is not limited within the industry, but it can also in a form of cross-industry partnership (Weiller & Neely, 2013).

This collaboration is important as firms may implement BMI by using trial and error experimentation (McGrath, 2010; Sosna et al., 2010). Experimentation might require resources such as financial capital or knowledge that are available outside the firm and can only be accessed by collaboration. One form of experimentation is by having multiple business models that can co-exists in the same firm as a transition process before the most suitable business model can be chosen (Chesbrough, 2007; Lindgren, 2012). The use of multiple business model or multi-sided model was also being put as research agenda as it can potentially address multiple type of customers (Baden-Fuller & Mangematin, 2013). This business model co-existence might burden the firm in term of high capital cost, hence the best model should be chosen eventually (Weiller & Neely, 2013).

There are many available definitions of BMI, and one of the most comprehensive and straightforward definition of BMI can be found from Barjak et. al. (2014): "*Business Model Innovation as changes of all three components of business models, which are value creation, business systems, and revenue generation (value capture)".* The factor of external collaboration is implicitly covered by business system component in this BMI definition. Although this definition implies that all the components of business model must be changed in order to do BMI, Mitchell & Coles (2003) suggests that changing just most elements of business model (not all of them) can also be considered as a radical change or BMI.

Another study also suggested that just by reinventing two elements of business models, it can be considered a BMI (Lindgardt et al., 2009). The change in majority of business model components can be considered a radical innovation, while the change in only one component regarded as incremental innovation (Hartmann et al., 2013). Existing core processes will be changed in radical business model

innovation, but it will be still retained in incremental business model innovation while adding or removing certain processes (Cavalcante, Kesting, & Ulhøi, 2011). One thing that should be considered when a firm radically change its business model is coordination cost with external partner (Velu, 2015).

Based on the source, BMI can be further classified into two categories: *original BMI* and *imitative BMI* (Kim & Min, 2015). It can be an original BMI when it the innovation process is using firm's internal breakthrough, while it is said to be imitative when the new business model was invented by other firms. In the imitative BMI itself, firm can choose to completely replace old business model (adoption) or add new business model to their existing one (addition) (Kim & Min, 2015).

The notion of imitative BMI is similar to *BMI replication*, but BMI replication offers wider meaning. In BMI replication, firms do not only simply replicate but they also learn on what works and what does not in the business model and making it suitable in different situation (Aspara, Hietanen, & Tikkanen, 2010). It implies that the firm that replicate a successful business model follows a "Fast Follower (Analyzer)" strategy of refining what works in the innovator's firm (Mohr, Sengupta, & Slater, 2010).

Business model innovation can also be seen as a continuous process as a result of intended voluntary decisions and unintended emerging consequences of a firm (Demil & Lecocq, 2010). This continuous changing process can be reflected as change models that was discussed in several studies (Cavalcante et al., 2011; Linder & Cantrell, 2000). Because it might involved intended voluntary decisions, thus BMI can be part of a strategic innovation decision, which can be driven by the firm's culture or capacity/capability (processes, people, resources) (Aspara et al., 2010; Siguaw et al., 2006). The capability of the firm to be able to deal with risks and uncertainties that come with it, and also the firm capability to adapt seamlessly into the new business model is important in this process.

SMEs can be more suitable to cope with the uncertainties that comes from BMI compared to large firms. One of the crucial trait of SMEs that supports this is flexibility and less bureaucratic processes inside it (Cohen & Klepper, 1992; Verhees & Meulenberg, 2004). When a firm conducted BMI, they will have to change the processes and activities, which may be related to their IT infrastructures and applications. Large firms may have a big IT infrastructure as legacy system that can be very complex and expensive to be replaced, different from a relatively simpler systems in SMEs (Verhees & Meulenberg, 2004).

Large firms can also have existing capabilities that may not be relevant for new and radical business opportunities. This shows that BMI also have the characteristic of innovation which is path dependency (DaSilva & Trkman, 2013; Dosi, 1982; Teece, 1996). By considering the difficulty of changing business model, ideally, a sound business model should have been adopted from the early period of the firm (Brannback et al., 2014).

Nevertheless, the situation might changes rapidly and it is hard to predict whether the business model will still be relevant in years to come. This shows the importance of a dynamic business model. A dynamic business model can cope with running existing activities while at the same time being flexible to changes in the surrounding environment (Cavalcante et al., 2011). This capability to adapt the business model to the changing environment is crucial for the performance of the firm (Balboni et al., 2014).

2.1.5.3. Conducting BMI through business model steps

For firms that have existing business model, there will be a transition period when going through the process of innovating business model. A business model roadmapping may be used to ensure the transition period from existing business model to desired business model went smoothly (De Reuver, Bouwman, & Haaker, 2013).

Business model roadmapping is a plan that comprises the intermediate steps to achieve the desired business model (De Reuver et al., 2013). The steps include things such as identifying the preferred

business model, analyze its impact, translating it into specific activities, and see if it created path dependencies or can it be reversed into previous business model (De Reuver et al., 2013). In short, business model roadmapping can provide some guidance so the business model innovation process is structured and focused.

A series of processes, from design to implementation (Osterwalder, 2004), can be conducted after the roadmapping is done. In the design stage, business concept or logic should be defined according to the market situation (Osterwalder et al., 2005). Meanwhile, in implementation stage, the concept should be concretely translated into elements such as structure, processes, infrastructure and systems (Osterwalder et al., 2005). Looking at these steps, one can see that conducting BMI might not be an easy task. Nowadays, however, consultancy firms are also offering their services in helping other firms in innovating their business model (DaSilva & Trkman, 2013).

Changing business model means that there might be some alterations in the offering, the activities or processes that support that offering and the resources needed to deliver the offering. To understand these outcomes of business model innovation, one approach can be by looking at the concept of reach, richness and range (Wells & Gobeli, 2003). Reach is related to the how a firm provide connectivity and access to its customers with the management of the value chain. Richness is related on the amount of information and goods exchange or interaction with the customers, so the firm can deliver the product exactly like what customer wants. Meanwhile range is the variety of product or services offered by the firm.

The change in the business model might involve a new target segments and the way a firm reach this target segments. The addition of online channel might provide additional customers or reach that is new to the firm. The change in the mechanism which determines how customers interact with the firm can change the richness of the interaction. By involving customers directly in the making of a product/service, the customer can get customized solution. This will also affect the suppliers that should be capable in fulfilling this solution together with the firm, which should be defined in the value network element of a business model. The change in value proposition in the business model might introduce a variety of new products or services and modify the range dimension.

2.1.6. Innovativeness

On previous sections, this research has introduced the term business ecosystem and its tendency to change constantly. This change in the ecosystem puts the emphasis on the importance of continuous innovation (Moore, 1993). When the ecosystem cannot evolve, it might give birth to a new challenging ecosystem. This continuous innovation is closely related with the concept of innovativeness.

Innovativeness is a concept that is different from the concept of innovation, but these two concepts are sometimes mistaken for each other (Garcia & Calantone, 2002). Previous studies have used different definitions of innovativeness. According to Garcia & Calantone (2002), the term "innovativeness" is regularly used to measure the degree of newness of an innovation. It is also most closely related with the firm culture, which is openness to new ideas (Hurley & Hult, 1998; Zaltman et al., 1973). This was shown in the definition of firm's innovativeness in other studies, which is *"the tendency for a firm to adopt innovations"* (Damanpour, 1991; Garcia & Calantone, 2002).

One study (Hult et al., 2004) derive another definition of Innovativeness as "*The capacity to introduce of some new process, product or idea in the organization".* This is related to the definition of capacity to innovate, which is "*the ability of the organization to adopt or implement new ideas, processes, or products successfully*" (Hurley & Hult, 1998). These capacity to innovate also mentioned in another study by Burns and Stalker (1977), as cited by Siguaw and colleagues (2006).

Another definition of innovativeness can be seen from the perspective of the product/service offered. Product innovativeness has been micro-economically defined as "*capacity of new innovation to influence*

firm's existing resources, skills, knowledge, capabilities or strategy" (Garcia & Calantone, 2002). Meanwhile, another study from Clausen & Rasmussen (2012) adopted the macro-level definition of innovativeness from Garcia and Calantone (2002) as "*the capacity of a new innovation to create a paradigm shift in the science and technology and/or market structure in an industry*". This micro and macro-level definitions of innovativeness concerns to whom the degree of newness applied. On a macro-level, the innovation can be new to the world, market or industry, while on a micro-level innovation can be new to the firm or customer (Garcia & Calantone, 2002).

Another definition of innovativeness is "*the degree which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other member of the system*" (Rogers, 1983). This definition puts strong emphasis at the timing or rate of adoption, and based on this, the adopters can be divided into five different type: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, (5) laggards (Rogers, 1983). An firm with high innovativeness will most likely be innovators or early adopters.

From these definitions, this research will focus on the micro-level definition of innovativeness (with firm as the focus). Therefore, this research define Innovativeness as *"the capacity and tendency of a firm to adopt innovations or to innovate".* This implies that innovativeness has two dimensions: capacity and tendency. Because of its complexity, innovativeness needs to be measured on multiple dimensions in order to correctly estimate its impact (Y. Lee & O'Connor, 2003). The acknowledgement of these two dimensions of innovativeness can also be found in the study of Siguaw and colleagues (2006).

This capacity reflects the ability of a firm to adopt innovation in the internal organization rather than the innovation diffusion in the market (Hurley & Hult, 1998). The firm can introduce some new processes or ideas internally (Hult et al., 2004). This capacity can be influenced by the firm's resource and firm's characteristics, which in turn can have positive effect on greater competitive advantage and improved business performance in the firm (Hurley & Hult, 1998).The behavior of actively improving competitive advantage is closely related to strategic orientation (Ireland et al., 2009, 2003), thus innovativeness can be considered as a dimension of the firm's strategy (Subramanian & Nilakanta, 1996). When a firm is following the strategy of "Prospector", which is innovation-oriented, it is most likely they will have a high innovativeness (Miles & Snow, 1978).

On the other hand, *tendency to innovate* dimension refers to a more cultural aspect of a firm, which is the degree of openness to new ideas or innovation (Hurley & Hult, 1998). The notion of 'open innovation' is closely related to this degree of openness as it explains the necessity of firms to combine external and internal ideas for innovation (Chesbrough, 2003). Firms adopting open innovation acknowledge that ideas, resources or capabilities can be found on the external part of the firm.

This cultural dimension of innovativeness is the pre-requisite and requirement for the capacity to innovate dimension (Bock, Opsahl, George, & Gann, 2012; Teece, 1996) as it can often be found in the initiation stage of innovation process (Hurley & Hult, 1998; Zaltman et al., 1973), thus both dimensions of innovativeness are related. To improve innovativeness, previous study also emphasize the importance of collaboration for SME (Nieto & Santamaría, 2010).

Firms with high innovativeness should exhibit a consistent innovative behavior over time, because innovativeness is an enduring organizational trait (Subramanian & Nilakanta, 1996).This notion of "time" is aligned with innovativeness definition from Rogers (1983). On top of being the early adopter, in terms of the time of adoption, an innovative firm is more likely to adopt a high number of innovations and also the timing of the adoption would not have a high variation (or in other words, they consistently innovate) (Subramanian & Nilakanta, 1996). Hence, it can be said that firm's innovativeness is related to the number, timing and consistency of innovation adoptions (Subramanian & Nilakanta, 1996). These three dimensions of innovativeness are significantly correlated with firm's characteristics such as centralization, formalization, specialization, and size (Subramanian & Nilakanta, 1996).

Innovativeness can be modeled either as the cause or consequence of innovation, as suggested by Garcia & Calantone (2002). Firms that have innovated their business models can have bigger capacity/capability in capturing value of innovation or innovativeness. When there is a reconfiguration of elements in the business model, it can give a new design and capability to the firm to facilitate the adoption of innovations that are previously impossible or difficult (Siguaw et al., 2006). The firm that underwent BMI process might use new resources, new processes, or new value network (Demil & Lecocq, 2010) that might be needed to make innovations or to adopt new innovations.

On the other way around, this capability to innovate will determine the value creation of a firm (Adner & Kapoor, 2010). Furthermore firm with more innovativeness can have faster innovation cycle (rate of innovation), including for BMI process, due to the willingness to invest in building their internal capability to innovate (Siguaw et al., 2006; Vázquez, Santos, & álvarez, 2001).

Furthermore, to cope with high number of innovation adoption and to be consistently the innovator or early adopter of new innovations, innovativeness may trigger the continuous change in business model (Giesen et al., 2010). It is aligned with the micro-economic definition of innovativeness that was previously mentioned by Garcia and Calantone (2002).The innovation that can generally trigger the business model innovation is technological innovation (Calia, Guerrini, & Moura, 2007).

Innovativeness can also related to the willingness and capability of the firm to do experiments in the innovation process. The more experiments conducted by the firm, the more successful innovations can be created or adopted (Siguaw et al., 2006). Furthermore, previous study showed that innovativeness has positive influence on performance of SME (Rosenbusch et al., 2011), which is most likely because of the adoption of successful innovaiton.

2.1.7. Market Orientation, Learning Orientation, Entrepreneurial Orientation

Innovativeness is important for firms to successfully innovate their business model. As mentioned before, changes in the environment create uncertainty because it involves new situation which firms have not experienced before. Continuous learning, experimentations, and making adjustments are the necessary processes to cope with this uncertain situation (Teece, 2010). These processes are closely related to cultural dimension of innovativeness, which is the tendency or willingness to innovate.

Three antecedents of innovativeness can positively influence this tendency to innovate: market orientation, learning orientation, and entrepreneurial orientation (Hult et al., 2004). Market orientation is related to the firms behavior towards market intelligence, learning orientation is related to development of new knowledge in the firm, and entrepreneurial orientation is related to the bold activities and tolerance to risks in order to open new market (Hult et al., 2004).

Due to the market dynamics that involve uncertainties, firms will have to continuously collect market intelligence about what customer needs and what are the available technologies that can be used to fulfill these needs. The decisions and actions taken based on this market intelligence are also equally important to realize these needs (Hult et al., 2004). This market orientation actions are not limited to the present but also in understanding customer's future needs (Slater & Narver, 1999), thus driving the firm in shaping future markets through innovation. In small firms, market intelligence can be disseminated easier compared to larger firms due to less bureaucratic hierarchy, although their responsiveness might still be hindered by limited financial and technical resources (Verhees & Meulenberg, 2004).

By definition, learning orientation is the " *organization-wide activity of creating and using knowledge to enhance competitive advantage*" (Calantone, Cavusgil, & Zhao, 2002). It has four factors: commitment to learning, shared vision, open-mindedness, and intra-organizational knowledge sharing (Calantone et al., 2002). It can be associated to the experimentation process conducted by the firm. Experimentation is a

crucial process for innovation, including for business model, and it can provide learning to the firm (Chesbrough, 2010; Teece, 2010).

Failure in the experimentation process can bring new knowledge about what did not work and what should be altered for the new experiments, thus it can bring firms a step closer in finding the best business model (Chesbrough, 2010; McGrath, 2010). A new knowledge developed in the firm as the result of learning orientation may also lead to improved capacity to innovate, as the firm has gained knowledge in maximizing resources required for innovation (Demil & Lecocq, 2010).

As firms are facing uncertain market or situations, it means that there are risks associated with these situations. Firms that have entrepreneurial orientation can cope better with this situation than the one that does not as they might show the propensity in risk taking, more proactiveness, high degree of autonomy, high degree of innovativeness, and competitive aggressiveness (Lumpkin & Dess, 1996) These firms are willing to take risks and being proactive in engaging the opportunities in these situations, which can help them to can have bigger chance to create a new market entry (Lumpkin & Dess, 1996). These characteristics are aligned with the definition of entrepreneurial firm: "*an entrepreneurial firm is one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with 'proactive' innovations, beating competitors to the punch"* (Miller, 1983).

A high degree of autonomy, which is the action of bringing new ideas in the firm can help in tapping these opportunities. These firms will also show the willingness to engage and support these new ideas innovativeness . A competitor may react to this firm's initiatives, thus the willingness to aggressively compete head-to-head with them can provide them the chance to survive in the competition. In fact, firms with high entrepreneurial orientation are often associated with high business performance (Balboni et al., 2014).

2.1.8. Business Performance

Definitions of Business Performance

Firms generally pursue the adoption of innovation in order to improve their performance (Damanpour, 1991). This innovation can be triggered by changes in the internal or external environment of the firms (Hult et al., 2004). The capacity to innovate, which is a dimension of innovativeness, is one of the important factors for firms to be able to successfully adopt innovations and eventually improve their performance (Hult et al., 2004). This also applies to the innovation in business models. CEOs are now considering business model innovation as an important innovation, on par with product, process and services innovation (Pohle & Chapman, 2006). This BMI importance can be based on the fact that firms which put more emphasis on BMI outperformed the ones that did not, in terms of business performance (Giesen et al., 2007).

The concept of business performance itself need to be defined. It is considered as the essence of strategic management and it can serve as an evaluation of a strategy (Venkatraman & Ramanujam, 1986). Because strategy reflects the choice of business model that a firm used (Casadesus-Masanell & Ricart, 2010), then business performance can also evaluate the performance of a business model. Previous study saw business performance as layered domain (Venkatraman & Ramanujam, 1986) as shown in the **figure 11** below.

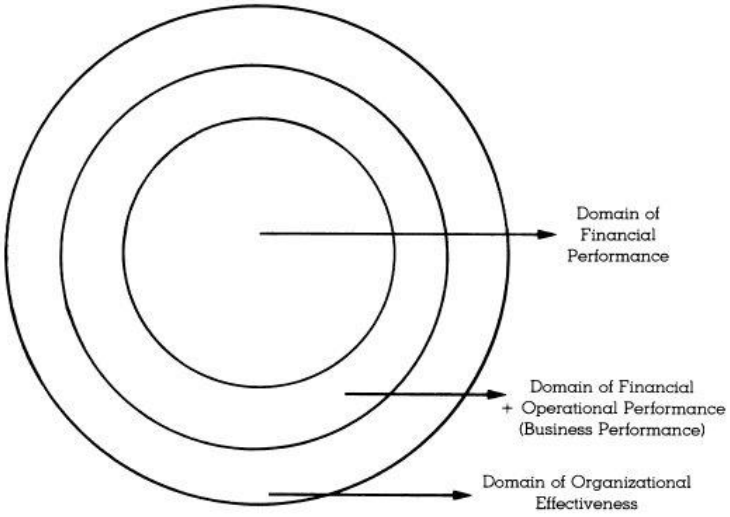

Figure 11 - Domain of Business Performance (Venkatraman & Ramanujam, 1986)

At the center, business performance can be simply defined as the financial performance of the firm (Venkatraman & Ramanujam, 1986). This includes indicators such as sales growth, profitability, earnings per share, or market value. Looking at the broader term, financial performance should be added by operational performance to define business performance (Venkatraman & Ramanujam, 1986). These operational performance can be market share, new product introduction, product quality, marketing effectiveness, etc. Operational performance such as market share can be the determinant of profitability, which is a financial performance (Venkatraman & Ramanujam, 1986).

Another definition of business performance is from Hult, Hurley, and Knight (2004), which defined the concept as: "*Achievement of organizational goals related to profitability and growth in sales and market share, as well as the accomplishment of general firm strategic objectives*". This definition covers both financial and operational performance defined by Venkatraman and Ramanujam (1986), thus it can be used for this research. In SME, some studies used market value as the main performance indicator (Zott & Amit, 2007, 2008) as SME may still be young in term of age, thus it does not have significant sales value yet.

A more updated perspective can be found from another study which argued that performance should be looked at multiple dimensions (Molina-Castillo & Munuera-Alemán, 2009). This study also suggests that, what can be considered a business performance in each firm is different, depending on what is important for the managers in the firm. Furthermore, this attribution of performance importance from managers will be relevant in assessing short term and long term performance indicators (Molina-Castillo & Munuera-Alemán, 2009).

Molina-Castillo & Munuera-Alemán (2009) also stated that there are three widely accepted performance dimensions based on other studies (X. Huang, Soutar, & Brown, 2004; Y. Lee & O'Connor, 2003): market-based performance, customer-based performance, and financial-based performance. Some of the market-based indicators are sales quantity, market share, penetration rate (Hultink & Robben, 1995). For customer-based indicators, it can be seen from customer satisfaction and loyalty (Y. Lee & O'Connor, 2003). For the most generally used indicators, financial-based, some of them are profit or return on investment (ROI) (Hart, 1993; Moorman & Miner, 1997). Other study also provide similar measurements (Griffin & Page, 1996), but it is also seen from project level, the same as Molina-Castillo & Munuera-Alemán (2009). Nevertheless, these studies have provided some insights on various performance measures. It's usage can also be stretched and applied in firm level, as other studies also used similar measurements (Hooley, Greenley, Cadogan, & Fahy, 2005; Hult et al., 2004).

From studies by Venkatraman and Ramanujam (1986), Hult and colleagues (2004) and Molina-Castillo & Munuera-Alemán (2009) above, we can see that there are various performance indicators available. The challenge is to analyze and choose the most appropriate indicators for this research. For this matter, this research also looked up for another reference to provide additional insights.

One reference that can be relevant is the indicator mentioned in the book by Brannback, Carsrud, and Kiviluoto (2014). In this book, they highlight the problem of choosing growth as the performance measure, especially for startups or small-medium enterprises (SMEs). Growth is being seen as an important performance measure because it is being overhyped by the media, which sees high growth firms as appealing firms that have media value. Growth is also mainly being the interests of Venture Capitalists (VCs) which are aiming to improve market share growth before they can cash it out (Brannback et al., 2014). But in the end, VC-funded-firms are the one that will be negatively affected by these overhyped performance measure because the sustainability of the firm is not VCs main concern.

Emphasis on Profitability as Business Performance Indicator for SMEs

Brannback and colleagues (2014) put strong emphasis on profitability as the most important performance measure for firms. They also said that there is a misconception of growth being the pre-requisite for profitability of a firm. In fact, they showed that firms which think that growth will eventually lead to profits are actually less profitable. Firms that are prioritizing profitability as their performance measure can achieve high profitability and high growth three times more likely than the one that prioritizing growth (Brannback et al., 2014).

For entrepreneurial startups or SMEs, the expectation of having future profits is the one that should have driven them in the first place to enter the market (Brannback et al., 2014). By being profitable first, firms will have internal financial resource that can be allocated to fund their growth, without external funding from VCs. The typical goal of VCs is usually high market share, so it can be cashed out (Brannback et al., 2014). This is actually bad for SMEs, because focusing on market share growth without profitability will not support the their long term viability.

Another misconception of growth can also come from policy makers (Brannback et al., 2014). Often the goal of policy makers is to increase employment by growing the number of firm's employee. But many of the SMEs may not want to increase the number of their employee, but they would want to add innovations which might actually reduce the employee requirement. Employees are often seen as cost center by SMEs, thus it should be reduced (Brannback et al., 2014). This is a thing to consider for policy makers when they support innovations in SMEs.

According to Brannback and colleagues (2014), there are only 3% of high growth firms, while the other 97% are SMEs might want to stay small but have high profit margin. Looking at this proportion, the SMEs that are being the focus of this research are most likely fall into the 97% category. These SMEs are most-likely non-VC funded and can also be family businesses that do not put employment growth as its main focus.

From all the studies mentioned above, profitability would be the one that should be measured as indicator of business performance. It was being mentioned by Venkatraman and Ramanujam (1986), Hult and colleagues (2004) in their definition, Molina-Castillo & Munuera-Alemán (2009), and received special attention from Brannback and colleagues (2014). By simply mentioned by several studies, it shows its relevancy as a business performance measure.

Another consideration is that EBIT, as one of the measures of profit, has a high concurrent validity with other profitability measures, both relative and absolute measures, such as Return on Investment (ROI), Return on Asset (ROA), operating result, and net result (Brannback et al., 2014). This high level of concurrent validity shows that these measures can provide similar description of the same construct, as cited by Brannback and colleagues (2014) from another study (Shepherd & Wiklund, 2009).

Furthermore, the usage of profit as the performance measure is related to topic of this research, which is business model. The best proof of a good business model is when the firm is able to make profit with this business model, which can help in getting growth later on (Brannback et al., 2014). This profit will be the basis to internally fund their growth, because the availability of money is required to fuel growth. As the SMEs in this research is most-likely non-VC-funded, then the capability to internally fund their growth is a necessity.

For sales growth, the relative measures shows weak correlation with all other performances measures. Unlike the relative sales growth, an absolute sales growth might give additional insights as it can still show moderate and high correlation with other absolute performance measures (Brannback et al., 2014).

2.2.Operationalising Concepts

Constructs such as Business Model Innovation and Innovativeness might not be directly observed and measured, which is also known as latent constructs, thus some indicators or variables need to be chosen by the process of operationalization (Verschuren & Doorewaard, 2010). These indicators will need to be translated into instruments in a form of question items and one indicator will need at least one item (Verschuren & Doorewaard, 2010). Furthermore, it is important to be aware that the translation of latent constructs into observable variables can introduce several type of errors that need to be reduced (Malhotra & Grover, 1998).

2.2.1. Operationalising 'Business Model Innovation'

First, we shall try to do initial operationalization of *Business Model Innovation* concept. Operationalization of Business Model Innovation made by Barjak and colleagues (2014) combined the several Business Model definitions and components from previous studies (Chesbrough & Rosenbloom, 2002; Itami & Nishino, 2010; Morris et al., 2005; Osterwalder & Pigneur, 2010; Teece, 2010) with the Innovation definitions from OECD (2005). These operationalization indicated that Business Model Innovation is a composite type of Innovations (the intersection between Product, Process, Marketing, and Organizational Innovation) (Barjak et al., 2014) , and BMI is mainly changes in the components of business model. It yielded the following propositions that can be used as BMI dimensions:

- **Novel Value Propositions**: Mainly related to Product Innovations
- **Novel Business Systems**: Changes in Business Systems can be in the form of Process or Organization innovation along the value chain
- **Novel Value Capture**: New way of Capturing Value will be related with Process and/or Marketing Innovation

While these dimensions represents the definition of BMI by Barjak and colleagues (2014) and can be used as variables, the downside of this operationalization is that it have not yet used in many studies. Moreover, these dimensions might need to be drilled down further as it might be too superficial. To drill down these dimensions, this research look for the elements of business model that were mentioned in different studies and count the occurrences. If the elements were mentioned more than once in different studies, then this research see them as a relevant business model elements. These elements can be seen on **table A4 in Appendix A**, and they can serve as a more specific variables for the three dimensions of BMI introduced by Barjak and colleagues (2014).

The "organization" element in **table A4 in Appendix A** might be too vague as it can consists of other elements such as "resources" and "processes" (Christensen & Kaufman, 2006), especially if we look into the previously defined term of "organization" by Selznick (1948). Meanwhile the "channel" element might overlapping with "value delivery", as product/service delivery includes the distribution channel such as

online or brick & mortar retail store (Itami & Nishino, 2010; Teece, 2010). Thus, the use of "organization" and "channel" as BMI variables might be overlapping and can be excluded.

As mentioned in the first chapter, this research is a part of a larger project called Envision project. This project has its own requirements which may not originally part of this research. One of the requirements is the variables of BMI. Initially this research would only take the changes of the business model elements as the operationalization of BMI, which follows the guidelines by Barjak and colleagues (2014). Some additional dimensions and variables of BMI were added and it is described in the subsequent paragraphs.

The changes to business model elements can be triggered by the *drivers of innovation*. In the previous sections, it has been described that business model might change due to the poor performance of the firm. It might be that the product or service offering is no longer appealing for customers or new suppliers with cheaper price need to be acquired to maintain profitability. Another internal drivers can be in the form of a new combination of existing resources, or a new product or service development in the firm.

From the external part of the firm, a new opportunity in the market might induce the firm to change its business model. It can be the result of a technological change which requires new ways to sell it to the customers. A new business model is also needed to cope with the change in customer preferences. The firm might need to produce new product or collaborate with new partners to acquire necessary components for the new product. Lastly, new regulation might restrict the firm's current product/service offering, forcing them to alter their value proposition.

The steps of innovating business model can also help in operationalizing BMI. As mentioned in previous sections, the steps can consist of *design, implementing,* and *outcome*. In the design stage, firms can use certain business model ontologies or frameworks to help framing their business. Firms can use one of the most widely-known ontology is Canvas Model, aside from other ontology such as STOF, VISOR, and other similar ontologies. To help discussing these ontologies in a brainstorm session, some business model tooling can be used. Some of the tools can be board game, excel spreadsheet, post it notes, and many others.

The result of the business model design will have to be implemented. Operating model, as part of business model, will served as the basis for this implementation. The standardization and integration of process requirements defined in operating model will be translated into operation by the use of Enterprise Architecture (EA). This EA will help specifying the detail business process while at the same time standardize and integrate them. When the business process has been defined, the information system can also be designed. This information system can include IT software and also IT infrastructure. Moreover, EA can also assist the development or transformation of the firm's organizational structure.

Implementing BMI can also be done through experimentations (Sosna et al., 2010). Firms might use multiple business models simultaneously on a small group of customers to test them (Chesbrough, 2007). This process is normally done due to the uncertainty aspect that is attached as inseparable attribute of innovation. Because the choice of a business model reflects the strategy of a firm, the decision to innovate business model is more likely come from the management of the firm. This decision can be delegated to a specific team that handles the implementation (Sosna et al., 2010). The firm can also ask the help of consultants to reduce the learning curve and hasten the transformation (DaSilva & Trkman, 2013)

Lastly, operationalization of BMI can also be done by looking at the outcome. This outcome can be seen in the radicalness (Cavalcante et al., 2011; Hartmann et al., 2013), disruptiveness (Christensen & Raynor, 2003), and originality (Aspara et al., 2010; Kim & Min, 2015) of the business model. When most of the business model components or elements changed, it means that it has a radical BMI. When the changes of the business model has the potential to threaten the industry leader's business, then the BMI created a disruptive business model. When the business model is the result of internal formulation, it can be said that the business model is original.

The summary of the BMI operationalization result can be seen on **Table A5 on Appendix A**. The BMI dimensions of *BMI Drivers*, *BMI Design*, *BMI Implementation*, and *BMI Outcome* are the result of additional input from the Envision project.

2.2.2. Operationalising 'Innovativeness'

Meanwhile, from the definitions of *innovativeness* (Garcia & Calantone, 2002; Hult et al., 2004) we can see that it is a multidimensional concept. It is related not only to the capacity but also tendency to innovate. Both of them are required because just having the ability without the willingness to innovate will put those ability to waste, while having the ability is certainly required when the firm is willing to innovate.

A firm can be said to have the capacity to innovate when the firm adopted multiple innovations instead of single innovation (Damanpour, 1991; Subramanian & Nilakanta, 1996), because it reflects the ability of the firm to adopt new ideas successfully (Hurley & Hult, 1998). Moreover, time of adoption also important to reflect the readiness of the firm to innovate (Rogers, 1983; Subramanian & Nilakanta, 1996). The firm might readily possesses certain resources or skills that made it possible for them to adopt innovation early. Innovativeness is also being regarded as an enduring trait of an innovative firm, thus consistency of the adoption timing also matters (Subramanian & Nilakanta, 1996). By being consistent in the timing of innovation adoption, it reflects the sustainable capacity to innovate.

Because capacity to innovate is related to whether products/service innovation has been adopted or implemented successfully, then the degree of newness of the product or service innovation might also be used as the variable to measure capacity to innovate dimension. When the product is not new then, it might not be counted as innovation, thus might nullify the success of innovation adoption. Thus the three variables mentioned by Subramanian & Nilakanta (1996) which are *mean number of innovation adoptions*, *mean time of innovation adoption*, and the *consistency of the time of adoption***,** with the addition of *the degree of newness of product/service* can be used to measure the capacity of a firm to innovate.

Meanwhile, *tendency to innovate* is a cultural aspect, which is related to the openness of a firm towards new ideas (Hurley & Hult, 1998). It can also reflected on the strategic orientation of a firm, whether they are pursuing to be an innovative firm or not (Miles & Snow, 1978). Other orientations possessed by the firm can also reflect their willingness to innovate. When the firm is willing to learn new ideas, they will make investments in employee trainings and development (Calantone et al., 2002). Furthermore because employees are important asset in pursuing innovation, the willingness to innovate will most likely be shared from the top management throughout the firm. Managers in the firm will encourage the "out of the box" thinking from their team members.

Accepting external ideas will also be encouraged, as knowledge can come from outside the firm (Chesbrough, 2003), thus firms will be willing to collaborate with external parties. Pursuing new ideas, whether it is from the internal or external part of the firm, possess a certain risks due to uncertainties. Being bold in the decision to adopt new ideas or innovation despite the risks indicates the entrepreneurial spirit in the firm (Miller, 1983). Market condition can contribute to the uncertainties surrounding the innovation. Firms can pursue information in the market, whether a particular innovation is needed or wanted by a set group of customers, and whether competitors already possessed this innovation (Slater & Narver, 1999).

All of above arguments lead to the variables that can be used to operationalize *tendency to innovate* dimension, which are: *learning orientation*, *market orientation*, *entrepreneurial orientation, external collaboration,* and, *strategic orientation on innovation*. Three components of learning orientation can be used to operationalize tendency to innovate dimension: *commitment to learning, shared vision, open-mindedness* (Calantone et al., 2002).

Meanwhile, two components of market orientation can be used to operationalize tendency to innovate: *customer orientation* and *competitor orientation* (Slater & Narver, 1999). While these variables were defined as antecedents of innovativeness in the study by Hult and colleagues (2004) and innovativeness was defined as a variable itself in the study by Hurley & Hult (1998), their items are similar. Hence, this research wanted to specify the innovativeness variable using, especially on the *tendency to innovate* dimension, using these antecedents.

Other variables such as *R&D expenditure*, *Internal Capital Investment in Innovation* and *Average Innovation Training Days for human capital* that were mentioned in other study (Carayannis & Provance, 2008) can also be considered as variables to operationalize innovativeness. While these variables might represent the tendency of a firm to innovate dimension, SMEs especially micro enterprises, might not have these activities. In addition, because these variables ask specific numbers, the respondents might have troubles in recalling the specific numbers, thus it might not be relevant to be used in the measurement instruments. Thus, the result of the operationalization process for 'innovativeness' can be seen on **Table A6 on Appendix A**.

2.2.3. Operationalising 'Business Performance'

Another concept that need to be operationalized is *Business Performance*. Looking at the definition of business performance by both Hult, Hurley and Knight (2004) and Venkatraman and Ramanujam (1986), the variables that can be used to measure business performance are mainly *Sales Growth* and *Profit***.** Profit can be operationalized as Earnings Before Interest and Tax (EBIT) (Brannback et al., 2014). Even though *Sales Growth* is considered as another important variable, but for SMEs, it is not as important as profitability. This is because profit can contribute to the growth of the firm, including in inducing sales growth, but not the other way around (Brannback et al., 2014). Profit will act as internal financial resource to fund growth for SMEs that do not seek external financial support, which account approximately 97% of total SMEs (Brannback et al., 2014).

This research has considered measuring *Market Share* or *Market Value* (Zott & Amit, 2007)**,** but it might not be suitable for several reasons. First, as mentioned before, the SMEs that are going to be surveyed are most-likely fall into the 97% category that does not put growth as its main concern. Thus, they will less likely to care about their market share or market value. Second, market share or market value would be the interest of VCs. These 97% SMEs are most-likely privately funded, either by their family or other sources, thus it will not be relevant to measure market share or market value because there would not be an Initial Public Offering (IPO) as one of the exit strategy of VCs (Brannback et al., 2014).

As mentioned before in previous section, there are other performance dimensions as suggested by Molina-Castillo & Munuera-Alemán (2009):*market-based performance*, *customer-based performance*, and *financial-based performance*. Although it can yield additional insights when used, market-based and customer-based performance might be too complex for SMEs, especially micro-enterprises. Thus financial-based performance, especially *profitability* and *sales growth,* will be the main variables used. Nevertheless, other performance variables might be important for certain firms, thus it might be beneficial to ask additional question in the questionnaire on what they consider as important performance indicator for their firm.

The operationalization result for 'Business Performance' can be seen on **Table A7 on Appendix A**.

2.2.4. Operationalizing 'Environmental Turbulence'

As mentioned in previous sections, innovation's relationship to business performance is moderated by the turbulence or uncertainty in the environment (Siguaw et al., 2006). While this moderation effect is true for product innovation (Calantone et al., 1997; Siguaw et al., 2006), further investigation is needed for business model innovation .

According to Zahra & Bogner (2000), environmental turbulence can be divided into three dimensions: environmental dynamism, hostility, and heterogeneity. From this three dimensions, this research will only use two of them, which is dynamism and hostility. These two dimensions of environmental turbulence are more representative for the "uncertainty" aspect because it cannot be controlled by firms and purely by external factors. Meanwhile heterogeneity can still be affected by the choice that the firm makes in choosing a particular market segment, thus reducing this "uncertainty" aspect. (Zahra & Bogner, 2000).

The environmental dynamism can be reflected by rapid change in customer preferences, the rapid market entry and exit of competitors, and the change in technological landscape (Zahra & Bogner, 2000). On the other hand, environmental hostility can be seen in the competitive intensity, lack of resources, and unfavorable regulations (Zahra & Bogner, 2000). From previous studies, the one that has been empirically investigated are technological turbulence, market turbulence, and competitive intensity (Barnett, 1997; Jaworski & Kohli, 1993; Moorman & Miner, 1997). Thus, technological and market turbulence will represent environmental dynamism dimension, while competitive intensity will represent environmental hostility dimension.

The operationalization result for '*environmental turbulence*' concept can be seen in **Table A8 in Appendix A**.

2.2.5. Summary of Variables

The concepts of BMI, business performance, innovativeness, and environmental turbulence have been operationalized in previous sections, which can be found in **table A9 in Appendix A**. These variables will be use as the guidance for conducting meta-analysis in the next step.

2.3.Qualitative meta-Analysis of the relationship between BMI, Business Performance, Innovativeness, and Environmental Turbulence

A meta-analysis is an analysis about analysis and it is mainly used to integrate findings from previous studies (Glass, 1976). In this research, meta-analysis will serve as a step of reviewing literatures that are related to business model innovation, innovativeness business performance, and environmental turbulence which can provide initial outlook about the relationship between those four concepts. This meta-analysis will look into the empirically researched studies for these relationship, so it can provide a more rigor approach in formulating relationship in this research and generate a robust conceptual model.

As stated in the research objective, finding reliable and valid measurements of BMI would be instrumental in understanding the relationship between those three concepts, thus this meta-analysis will also look into those measurements in previous studies. Because those measurements were already tested for their reliability and validity in previous studies, it can be added to the set of measurements for BMI in this research on top of new measurements that might be developed. Finding new measurements for business performance and innovativeness are not the main objective in this research because those concepts are more common than BMI and this research can just use measurements that had been researched in previous studies. Variables to operationalize the concepts can be found in the body of the text of those studies and the items that measured them can be found in the original questionnaires, if it were included in those studies.

Before conducting meta-analysis, some hypothesis regarding the relationship between concepts need to be formulated and those hypothesis will form a conceptual model. This conceptual model will serve as a basis for finding relevant relationships in meta-analysis.

2.3.1. Hypothesis Development

Conceptual model will help in formulating the assumed relationship between core concepts in the research (Verschuren & Doorewaard, 2010). This conceptual model will be used in the process of validating the theoretical relationship of BMI measurements to other related concepts in the theory, with a process called Nomological Validity (Yang, 2003).

There are several purposes of using conceptual model, and what would be used in this research is the exploratory purpose (Verschuren & Doorewaard, 2010). Compared to the theory-testing approach, the conceptual model will be more generic at the beginning. Because the exploratory nature, a wider phenomena needs to be studied first. To refine and make the conceptual model more specific, this research will refer to previous studies that were already empirically tested the relations in the generic model (Verschuren & Doorewaard, 2010). To build the conceptual model, some preliminary literature reviews are needed. Definitions of BMI, business performance and innovativeness have been defined in previous section of this research, thus this section will explore the relationship between them.

2.3.1.1. Business Model Innovation and Business Performance

This business performance can be significantly affected by BMI, as firms that were more focused on BMI outperformed firms that did not, in terms of profit (Giesen et al., 2007). Thus business model was seen as the differentiator that determines the outcome of a business performance. IBM CEO study also reported that CEOs from top firms are acknowledging the impact of BMI to the growth of operating margin in their companies (Pohle & Chapman, 2006). BMI has become one of the three focus of innovation for these CEOs to improve their firm's business performance. By innovating its business model, firms can also gain competitive advantage as business model might be hard to be replicated thus it can continue to be profitable (Chesbrough, 2007). Market share performance of a small-medium firm or startups can also be positively affected by BMI as a novel business model can recombine existing internal resources or use external partner's resources (Zott & Amit, 2007).

On the other way around, poor business performance can also be the driver for firms to re-think their business model (Demil & Lecocq, 2010). Firms might suffer from poor business performance because of the change in customer's preferences. This market turbulence makes the firm's business model not relevant anymore because their product or services are no longer relevant for the customers (Jaworski & Kohli, 1993). To change the value propositions, firm might need to change their suppliers and the way they market these new offerings. In short, they have to change their business model.

Therefore this meta-analysis can formulate the hypothesis as follow:

> ***Hypothesis 1a:*** *The relationship between Business Model Innovation and SME performance is positive*
>
> ***Hypothesis 1b:*** *Poor business performance triggers BMI in the firm*

2.3.1.2. Business Model Innovation and Innovativeness

The innovation in business model is required for capturing the value of other innovations (Chesbrough, 2007; Teece, 2010), typically technological innovations, which means that BMI can affect the capacity of a firm to adopt those innovations. Innovative business model will bring the capability to exploit the opportunity in fulfilling underserved demand in market through disruptive innovation (Johnson et al., 2008). The solution that the market needed might not necessarily better in performance, but they might need something simpler or can be easily accessed (Johnson et al., 2008). Firm's can define this in the value

proposition element of the business model (Barjak et al., 2014; Osterwalder et al., 2005) which in turn may also define the requirement of the business system configuration (Barjak et al., 2014).

If firms cannot capture the value of an innovation, it is less likely that they will adopt it as they may have to invest a lot of time and resources to study the markets (Hult et al., 2004). Furthermore, resource is something that SMEs lack compared to larger firms (Nieto & Santamaría, 2010), but they can seek external resources from their partners in the value network (Bretherton & Chaston, 2005; Jarillo, 1989). The configuration of the resource transfer/transaction and usage within the value network will also be defined in the business model, more specifically in transaction governance element (Amit & Zott, 2001) or other study call it business system element (Barjak et al., 2014).

These new configuration of business model can give the capability to adopt new innovations (Siguaw et al., 2006) through new use of resources or value network (Demil & Lecocq, 2010), thus the relationship between BMI and Innovativeness can be formulated as a hypothesis as follow:

Hypothesis 2a: *Business Model Innovation can positively affect firm's Innovativeness*

Another dimension of innovativeness is the propensity or willingness of a firm to innovate (Garcia & Calantone, 2002), which can positively affect the firm's capacity to innovate (Bock et al., 2012; Hurley & Hult, 1998; Teece, 1996). This dimension is related to the firm's culture of openness to new ideas (Hurley & Hult, 1998) and it is positively driven by market orientation, learning orientation, and entrepreneurial orientation (Hult et al., 2004).

Innovativeness is also related to strategy, and can be considered as a dimension of strategy (Subramanian & Nilakanta, 1996). Strategy is the first step before designing new business model because it can protect the competitive advantage of the new business model (Teece, 2010). There are several strategy archetypes or typology (Miles & Snow, 1978; Mohr et al., 2010; Slater & Mohr, 2006), and one of them is Prospector which put great emphasis on innovation. When a firm is following this strategy, it is most likely that they will have more willingness to innovate and capacity to innovate than other firm that follow other strategy. With better capacity to innovate, firms can capitalize new technological innovation and creating new market (Johnson et al., 2008).

Business model is also one of the subjects of innovation (Chesbrough, 2007; George & Bock, 2011; Mitchell & Coles, 2003), thus BMI can also be affected by the increased innovativeness in the firm. This is possible due to the three previously mentioned factors that can affect innovativeness of a firm. The more learning oriented, market oriented, and entrepreneurial oriented the firm is, the more likely the firm will have the willingness to experiment on the business model. While experimentation of business model is crucial in the process of innovating it, it can cost a lot of time and financial investment (Chesbrough, 2007). Thus, this willingness to innovate can be in a form of increased R&D budget allocation, which affect the number of business model experiments/innovations adopted by the firm.

These process of innovating business model through experimentation can utilize both internal and external ideas, which is known as open innovation (Chesbrough, 2003), to speed up the process of finding best business model. Moreover, as BMI also involves the re-arrangement of business activities, a firm with high innovativeness or willingness to innovate are more likely to embrace changes in the firm (Bock et al., 2012) and making the BMI implementation smoother.

This willingness in spending time and financial investment should be mainly driven by the top management of the firm (Chesbrough, 2007) and be incorporated into the company culture. When lower level employees are exposed to the goal of innovation, innovative ideas may come from them (Daft, 1978). Top management can come up with administrative ideas, while lower level employees might come up with technical ideas (Daft, 1978) that can be incorporated into the new business model design. This implies that the relationship between BMI and innovativeness is not one-way relationship, but rather a two way relationship as depicted in the conceptual model shown in figure 1.

Hypothesis 2b: *Firm's Innovativeness can positively affect the adoption or implementation of Business Model Innovation*

2.3.1.3. Innovativeness and Business Performance

Innovativeness can have positive effect on business performance as they can enable firms to develop competitive advantage (Hult et al., 2004; Hurley & Hult, 1998). Firms with willingness to innovate will underwent activities that give them better capacity to innovate (Hurley & Hult, 1998). As previously mentioned, this willingness to innovate is mainly driven by market orientation, learning orientation, and entrepreneurial orientation (Hult et al., 2004). These orientations drive firms to improve continuously in order to adapt to the constantly changing market, which if their competitors cannot keep up, will give them the competitive advantage they needed to survive in the competition.

Aside from business model innovation that was previously mentioned, this competitive advantage can be the result of other various innovative activities such as product innovation and process innovation (Hurley & Hult, 1998; Utterback & Abernathy, 1975). It can be in a form of a new and innovative products that have better performance compared to other similar products in the market (Utterback & Abernathy, 1975). It can also be in a form of reduced operational costs and increased efficiency due to process innovations (Utterback & Abernathy, 1975), which eventually can affect the product or service pricing to be more competitive in the market. These innovations can close the performance gap that a firm might have due to a new competition or the emergence of new demands in the market (Zaltman et al., 1973).

All of this competitive advantage can only be obtained through innovation if the firm possess the willingness and capacity to innovate, which are the dimensions of innovativeness (Garcia & Calantone, 2002; Hult et al., 2004; Hurley & Hult, 1998). In the end it can give more sales from tapping unfulfilled demand, more profitability from reduced costs, and also market share from capturing competitor's customers with better products or services.

Hypothesis 3a: *Firm's Innovativeness can positively affect Business Performance of a firm*

On the other way around, a good business performance and competitive advantage can reinforce the innovativeness culture in the firm, as shown by Hurley & Hult (1998) in their research. One of the important measure of business performance, which is profitability, can also affect innovativeness. Profit is what enable innovation in the first place (Brannback et al., 2014) because innovation is costly (Miller et al., 1988). Firms with high profitability can internally funded their growth (Brannback et al., 2014), by investing in their capability to innovate. They can acquire more resources such as knowledgeable employees and equipments, and fund the experimentations needed to enable the innovation or adoption of innovation.

Hypothesis 3b: *High Business Performance can positively affect Innovativeness of a firm*

2.3.1.4. Environmental Turbulence as moderator of the relationship between BMI and Business Performance

Business model innovation (BMI) is a form of innovation just like product or process innovation (Mitchell & Coles, 2003), that is why some determinants of innovation can also be applied also to BMI. There are some determinants of firm-level innovation (Teece, 1996), but in the context of business model innovation, one of the most important determinant is the business environment. This determinant is related to customers, competitors, government regulations, external partners, market structure, etc (Teece, 1996). It is also found that the turbulence or uncertainty in the environment serve as moderator for the relationship between innovation and performance (Calantone et al., 1997; Siguaw et al., 2006).

This environment factor is relevant for business model innovation as it is related to the business system or value network element of a business model. When firms are planning to pursue an innovation opportunity, they will look into the expertise or knowledge that they possess (Cohen & Klepper, 1992; Denicolai, Ramirez, & Tidd, 2014). If they cannot find it internally, they will look on the external sources which is part of the environment surrounding the firm. The availability of these external sources will determine which innovation approach can be pursued. Firms typically devise a strategy to adapt to their external environment (George & Bock, 2011), and business model is a representation of strategy (Casadesus-Masanell & Ricart, 2010).

This different environment situation is also relevant especially when BMI is being implemented or conducted in SMEs. Different environmental situation, either it is hostile or benign, requires different approach from SMEs. An environment might be hostile when it has intense competition and lack of marketing or investment opportunities (Covin & Slevin, 1989). The more hostile the environment, SMEs need to be more organic in organization structure and needs to have higher strategic posture (more entrepreneurial) and vice versa (Covin & Slevin, 1989). Environment can also have high dynamism, which marked by technology and market turbulence (Zahra & Bogner, 2000).

These environmental factors lead to the following hypothesis:

> ***Hypothesis 4:*** *Environmental Turbulence has a moderating effect on the impact of BMI to Business Performance*

2.3.2. Conceptual Model

The hypotheses formulated above lead to the formulation of a conceptual model. Even though conceptual model is mainly used in theory-testing as a research perspective (Verschuren & Doorewaard, 2010) , this research will use it mainly for giving clear indication on which relationship it will investigate. Furthermore this conceptual model will be needed to assess nomological validity of a newly developed measurements (Cronbach & Meehl, 1955).

The core conceptual model would be made as a generic model first, as shown in **figure 12** below, to capture the wide phenomenon before refining it into more specific during the research. Some other variables might be identified during the process of meta-analysis.

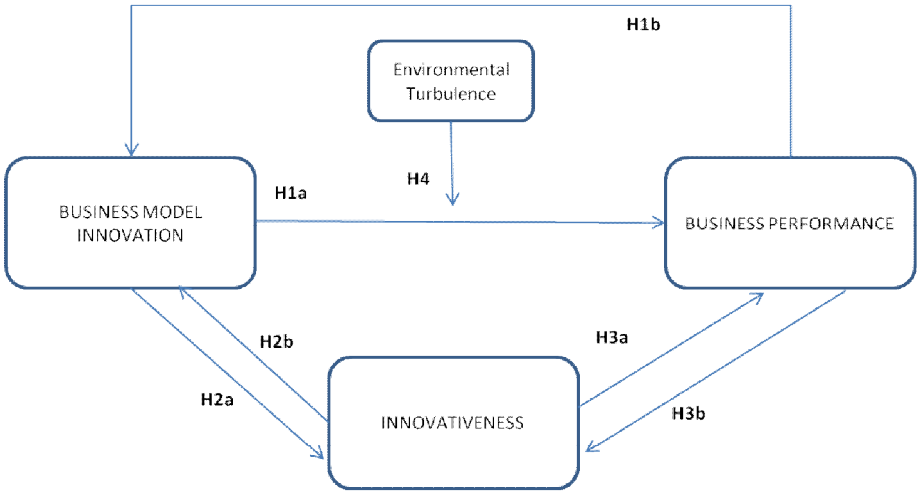

Figure 12 - Initial Conceptual Mode

The variables for these concepts were already operationalized and can be found on previous sections.

2.3.3. Study Selection

In the study selection, this meta-analysis prefer to have studies that already have explicit and empirically tested hypotheses by using quantitative approach. But, meta-analysis relies on the availability of all relevant information (Burns & Burns, 2008). When such studies are not available, a research may used non-explicit hypotheses from qualitative studies (van de Wijngaert et al., 2012). This meta-analysis will try to use several core papers with several selection criteria:

1) Have empirically tested explicit hypotheses about the relation between BMI, Innovativeness , Business Performance and Environmental Turbulence.
2) It will focus first on studies that have BMI as its main concept, and will put innovativeness, business performance, and environmental turbulence as its subsequent priorities.
3) The unit of analysis was at organizational or firm level.
4) Even though the scope of this research is SMEs, but because the topic of Business Model Innovation is relatively new, this meta-analysis will also include studies that covered larger firms.
5) Business Performance variable will be referred to the firm as a whole, which can be measured by profit or sales. Market share and market value can also be included only for additional insights.
6) Business Model Innovation is a relatively new concept, thus the definition can be different in various papers but this research mainly refer BMI as when there are changes in the component in the business model that is new to the firm or to the market. It can be measured by novel value proposition, novel business systems, or novel value capture.
7) Innovativeness can be defined as two dimensions: tendency and capacity to innovate, with the prior as the pre-requisite to the latter. The prior can be measured the level of learning orientation, market orientation, entrepreneurial orientation, collaboration effort, and their strategic emphasis. Meanwhile the latter can be measured by mean number of innovation adoptions, mean time of innovation adoption, the consistency of the time of adoption, and the degree of product/service newness.
8) Three variables used as guidance for environmental turbulence concept: competitive intensity, market turbulence, technological turbulence.
9) Depending on the availability of variables in the papers, other similar variables in the papers can be used with proper reasoning.
10) If possible, these papers are papers that were cited by many other papers.

The process of searching for relevant studies were conducted on Scopus, Web of Science and Google Scholar as the source by typing keywords. When one of the source cannot provide the paper, then this meta-analysis turn to the other source. References in studies were also used to find relevant articles, which commonly known as *snowball effect*, by means of search method (Verschuren & Doorewaard, 2010).

This meta-analysis aims to find as many papers as possible, especially papers regarding BMI. Eventually the search method found several empirically tested core papers as shown in **Table B1 in the Appendix B** and summarized in **table B2 in Appendix B**: eight papers to support hypothesis 1a (Hartmann et al., 2013; Zott & Amit, 2007, 2008), three papers to support the hypothesis 2a (Clausen & Rasmussen, 2012; Hult et al., 2004) and two papers to support hypothesis 3a. This number of papers might not be enough to statistically combine or compare the results, but this meta-analysis can still use it as empirically-proven basis for supporting the conceptual model, while at the same time it can be used to find relevant variables and measurements for the concepts.

2.3.4. Meta-analytical Procedures

According to Burns & Burns (2008), the core of meta-analysis relies on the statistical combination across studies. The technique is comparing studies based on p-values or effect sizes, and if the studies are not significantly different, they can be combined (Burns & Burns, 2008). The effect size is more preferred than p-values because it can provide better estimate of the impact of a variable, and it can be estimated from standardized mean differences (d), correlation coefficient (r), or *eta* (Burns & Burns, 2008). Employing *r* as effect size estimate is more preferable than *d* as it can be more consistent in facing different size of study, aside from the difficulty of obtaining d data from the studies (Rosenthal, 1991). Using *r* is also more

preferable than r^2 because r^2 underestimates the relationship between variables and related only in a non-linear way to the magnitudes of effect size (Hunter & Schmidt, 1990).

This meta-analysis aims to find *r* as the estimated effect size from the studies regarding the relationship in the hypothesis but sometimes the information is not available or some of the papers tested the relationship with the interaction of a moderating variable. Thus instead of using *r*, this meta-analysis extracted r^2 from some of the papers. The effect size from each studies can be seen in **Table B3 in the Appendix B**.

This meta-analysis is not a typical quantitative meta analysis, but a more qualitative in nature. Statistical computation cannot be conducted to integrate or compare the result from the selected studies due to several reasons: (1) Limited number of related empirical studies available, (2) Some of the selected studies did not test the hypothesis directly (some used interaction effect with moderating variable and some used different but similar concepts), (3) There are inconsistencies in statistical data that can be extracted (*r* or r^2), (4) There is high degree of variability in the scales and variables used, (5) This research does not know the number of related unpublished studies that yielded null results (did not reach significance), thus it might have file drawer problem (Burns & Burns, 2008).

The limitations above indicates that any statistical result from this meta-analysis might produce incorrect results or have low robustness. If the limitation above can be addressed, meta-analysis could have also predicted whether effect size from different studies can be combined, if they do not differ significantly, by converting *r* to Fisher Z and test their differences (Burns & Burns, 2008).

Thus, this meta-analysis was only used qualitatively to identify empirically tested relationships from existing studies, which provide foundation for the hypothesized relationship in this research. While some empirical support for three hypothesis (hypothesis 1a, 2a, and 3a) can be found from the selected studies, empirical support is still needed for hypothesis 1b, 2b, 3b, and hypothesis 4.

2.3.5. Initial outlook on the meta-analysis result

BMI - Business Performance relationship

From**Table B3 in Appendix B**, previous studies have shown that there is a positive correlation between BMI and performance. The problem relies on the inconsistencies of the strength of the correlation shown. Some studies showed a relatively weak correlation (Hartmann et al., 2013; Kim & Min, 2015), some showed moderate correlation (Abd Aziz & Mahmood, 2011; Cucculelli & Bettinelli, 2015), some showed strong correlation (H.-C. Huang et al., 2012; Zott & Amit, 2007, 2008).

Because the information about *r* cannot be found in some papers (Zott & Amit, 2007, 2008), this meta-analysis uses r^2 instead, which is less preferable than *r* (Hunter & Schmidt, 1990). Furthermore, the strong correlation between BMI and performance in these two papers (Zott & Amit, 2007, 2008) might be because of the interaction effect with moderating variable of strategy.

Other remarks on the relationship between BMI and business performance is the variable used as the indicator for business performance. These variables also vary between expected performance (such as market value or market share) and realized performance (such as sales growth and profit). Moreover, these studies also used various BMI scales. Some studies used only one general BMI scale with several measurements, other studies used a more specific scales (consists of elements of a business model).

BMI - Innovativeness relationship

Selected studies also show the positive correlation between BMI and innovativeness but some remarks come with it. The meta-analysis can only found three studies (Cheng et al., 2014; Clausen & Rasmussen, 2012; Su, Tsang, & Peng, 2009), and some of them were not directly tested the relationship between BMI and innovativeness. The paper from Clausen & Rasmussen (2012) tested the use of several business

model to improve innovativeness while paper from Su and colleagues (2009) used the interaction effect between Internal Capability and External Partnership to test the relation with Product Innovativeness.

The use of multiple business model in this meta-analysis can be seen as the approximation to BMI approach, as it can be considered as part of the process of experimentation in finding the right business model. The combination of internal capability and external partnership is also being seen as an approximation to business model because they are related to business model element, more specifically to business system or value network element. Business model can also be considered an organizational design which links internal perspective of a firm to external perspective (Velu, 2015). This integration of knowledge is important for firm's capacity to generate innovations (Su et al., 2009), thus the process of innovating business model can certainly benefit from it.

Innovativeness - Business Performance relationship
Between innovativeness and performance, a positive but relatively weak correlation was found in the two selected studies (Hult et al., 2004; Subramanian & Nilakanta, 1996). In both studies, innovativeness was being positioned as the mediating variable: one to mediate the relation between organizational characteristics and performance (Subramanian & Nilakanta, 1996), while the other one to mediate the relation between three type of organizational orientation to performance (Hult et al., 2004). Thus, these two cases shows weak support for the hypothesis 3a, and it will need further empirical testing to provide stronger support.

Moderating effect of Environmental Turbulence to the BMI-Business Performance Relationship
Environmental turbulence concept cannot be found in any of the selected studies, let alone being used as a moderator variable. This might be because BMI is still a relatively new concept in the innovation domain. One of the moderating variable between BMI-business performance relationship found was "strategy", which is not the focus of this research. Meanwhile, environmental turbulence is more commonly used as the moderating variable for product innovation.

2.3.6. Related Concepts and Variables from Selected Studies

After the magnitude of the relationships between concepts were identified, this research proceeds to the next objective. This meta analysis can be useful to identify concepts, variables and measurements that were being used in the selected studies. This will serve as our reference in finding existing valid and reliable measurements (summative scales), as well as reference to develop new measurements (formative scales) if needed. Summary of the findings can be found in **Table B4** and **Table B5 in Appendix B**.

2.3.7. Network Analysis

In qualitative meta-analysis, analyzing both core concepts and its relationships (hypothesis) in previous studies can be assisted by visual guidance such as network analysis (van de Wijngaert et al., 2012). Concepts can be depicted as nodes and the relationship between them, the hypothesis, can be depicted as the connecting line. This visual representation can be helpful as it also shows which concepts that are more of a dependent concepts and which one that are more independent (van de Wijngaert et al., 2012). The more in-degree, which is the number of incoming relation to a concept, the more dependent the concept is to other concepts.

Because this research is more exploratory in nature, the concepts in this network analysis are not limited to the one stated in hypothesis, but also concepts mentioned in the selected papers that served as theoretical background. Concepts from **Table B4 in Appendix B** were analyzed for similarities and a set of unified concepts were generated, as can be seen in **Table B6 in Appendix B**. The network representation of the unified concepts in table 11 is visualized using Gephi and can be seen in **figure B1 in Appendix B**.

2.3.8. Interpretation of Network Analysis

To interpret visual network in **figure B1 in Appendix B**, it can be by looking at the number of outdegree and indegree from each concept (van de Wijngaert et al., 2012). From the visual representation, the concepts that received more connection, or indegree, will be represented as bigger circles and can be considered more dependent concept. Vice versa, the more outdegree the concepts are, the more it become independent variable and serve as explanatory concepts. From **figure B2 in Appendix B**, we can derived several insights:

- Business model innovation (BMI) is a relatively new concept, but it gives high outdegree, which means that it can affect or explain the changes in other concepts (an independent variable). This high outdegree also indicates that it can be worthwhile to find out more about BMI.
- Performance is the ultimate dependent concept (dependent variable), because it receives high number of indegree without a single outdegree. It is usually the ultimate objective of firms adopting innovations.
- Internal capabilities and external relations of a firm were combined in previous study in order to improve firm's innovativeness and performance. In other words, their effect might be less significant if they were utilized separately. Furthermore, this internal capabilities and external relation can be considered as part of elements that shape a business model.
- The characteristic of a firm gives a lot of explanation as they have relatively high number of outdegree. It might be because it can affect the internal capabilities of the firm and decision making process in response to changing business environment.
- While it is not much mentioned, strategy was also used in interaction with BMI in one of the studies but not on its own, but rather as interaction effect. In this research, strategy will be covered by innovativeness, as innovativeness is considered as a dimension of strategy.
- Environmental Turbulence were not being used as a concept that can explain other concepts, nor being the concept that was being explained. The addition of business environment concept as moderating variable in the conceptual model of this research can potentially give additional insights.

2.3.9. Implication to conceptual model

From both effect size and network analysis above, some insights can be inferred to support the conceptual model formulated earlier. These insights will be discussed in the following subsections.

2.3.9.1. The justification for the addition of a moderating variable

Inconsistencies found in the relationship between BMI and performance from previous studies give justification for the existence of a moderating variable. Some studies reported weak correlations (Cucculelli & Bettinelli, 2015; Hartmann et al., 2013; Kim & Min, 2015; Velu, 2015), but there are also studies that reported moderate (Abd Aziz & Mahmood, 2011) and strong correlations (H.-C. Huang et al., 2012; Zott & Amit, 2007, 2008). The inconsistencies shows that the relationship might depends on a certain condition or factor .

This other factor is represented by a moderating variable, which addresses "when" and "for whom" a dependent variable is more strongly related (Hunter & Schmidt, 1990). Moderating variable can determine the strength and relationship between independent and dependent variables (Sharma, Durand, & Gur-arie, 1981; Walsh, Evanschitzky, & Wunderlich, 2008).

The selection of a moderator variable should be based on theoretical reference and research context (Frazier, Barron, & Tix, 2004). For this research, environmental turbulence was selected as moderator variable because previous studies have found the moderating effect of environmental turbulence to the relationship between innovation and performance(Calantone et al., 1997; Siguaw et al., 2006). In those

studies, environmental turbulence is not specifically moderating BMI to business performance, but more into product innovation. From the selected studies in meta-analysis, there has not been a single study that investigated this environmental moderation effect. Thus, adding this moderator variable might provide additional insights on BMI theory.

A study from Zott & Amit (2008) shows that strategy is also a moderator variable to the relationship between BMI and performance. In this conceptual model, strategy is not covered because it is not the focus of this research. Although, thec concept of strategy will be implicitly covered in innovativeness concept as innovativeness is considered as a dimension of organizational strategy (Subramanian & Nilakanta, 1996).

2.3.9.2. The need for control variables

Most of the selected studies were using control variables in estimating the relationship between independent and dependent variable in the model. Control variables are basically representing contaminants that might be a factor that affect the relationship between independent and dependent variables but not being emphasized as the focus of the research (Becker, 2005; Carlson & Wu, 2012).

The use of control variables is reduce the possibility of error and to find "true" strength of the relationship between independent and dependent variables (Becker, 2005; Carlson & Wu, 2012). The selection of control variables are depending on the purpose and context of the research. The selection of control variables will also be following the requirements of Envision project. Some of the most common control variables found in the studies are: Firm Age, Firm Size, and Country of Origin.

Another control variable that is not commonly used but might be relevant for this research are Type of Firm Ownership. This variable is related to the speed of decision making which affect the responsiveness to the change caused by BMI or environmental change (Nooteboom, 1994; Verhees & Meulenberg, 2004). A family business or firm might also have different objectives than regular firm because they have family norms or values incorporated (Brannback et al., 2014). ,

The organization lifecycle can also be relevant to see if it has an impact to the model, as different stages in the lifecycle will yield different need and direction of the firm (Jawahar & McLaughlin, 2001). Furthermore, the timing when the firm enter the market might have an effect to their business performance and resources, as it can give them first-mover advantages (and disadvantages) (Golder & Tellis, 1993; Lieberman & Montgomery, 1988). Gender issue is also being put as special attention because it was assumed that SMEs were founded and operated by men (Brannback et al., 2014). In the end, the addition of control variables can increase Internal Validity (Ihantola & Kihn, 2011). Thus, the conceptual model will be further developed as shown in **figure 13** below.

2.3.10.Conclusion of Meta-Analysis

This meta-analysis is not a quantitative meta-analysis but a more qualitative meta-analysis (van de Wijngaert et al., 2012) due to several limitations mentioned above. From this qualitative meta-analysis, there are some key insights that can be used for this research. **First,** Although the statistical meta-analysis method cannot be done due to several reasons, selected studies were generally supported most of the hypothesis in the conceptual model. Four of the hypothesis, which was not supported due to lack of existing empirical research, can be further tested in future research. **Second**, previous studies have provided this research with concepts, variables and measures that can be used, especially the measurements that have been tested for its validity and reliability. **Third**, looking at inconsistent strength of relation between BMI and Performance, this research may add moderating variable such as environmental turbulence. **Fourth,** it has been found that previous studies were using control variables to determine the true strength of the hypothesized relationships (or internal validity), thus this research will also use several control variables.

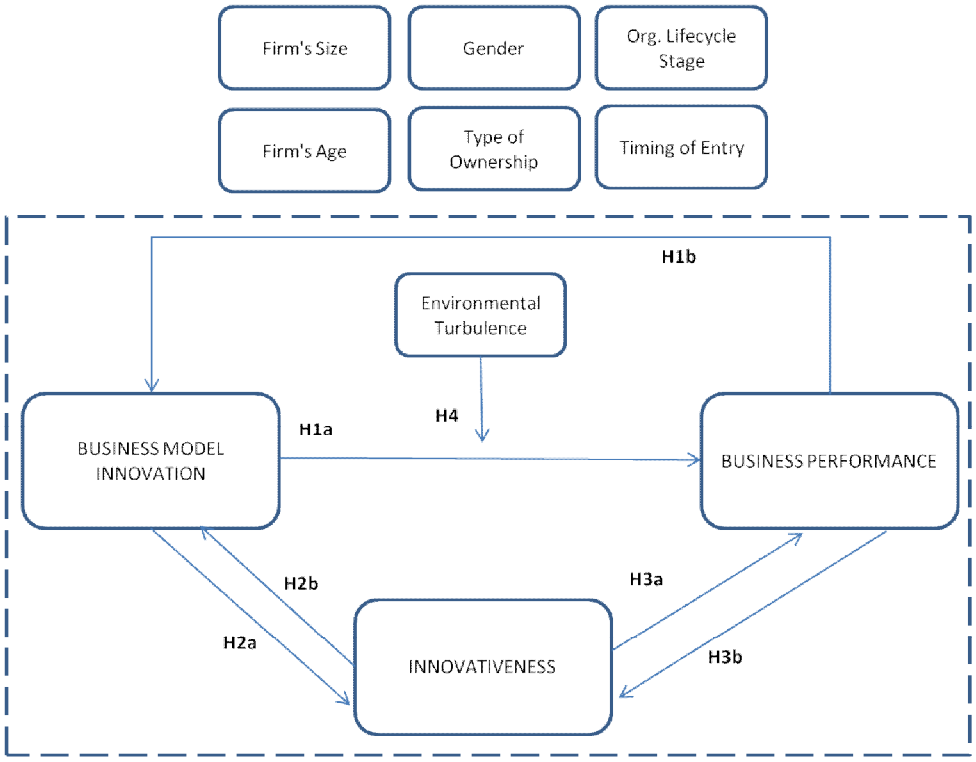

Figure 13 - Revised Conceptual Model with Control Variables

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3 Measurement Instrument Development

3.1.The importance of measurement

The main deliverable of this research is a measurement instrument which will be used to measure the effect of BMI to both innovativeness and business performance. The activity of measurement is important, especially in science, in order to obtain knowledge from the object of interest (DeVellis, 1991). The typical measurement instrument is questionnaire, like the one that will be developed in this research, and eventually this measurement is often used to solve practical problems (DeVellis, 1991).

By definition, " *measurement consists of rules for assigning numbers to objects to represent quantities of attributes*" (Nunnally, 1967). It can be derived from this definition that we do not measure the object itself, but rather the attributes that are part of the object. Generally it is not preferable to have mixed attribute in one measure because each measure should only concern about one unitary attribute (Nunnally, 1967). In the end, different measures can be combined to measure several attributes of a construct.

A measure can be said to be useful if it can support scientific explanation for the construct of interest (Nunnally, 1967), or its validity, and it can be determine by the rigor of the rules and skills applied when developing the measure (Churchill Jr., 1979). It is recommended to use triangulation to have a better assessment on the construct of interest (Malhotra & Grover, 1998). Triangulation can be in the form of multi-item measure and multiple respondents per company.

Measures, when it is standardized, can provide several advantages such as objectivity, specific quantification, communication, and economy (Nunnally, 1967). For this research, the measurement instrument can be used by European Commission to objectively gather information regarding BMI effect to business performance and innovativeness of SMEs. The result can be easily communicated internally among European Commission members and also to the SMEs itself.

3.2.Procedures of Measurement Instrument Development

Before developing the measurement instrument, as previously mentioned, it is important to remember that a measure should be useful, thus it should be valid (Nunnally, 1967). A measure is valid when "*differences in observed scores reflect true differences on the characteristic one is attempting to measure and nothing else*" (Churchill Jr., 1979) or in other words it is measuring the right construct (Sekaran & Bougie, 2013).

When the measure is valid, it is also reliable, but not the other way around (Churchill Jr., 1979; Nunnally & Bernstein, 1994). A measure is reliable when "*independent but comparable measures of the same trait or construct of a given object agree*" (Churchill Jr., 1979) and it is repeatable (Nunnally, 1967). Hence, ensuring validity of the measures is the main objective when developing measurement (Churchill Jr., 1979).

In developing measurement, a deep understanding and knowledge about the phenomena that being the object of interest is important (DeVellis, 1991). This knowledge can be derived from theories that were previously developed. The more we know about the phenomenon, the higher the possibility of developing a valid and reliable measurements. This is because theory can help in conceptualizing the measurement problems (DeVellis, 1991). There can be certain phenomena that exists but cannot be measured directly, thus scales should be developed. These phenomenon are also known as latent variable or construct (DeVellis, 1991). Scales are "*items intended to reveal levels of theoretical variables, not readily observable by direct means*" (DeVellis, 1991), while measurement instrument are collection of scales.

The measures can be derived from constructs through the process of operationalization (which has been done in chapter two), from theoretical domain to operational domain (Malhotra & Grover, 1998). This process can also introduced four type of common errors: *measurement error, sampling error, internal validity error*, and *statistical conclusion error* (Malhotra & Grover, 1998). These errors can be reduced through the use of certain norms and standards (Malhotra & Grover, 1998).

Measurement error can be reduced through validation processes, sampling error can be reduced by determining the right sampling frame and random selection process, internal validity error can be reduced with test causality with structural equation modeling (SEM), and statistical conclusion error can be reduced with large sample size (Malhotra & Grover, 1998).

Measurement error is the most important error to be addressed in the process of developing a measurement instrument (Malhotra & Grover, 1998). Measurement error can be caused by random or systematic errors (Waltz, Strickland, & Lenz, 2010). While random error affects reliability of a measurement instrument, systematic error affects the validity of a measurement instrument. Measurement error can be reduced through a series of validation techniques and procedures (Malhotra & Grover, 1998).

This research will follow the guideline from Churchill (1979) and Suhonen, Valimaki, and Katajisto (2000) for the scale development procedure. The general overview of the procedures, as adapted from Churchill (1979), can be seen in the **figure 14** below. **Table C1 in Appendix C** gives a further detail about the procedures, as adapted from Suhonen and colleagues (2000), which divided the procedure into 2 phases.

The overall procedure in **table C1 in Appendix C** consists of two phases: **(1)** Preliminary instrument development and **(2)** Instrument Pre-Testing. First phase mainly related to the theoretical research and initial item generation, while second phase will mainly related to data collection and purifying the instrument. Due to time limitation, this research scope would only be on the first phase of the procedure, while second phase will be left out for future research.

First phase suggested that we should first make clear about what is included and what is not in the definition of the constructs. Literature research or review is the main method in determining the domain of constructs (Churchill Jr., 1979). The second step would be developing the blueprint of the instrument as a guideline on what would be included in the questionnaire (DeVellis, 1991). After that, a pool of initial items can be generated according to the blueprint.

In this stage, this research have conducted a literature meta-analysis to find existing measures from empirically researched quantitative studies. This is useful especially to gain insights on what new measures should be added on top of these existing measures to properly assess the concepts. The last stage of the first phase is to have judges review on these initial pool of items, which also known as a step for ensuring face validity. Face validity is one of the criteria that should be possessed by measures (Churchill Jr., 1979). Items may be reduced after this judges review before it can be pre-tested.

The **second phase** will start with pre-testing the list of items that have been "purified" by judges. A number of respondents, approximately 30 respondents, will be used to pre-test the instrument. After pre-testing, the instrument will be further purified through Exploratory Factor Analysis (EFA) which will determine the number of factors and items that should be retained. Lastly, Confirmatory Factor Analysis (CFA) will be used to confirm the validity of scales derived from EFA. The validity that would be assessed is construct validity. Internal consistency (Cronbach Alpha) will be mainly used to assess the reliability in both factor analysis.

This second phase would be the agenda for future research and would not be conducted in this research.

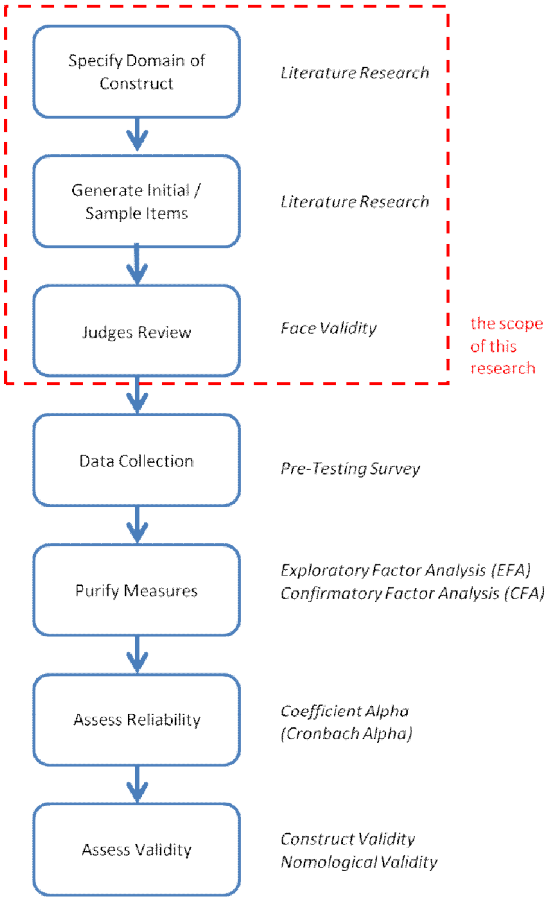

Figure 14 - Overview of Scale Development Procedure (Churchill Jr., 1979)

3.3.Initial Measurement Instrument Development

3.3.1. Domain of Construct Specification

In this step, some domains must be defined in a concept in order to be able to accurately measure the concept (Churchill Jr., 1979). A domain is defined as " *the particular conceptual, behavioral, or affective area within which skilled activity operates*" (Mascolo, 2008). As defined above, a domain is closely related with a certain skill, thus different domains can be identified by the skills attached to it. Furthermore, a domain is the background knowledge that gives comprehension or understanding to a concept (Clausner & Croft, 1999). Thus, to be able to understand a concept, it is necessary to know the domain that represent the concept.

This research have defined the all related concepts and operationalized them in the second chapter. From this second chapter, business model innovation can be separated into two domains: "business model" and "innovation". From the domain of business model, this research has identified elements that shaped a business model. These elements are subject to innovation, which means that there can be changes in the elements. Next, from the innovation domain, this research has identified that innovation has its properties which will also be relevant for BMI. These properties involve internal and external determinants/drivers of innovation, the process of innovation which involves experimentation, and the outcome of innovation which can be radical and also disruptive.

From the domain separation above, some areas of interest in the BMI construct can be defined. First, this research refer to BMI definition by Barjak and colleagues (2014) which saw BMI as changes of its components. Secondly, there are steps of BMI that can also be delineated, which are business model

design, implementation, and outcome. Third, there can be internal or external drivers that triggered firms to innovate their business model. The domain specification for BMI can be found on **Table C2 in Appendix C**. The domain specification for BMI is more detail than other concepts in this research, due to the focus of this research and the "newness" of the concept.

For innovativeness, it has been identified from second chapter that it consists of two different dimensions, which are the *capacity to innovate* and *tendency to innovate*..

Environmental turbulence has two dimensions which are environmental dynamism and environmental hostility. The dynamism in the environment is marked by technology and market turbulence, while hostility in the environment is marked by the competition intensity.

Meanwhile, business performance is mainly related to a financial domain. Profitability has been identified as the most important measure for a startup and also SMEs, because it can drive growth internally (Brannback et al., 2014). Thus this research will mainly concentrate on measuring business performance on financial domain and putting other measurements as items that will be assessed for its importance.

It is important to know the domains mentioned above as a frame of reference for the concepts. Thus, based on the concept operationalization in chapter two and domain specification above, areas of interests in the concept can be determined. Several areas of interest that would be measured in the measurement instrument are: *Changes in BM elements*, *BMI Steps*, *Driver of BMI*, *Capacity to Innovate*, *Tendency to Innovate*, *Environmental Dynamism*, *Environmental Hostility, Profitability*, and *Sales Growth*. Meanwhile, to see the overall variables that will be used to generate initial items, please refer to the variables that were already described in chapter two.

3.3.2. Objective or Purpose of Measurement

After the concepts have been specified and the domains within them have been identified, next step is to state the objective for the measurement (Dimitrov, 2012; Waltz et al., 2010). This step is important as objective can provide a link between theories, which described in chapter two, with measurements that will be developed in this chapter (Waltz et al., 2010).

BMI measurements are intended to gather information regarding changes in the elements of the firm's business model. Furthermore, it will measure certain situation, whether it is internally or externally, that can potentially drive BMI. Looking deeper into the concept, BMI is a relatively new concept among other type of innovation, thus measuring the practice of conducting BMI can give insights. In addition, more specific steps in conducting BMI such as designing, implementing and its outcome would also be measured to provide more understanding of the process. Eventually, the result of the measurement can be analyzed whether it has some impact to innovativeness and business performance.

For innovativeness, based on the definition, the measurements should be able to measure the whether the firm has the capability and tendency of a firm to innovate. These two dimensions of innovativeness cannot be measured directly, thus it will be further specified using variables from operationalization process in chapter two. This research sees the turbulence in the environment can affect the relationship between BMI and business performance. Thus it is important for the environmental turbulence measurement to be able to measure whether the environment has dynamism and hostility. Environmental dynamism can be measured by looking at the changes in market and technology, while environmental hostility will be measured by looking at the competition intensity. Lastly, for business performance, the measurement should basically assess the profitability and sales growth of the firm.

Looking at the description of objectives for each concept above, it can be understood that the main purpose of this measurement instrument is to provide evaluation about the firm's situation. There is no target, standard or desired behavior that is expected from this evaluation. Instead, when sufficient data has been collected from representative samples, comparison can be made on the result of the evaluation to see the

relative position of one firm to the population. Hence, from the measurements that will be developed in this research can be categorized as norm-referenced measurements (Waltz et al., 2010).

The concepts described above, aside from business performance, are hard to be observed directly, thus it is hard to have objective evaluation. A subjective evaluation can be used by determining the respondent's perception towards the situation in the firm. Identifying the purpose of the measurement will be useful in the next step questionnaire development, which is making a questionnaire blueprint (Dimitrov, 2012; Waltz et al., 2010).

3.3.3. Questionnaire Blueprint

The next step in the instrument development process is to develop a measurement instrument criteria or also known as measurement instrument blueprint (A. E. Davis, 1996; Waltz et al., 2010). This blueprint can give the detail of the questionnaire that would be constructed in terms of content areas to be tested, the number of items or proportion of items for each content area, and the format of the items (A. E. Davis, 1996; Dimitrov, 2012; Waltz et al., 2010). It can give overview whether the measurements will only measure specific part of the concepts or it will measure broader part of the concepts (DeVellis, 1991). Finally this blueprint will served as a feedback to highlight the gaps that exist in existing measurement scales (summative scales).

The blueprint is commonly depicted as grid format with content areas or areas of interest described in the rows and construct domain or objectives described in columns (Dimitrov, 2012; Waltz et al., 2010). Areas of interests have been identified in section 3.3.1. while the objective of measurement instrument was formulated in section 3.3.2. The blueprint should state either the number of items or the proportion of items to the total items in each cell (a crossing between areas of interest and objective) (Waltz et al., 2010).

BMI part will have largest item proportion as it is the focus of this research and might need more initial items. The second largest proportion will be in innovativeness part due to the complexity of the concept. Environmental turbulence and business performance will have roughly similar lower proportion because they are a relatively known concept and can found in existing studies. Although the number or proportion of items has been defined in this blueprint, it is still possible to change it during the item construction (Waltz et al., 2010).

Next step is to determine the item format for the items. The selection of item formats should be done according to the objectives of the measurement (A. E. Davis, 1996; Dimitrov, 2012; Waltz et al., 2010). As previously formulated, the main objective of the measurements in this research is to evaluate the situation of the firm, more specifically on BMI process, level of innovativeness, environmental turbulence, and business performance.

The evaluation is involving an attitude or feeling about a certain situation in the firm. This situation can be reflected as statements and the respondents will give their agreement or disagreement to it. In order to measure respondent's attitude or judgment towards a statement, a rating scale such as *Likert scale* is commonly used (Bowling, 2009; A. E. Davis, 1996) because it is easy to administer and analyze (Bowling, 2009; Jaeschke, Singer, & Guyatt, 1990).

Binary or *dichotomous scale* is also commonly used because, together with rating scale, it reflects differences among respondents in their footing regarding the measured trait (Dimitrov, 2012). An open ended item can also be used in measuring quantities (Krosnick & Presser, 2010), such as measuring the number of innovation adoption, or a specific financial number. Hence, this research will try to use open-ended questions and closed-ended questions with dichotomous and Likert scale as the item format.

Likert scale is considered polytomous scale because it uses more than two response categories, typically 5 or 7 point categories (Jamieson, 2004). The more response categories that a scale has, the more information it can extract (Fowler Jr, 1995), but it might not always be true as the use of more than seven

point will reduce the clarity of the meaning (Krosnick & Presser, 2010). Hence, this research will use seven point for the Likert scale.

Furthemore, Likert scale is actually an ordinal scale, which can only be used in non-parametric statistics (Dimitrov, 2012; Waltz et al., 2010). A non-parametric statistics are considered less powerful than parametric statistics that use interval and ratio scale (Bowling, 2009). This is a disadvantage as the procedures that will be undertaken in instrument development, such as factor analysis, use the assumption of interval-level data (Norman, 2010). Even though Likert scale is an ordinal data, but it is common practice to treat it as an interval to achieve apply a parametric statistics, which is a more powerful statistical method (Bowling, 2009; Rattray & Jones, 2007). It was argued that the sums of many items in Likert scale will makes it interval (Norman, 2010). In a sense, Likert scale treated as Quasi-Interval scale, or a scale that looks like interval scale (Floyd & Widaman, 1995). More arguments on the use of parametric methods on data with ordinal scale (such as Likert) can be found on the study by Norman (2010).

Looking at the dichotomous scale, even though it is less advantageous than Likert scale in terms of the richness of information, it is still one of the most common measurement scale aside from Likert scale (Bowling, 2009; Floyd & Widaman, 1995). Dichotomous scale is a nominal scale, which typically scored 0 and 1, thus it should use non-parametric statistics (Bowling, 2009). This scale is very good in terms of clarity and respondents with extreme positive or negative attitude toward an issue can easily map their attitudes (Krosnick & Presser, 2010). In other words, it does not put a burden to the respondent, although reliability might be compromised for respondents with more fine-grained distinction feeling toward an issue.

The blueprint for the measurement instrument can be found on **table 1**.

Because this blueprint is being positioned as the research perspective (see research framework in chapter 1), it serves as the criteria for evaluating existing measurements in previous studies. Based on the specification, the blueprint gives indication on where to find the questionnaire items for each scale or the background literature of the items. Some of existing items were identified during literature meta-analysis step in chapter two, but these existing items may be modified to ensure clarity to this research's target respondents. The specification of the measurement instrument blueprint of the measurement instrument can be found on **Table C3 in Appendix C**.

Table 1 - Measurement Instrument's Blueprint

	Objective Evaluation	
Content/ Areas of Interest	**%**	**Item Format**
BMI		
Changes in BM Elements	25%	Likert
BMI Steps	20%	Likert, Dichotomous, Open
BMI Drivers	10%	Likert
Innovativeness		
Capacity to Innovate	10%	Likert, Open
Tendency to Innovate	10%	Likert
Environmental Turbulence		
Environmental Dynamism	10%	Likert
Environmental Hostility	5%	Likert
Business Performance		
Profitability	5%	Likert, Open
Sales Growth	5%	Likert
TOTAL	100%	

3.3.4. Initial item generation and questionnaire design

This step aims to generate questionnaire items that can capture the domain as specified in previous step. This step is essential, especially in exploratory research (Churchill Jr., 1979), such as this research that would like to find new measurements of BMI. The process of question and answer is known as a base for measurements (Fowler Jr, 1995). To be a good question item, it must produce answers that eventually be a reliable and valid measures of construct of interest. The answers to the question would be consistent (or reliable), and it can describe the construct correctly (valid). For a good measurement process, one of the most important characteristics of the question is that it should be consistently understood by every respondent (Fowler Jr, 1995).

This research was using deductive method in developing the scales. This method relies on the theoretical definitions as guidance to generate the items (Hinkin, 1998). Domain of interests can be adequately captured by this method which will ensure content adequacy in the final scales, although it can be very time consuming to get good understanding on the concepts (Hinkin, 1998). Nevertheless, to generate the initial items, researchers might not have to write it from scratch.

The first step of generating the items in this research was by finding reliable and valid items in existing literatures, by the means of literature meta-analysis in chapter two. This meta-analysis has found several studies which most of them are related to BMI and the rest of them are related to innovativeness and business performance. The relationship between related concepts were empirically tested in those studies, which was helping this research in providing the basis for the hypothesis. Furthermore, some of them included their original questionnaire items which can be adapted for this research.

Conventional wisdom on the questionnaire design

When items have been generated, they have to be presented to the respondents in a form of a questionnaire. The design of the questionnaire should follow best practice to minimize response error (Krosnick & Presser, 2010). Starting from the general design, a good questionnaire should follow a conventional wisdom such as using simple words, avoiding ambiguous words, and avoiding double-barreled questions (Krosnick & Presser, 2010). This conventional wisdom also suggests to group same items with the same topic, arranging the items from general to specific, and putting difficult or sensitive items at the end of the questionnaire. To ensure the design is good, a pretesting is recommended by this conventional wisdom.

Based on the domain specification, the measurement instrument blueprint, and conventional wisdom in designing questionnaire mentioned above, new items need to be developed for most of the scales. Each scale will have a minimum three items to have an adequate internal consistency reliability (Hinkin, 1998). A multi-item measures, are recommended because it can bring out the average of each item uniqueness and have higher reliability (Malhotra & Grover, 1998). This use of multiple scales to measure a single construct can also be said as a form of triangulation (Jick, 1979).

In the end the initial item pool generated **176 items**, either it was adapted from existing (and validated) scales or totally new, to be reviewed by experts. Although it seems a lot, typically, these initial items would be reduced by minimum of 50% in the final scales (Hinkin et al., 1997). The development of new scales were guided on the definition of the concepts (Zaichkowsky, 1985). A total of **153 new items** were developed, which accounted for 87% of the total items. They were developed because either the existing studies did not have the required items that represent the concept, being too vague, or it were too complex.

The list of initial items along with their codes can be found in **Table C4 in Appendix C**. To see whether these items were newly developed or were using existing measurements from previous studies, please refer to **Table C5** in **Appendix C**. Items with minor modification such as changing one or two words were still considered "existing" in this research. Meanwhile, major modification in the sentences such as adding explanations or making it shorter with the possibility of changed meanings were considered "new".

For example, this research saw the items from BMI scale in the study by Zott and Amit (2007), which has been cited by more than a hundred times (according to Scopus and Web of Science), as vague and too general. One of the items states "*Incentives offered to participants in transactions are novel*", which raises some questions regarding what it meant by "*incentives*" and who are the "*participants*". On the other hand. some existing items also have double-barreled question, which also not desirable (Hinkin, 1998). The example can be found in the CIS 2008-2010 questionnaire. In the part regarding process innovation, which this research take as a benchmark for BMI scale, it has an item that states " *New or significantly improved logistics, delivery or distribution methods for your inputs, goods or services*". It has a doubled-barreled aspect in the word "*new or significantly improved*" and also "*logistics, delivery or distribution methods*".

In a sense, the item from the second example can also be seen as a complex item because respondents must parse the questions into several parts (Martin, 2006). Reducing the complexity of the items is needed to ensure consistently understood items (Fowler Jr, 1995), because a poorly worded questions can cause measurement error (Dillman & Bowker, 2002; Malhotra & Grover, 1998). Therefore, these items from existing studies mostly only served as the basis for developing new items that are expected to have more clarity and relevance to the concept.

The danger of response bias

One thing that should be put into attention in designing questionnaire is the danger of *satisficing*. This is a behavior of respondents where they will settle for a satisfactory answer instead of choosing the most accurate answer (Krosnick & Presser, 2010). Satisficing can be affected by three things: *respondent motivation, task difficulty*, and *respondent ability*. Thus, the design of the questionnaire should be able to maximize motivation while at the same time minimizing task difficulty. Motivation can be improved when the questionnaire length can be kept short, while task difficulty can be reduced by making the questions as simple as possible. By looking at the total number of initial items, the initial questionnaire will be lengthy but it can be reduced after the pretesting and factor analysis step.

Another behavior from respondents that can cause bias in the survey result is *acquiescence*. It is a behavior of simply agreeing to the question regardless of the question being asked (Krosnick & Presser, 2010). From the respondent side, this behavior is more likely to occur when the respondents have less formal education, lower social status, or lower intelligence. From the design of the questionnaire, this behavior can occur due to the difficulty of the question or when the respondents are fatigued. This shows the importance of pre-testing, which to ensure the questionnaire is easy enough to be done by the respondents. Series of discussion and feedback iterations with the project members will also be done beforehand.

Further optimization of the questionnaire

Some aspect of the design of the questionnaire can be further optimized, especially from the type of question and measurement scales used (Krosnick & Presser, 2010). When the question is difficult, open-ended question can provide richness. When choosing a measurement scale, it is preferred to have more number of scale points, as it can provide more information. More scale points can also improve reliability and validity of the scale. Furthermore, these scale points should have a clear meaning to be reliable.

This clarity of meaning can be gradually compromised as the scale point increased, which seven-point scale was suggested as the cut-off point for the optimum number of scale point. Clarity of the scale can be further improved by using verbal label. Thus, the Likert scale that was defined in questionnaire blueprint will use seven points. It will also use the convention where high numbers represent favorable evaluation (Bowling, 2009; Waltz et al., 2010).

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3.4.Judges Review (Face Validation)

It is strongly recommended for new or changed scale items to be examined by panel of experts for its face validity (Hardesty & Bearden, 2004). The items in the initial item pool are mostly new items that are either totally newly created or modified based on existing scales, hence establishing face validity is crucial. This

step is crucial prior to construct validity assessment as it can remove conceptually inconsistent items (Hinkin et al., 1997).

Face validity by definition is "*the extent which an instrument looks like it measures what it is intended to measure*" (Nunnally, 1967). It can also be defined as "*the degree which respondents or users judge that the items of an assessment instrument are appropriate to the targeted construct and assessment objectives*" (Hardesty & Bearden, 2004; Nevo, 1985). It is part of content validity as it concerns with inspection and judgment of the instrument (Nunnally, 1967), therefore it is a necessary step but not sufficient on its own (Hardesty & Bearden, 2004).

The target respondents of the final measurement instrument will most likely be people with little or moderate academic knowledge in business model innovation field. Thus the clarity of the questions/items in the instrument is also important, aside from its relevancy to the concept. Thus, when assessing the face validity, a mixed type of judges will be used. When looking at previous studies, the number of judges used to judge the items can be varied, thus there is no clear guidelines on determining the number of judges (Hardesty & Bearden, 2004).

There are several group of judges that can do the face validity: people who are the target respondents, people who will use the result of the survey, and general public (Nevo, 1985). The factors to be considered in this research will be time and availability of judges. Hence, this research will try to use six judges to assess the initial item pool. This number will consists of mixed judges combining the three group of judges mentioned above.

There are various method of doing face validity. One method is by giving each item rating on the following scale: (1) clearly representative; (2) somewhat representative; (3) not representative (Zaichkowsky, 1985). Another method is by using 5-point-scale: "5" is *extremely suitable,* "4" is *very suitable*, "3" is *adequate*, "2" is *inadequate*, "1" is *unsuitable* (Nevo, 1985). As another alternative, a dichotomous scale (yes or no) can also be used in assessing the relevance and clarity of the items (Suhonen et al., 2000).

A priori decision rule can also be set to determine whether the items should be dropped or retained (Hardesty & Bearden, 2004), for example, 5 out of 6 judges must agree on the item in order to retain that item (Yoo & Chon, 2008). Hardesty and Bearden (2004) suggested the use of "sumscore" or "complete" decision rule. Later on the total score will be computed for each item. "Sumscore" rule will assign points to each element of the scale, for example, three points for completely representative, two points for somewhat representative and 1 point for not representative. Meanwhile in "complete" rule, only a completely representative will receive 1 point, and it may require 50% of the judges to judge the item as completely representative to retain the item. Although studies differed in the way they retain items, most of the research used 75% of judges agreement as the minimum for an item to be retained.

3.4.1. Face Validation First Stage

This research adapted the method from Suhonen and colleagues (2000) that used dichotomous scale in assessing clarity and relevance of the items. The difference is that this research will only provide two boxes for judges to tick on, if the items are not clear and/or not relevant, with additional space for comments regarding that particular item. Considering that BMI concept is a relatively new concept and innovativeness is a complex concept, the items are very prone to unclear meaning and relevance. Thus this research will apply a very strict rule in reviewing the item, where it only need one of the judges to tick on "not clear" and/or "not relevant" box, aside from comments.

In this first stage, six judges were chosen: four of them came from academic environment, meanwhile two of them came from practical environment. The summarized result of the judging on face validity can be found on **table C6 in Appendix C**. For details on which items marked "not clear" by the judges, it can be found on **Table C7 in Appendix C**. Meanwhile, for details on items marked "not relevant", it can be found on **Table C8 in Appendix C**.

Items that would be reviewed are items that was given a minimum one judgment of "not clear" or "not relevant". From **table C6 in Appendix C**, we can immediately see that there are 72 items (or 41% of the whole initial items) to be reviewed because two or more judges marked it as "not clear". Meanwhile seven items (or 4% of the whole initial items) were judged as irrelevant. To make the modification or deletion of the items, it must refer to the comments provided by the judges on the items as can be found on **Table C9 on Appendix C**. The summary of the item-specific feedbacks can be found on **table C10 in Appendix C**.

By looking at the item-specific feedbacks in **table C10 in Appendix C**, the clarity of some of the items are the most pressing problem to be attended. The items might be too general, vague, and provide ambiguous meaning. The second problem is still related to the first problem, which due to the items being too general, some items seem overlapping with each other. Third problem is the difficulty of the items which is related to the terms or words used. Some of the items used words that are "too academic" and might less common to SMEs in their daily operation.

Interjudge reliability was investigated using *Fleiss's Kappa* method (Fleiss, 1971). This method is an adaptation of *Cohen Kappa*, and made to investigate the agreement among multiple raters (which more than what Cohen Kappa can handle) and when the data have nominal scale such as binary. From the formula listed on **Table C11 in Appendix C**, the overall agreement were calculated, which yielded the *K* value of 0.18. A study (Landis & Koch, 1977) tried to make an arbitrary classification of *K* value, and the range of *K* value of 0.00 to 0.20 means that a *slight agreement* has been achieved among the judges. In nomical scale, interjudge reliability has the same meaning with interjudge agreement (Tinsley & Weiss, 1975).This result allows this research to take the feedbacks into account.

Some general feedback on the overall design of the questionnaire were also captured. This general feedback are either captured on the last page of the questionnaire face validation form ,or was written in email. Aside from the six selected judges, the general feedback was also received from other voluntary judges. The general feedback on the questionnaire design can be seen on **Table C12 in Appendix C.**

To make use of this general feedback, each feedback is categorized based on similarities of context. The summary can be seen on **table C13 in Appendix C.** Questionnaire length is the aspect that most judges were concerned about. It might be the result of the initial generation of items where this research are still in the exploring stage of items. Some of the judges were also emphasizing on the content, arguing that some additional items might be needed and were not covered in this initial items.

The measured indicators or variables are also still need to be further motivated from concept operationalization process. The problems with lack of content and operationalization was also reflected in the item-specific feedbacks, which mentioned the items being too general.These feedbacks were being followed up by modifying or deleting items that were evaluated as "not clear" by at least one judge.

The questionnaire was then modified or deleted based on the item-specific feedbacks and general comments provided by the judges. The list of items that were modified and deleted can be seen in **table C14 in Appendix C**. In addition, two items were also created to fill some gaps in previous initial item pool, namely code INN042 and GEN017. To see the detail of the items, please refer to **Table C22 in Appendix C.**

Aside from questionnaire length, one of the highlights of the first validation result is the difficult terms used in the measurements. Several terms such as "capabilities", "resources", "business model" and "business model ontology" were judged to be too difficult for SMEs, and it need to be replaced by simpler terms. After reviewing some additional literatures, the term "capabilities" can be further specified into two aspects that constitute a capability of a firm: "process" and "resources" (Christensen & Kaufman, 2006; Osterwalder, 2004). These two aspects already have their own scales, thus "internal capabilities" scale can be deleted.

The term "resources" itself was also judged as difficult, thus it was further specified into the elements that constitutes a resources. Johnson and colleagues (2008), in their definition of resources, mentioned several elements, which are people, technology, products, equipment, information, channels, partnerships, alliances, and brand reputation. Although these elements can be used, but it might be too specific and will create many items. Thus, this research aims to categorized those specific resources based on categorization by Barney (1991): physical capital resources, human capital resources, and organization capital resources.

In the end, there were 13 items deleted, 66 items modified, and 2 items newly created. The result is 165 items that can be used for further evaluation in the second stage of face validation step.

3.4.2. Face Validation Second Stage

In the new item pool, there are two newly created items, one is "*external partners*" (code INN042) in collaboration effort scale (part 2 of the questionnaire), and "*What is your enterprise's primary business sector?*" (code GEN017) in the business sector scale (part 5 of the questionnaire). Thus taking the thirteen deleted items into account, it means the new item pool has deleted eleven items, making it reduced by eleven items to 165 items in total.

The modification and deletion result was then evaluated by another person that are working in an SME and he often gives management training to other SMEs. Unfortunately, due to time available for this research, he was the only judge that gave evaluation for this stage. This research will refer this stage as the second stage of Face Validation.

From this stage, there are 33 items that were judged as "not clear" (20% from the total 165 items) and five items were judged as "not relevant" (3% from the total 165 items). For details on the items judged as "not clear" and "not relevant" in this stage, please refer to **Table C15 and Table C16** in **Appendix C**. The summary of the item-specific feedback for the second stage of face validation can be seen on **table C17 in Appendix C,** while the detail can be found on **Table C18 in Appendix C**. Furthermore, general feedback on the questionnaire can be seen on **Table C19 in Appendix C.**

The questionnaire was then modified or deleted based on the item-specific feedbacks and general comments provided by the judges. The list of items that were modified and deleted can be seen in **table C20 in Appendix C**. In addition, one item were also created to fill some gaps in the result produced by first stage of face validation, namely code INN043. To see the detail of the items, please refer to **Table C22 in Appendix C.** In the end, there were 8 items deleted, 38 items modified, and 1 item newly created in this second stage. The result is 158 items that can be used for further evaluation.

The final item pool can be found on to **Table C22 in Appendix C** while the final version of the questionnaire can be found on **Table C23 in Appendix C**. In the end, the second phase of the procedure (measurement instrument pre-testing) cannot be conducted due to time limitation. Nevertheless, the detailed procedure will be described in chapter 5, after discussing the result of the face validation in chapter 4.

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4 Discussion

The deliverable of this research will be discussed in this chapter. First, the result of two stage face validation will be compared and discussed to see the impact to the final deliverable. Second, the result of this research will be compared to other existing measurements in other studies. Lastly, this chapter will also discuss the deliverable from validity point of view, whether it has already fulfilled validity requirements and what has been done to address validity problem.

4.1. Face Validity Analysis

Almost half of the items (41%) were subject to be reviewed as it were judged as "not clear" by at least one judge in the first face validation stage. This judgment by multiple judges was evaluated for its reliability using Fleiss Kappa method, and it was found that all of the judges have slight agreement. Based on this reliability result, we can take the feedbacks into account. Item clarity, overlapping items, and items difficulty are the top three feedback given by the judges.

Meanwhile, the second face validation stage produced lower judgment on unclear items (33 items out of 156 revised items, or 20% compared to total) and also on irrelevant items (five items out of 156 revised items, or 3% compared total). At a glance, the decrease in occurrences of the two criteria shows improvement in the questionnaire clarity and relevancy.

Next, this research will investigate the detail of the changes or improvement made based on the comparison between first and second stage of face validation. The full list of the effect of changes can be seen on **Table C21 in Appendix C** and the summary of the result can be seen in **table 2** below.

Table 2 - The comparison result between the first and second face validation stage

Action Taken on item after 1st Face Validation	Improved		Need Further Checking		New Issue	
	"Not Clear" Items	"Not Relevant" Items	"Not Clear" Items	"Not Relevant" Items	"Not Clear" Items	"Not Relevant" Items
deleted	9	1	0	0	0	0
modified	30	6	13	0	6	1
no action	16	0	4	0	10	4
TOTAL	**55**	**7**	**17**	**0**	**16**	**5**

Table 12 shows the result from the action taken on items (whether they are deleted, modified, or being left untouched) on the items that received judgment in first stage of face validation and compared to the judgment in the second stage of face validation (whether they are being judged as "not clear" or "not relevant"). The result can be "improved", "need further checking", and some "new issues" might occur.

The status of "improved" was attached to items that received judgment in first stage of face validation, but it did not in second stage of face validation. The status of "need further checking" was attached to items that received judgment in both stage of face validation. Meanwhile, "new issue" may arise in items that did not have issue in the first stage of face validation, but they received judgment in the second stage of face validation. Most of the items showed improvement in second stage face validation, but there are items that still need further checking. In addition, new issues arise for some items based on second stage face

validation. This research will not analyze all of the result, but only on the results that are intriguing, which is the "need further checking items".

4.1.1. Modified items that "Need Further Checking"

This research is interested in items which were modified but there were no changes in their "not clear" judgment (labeled "need further checking"). The second face validation stage still gave them a "not clear" status. This shows the items that are really hard to comprehend by the judges, and will most-likely by the actual respondents as well. The list of items in this criteria can be found on **table D1 in Appendix**.

Most of the problem in **table D1 in Appendix D** is about the vagueness and clarity of the item. This problem might be relevant to the opinion of Hinkin (1998) and Martin (2006) that thinks scale development is involving art, aside from science. It involves a creative thinking on how to develop a sound measures that can be clearly understood by respondents through combination of words.

Even though the concept and domain has been specified accordingly by following the procedure by Churchill (1979), finding the right word in the questions yield another difficult task. According to Martin (2006), respondents are sensitive to the use of different words and syntax. This forced the developer of the measurements to try to see from other perspectives, most-likely from the perspective of the respondents.

Furthermore, BMI items are the dominant items in **Table D1 in Appendix D**, which shows that BMI is indeed a new concept that might still not common to most people. Additional face validation might be helpful for evaluating these items in future research. A simpler, more common terms might be needed to improve the BMI item's clarity.

4.1.2. Remark on the use of dichotomous / binary measurement scale

Another important remark from the face validation stage is the use of measurement scale as the item format. Previously, although most of the items are using Likert scale, some items have a dichotomous scale (Yes or No). One judge specifically gave input in this matter, which he suggested to replace the dichotomous scale with Likert scale. He argued that is mainly because the Likert scale has more rating range than a dichotomous scale, which will be more beneficial for statistical analysis.

This was supported by study by Nunnally and Bernstein (1994) which argued that Likert scale can reflect more differences on the attribute (Nunnally & Bernstein, 1994). Furthermore, Hinkin and colleagues (1997) and Krosnick and Presser (2010) described that reliability and validity of the scales can be improved if the items are using scales with more than three points.

To support this argument, some benchmark from existing studies can be done. If we look at the selected studies in the meta-analysis step, all of them were using Likert scale, varying from five to seven point scale. Furthermore as an additional benchmark, this research look into other studies that also aimed to develop new measurements. These studies are from Suhonen and colleagues (2000), Salisbury and colleagues (2002), and Yoo & Chon (2008), which were also used as a benchmark for this research's procedure. All of these studies were using Likert scale on their items, either five-point scale or seven-point scale.

Meanwhile, looking at the references used for developing the scales, the use of dichotomous item was found in CIS 2008-2010 questionnaire. Thus based on theoretical arguments and benchmark from similar studies, the judge's input is valid and the dichotomous scaled items can be changed into Likert scale.

4.2.Measurements for Business Performance Concept

Unlike the concept of business model innovation (BMI), the concept of business performance has been relatively well known, thus existing measurements were also available. This research mainly used two

variables: *sales growth* and *profit*. Both variables are realized performance of the firm, different from market value which is an expected performance of a firm.

The use of realized performance is preferred in this research due to the nature of the scope of research. This research's scope, which is also aligned with Envision project's, is limited to SMEs. As argued in chapter two, most of the SMEs (97%) are internally funded. Due to this reason, profitability become the most important indicator, as it can fuel the growth of the firm. They have different indicator from externally funded SMEs, which put emphasis on market value. The reason is the involvement of venture capitalists that are looking to sell the firm as exit strategy.

Next, we shall compare this research's business performance variables with the business performance variables used in existing studies that were selected in this research's meta analysis. The list of variables in the selected studies can be found in **table D2 in Appendix D**.

Looking at **table 19**, there are several main points that are interesting to be discussed. First, eight out of twelve studies (or 67% of the total) have a scope of large firms or mixed between large firms and SMEs. It shows that there are still lack of quantitative empirical studies which specifically investigate the relation between BMI and business performance in SMEs. Moreover, even though they have existing measurements that have been tested for its reliability and validity, not all of them can be applied in SMEs. As previously discussed, the objective of most SMEs might be different than large firms, thus it determines the indicators that are important for them.

Secondly, looking at the variables in **table D2 in Appendix D**, either sales growth or profitability were used in nine out of twelve studies (or 75% of the total). This shows that most of the existing studies also recognized both variables as important indicator of business performance. Hence, the use of both variables in this research can be justified.

Furthermore, the business performance part is also measuring the importance of various business performance indicators. This is related to the research by Molina-Castillo and Munuera-Alemán (2009) which argued the different firms will have different business performances that they consider important. Thus, this measurements can give additional insights to the Envision project.

Next point is regarding the type of questions used for the measurements. This research adapted closed-ended question from Aspara and colleagues (2010) for measuring sales growth and profitability. This was meant to prevent recall error that can be caused by asking a specific number of sales growth and profits, which the respondents might have to look at their financial records to be able to answer it. Only one open-ended question was used as a measure, which ask about the percentage of the net profit margin (profitability).

In summary, this research disagree with the use of market value as business performance indicator in the study by Zott & Amit (2007,2008) due to the nature of profitability orientation most SMEs. Hence, this research is have higher level of agreement with the study of Brannback and colleagues (2014), which emphasizes profitability as the main indicator for business performance in SMEs.

4.3.Measurements for Innovativeness

This research mainly used two dimensions of innovativeness to construct the measurements: capacity to innovate and tendency to innovate. From the capacity to innovate dimension, four scales were used, which are the *number of innovation adoption, time of innovation adoption*, *consistency of innovation adoption,* and *degree of newness of product/service*. Meanwhile from tendency to innovate dimension, nine scales were used, which are *customer orientation, competitor orientation*, *commitment to learning, shared vision, open-mindedness, entrepreneurial orientation, collaboration effort, strategic emphasis on orientation, and degree of product/service newness*.

Next, we shall compare this research's innovativeness variables with the innovativeness variables used in existing studies that were selected in this research's meta analysis. The list of variables in the selected studies can be found in **table D3 in Appendix D**.

Looking at **table D3 in Appendix D**, there are several points that can be discussed in this section. **First**, the *tendency to innovate* dimension was explicitly used as a scale (which consists of five items) in the study by Hult and colleagues (2004). It is different from the positioning of *tendency to innovate* in this research. *Tendency to innovate* was positioned as one of the dimension of innovativeness due to various definitions of innovativeness. Thus as a dimension, tendency to innovate was further specified into several scales. The scales are related to the antecedent of innovativeness in the study of Hult and colleagues (2004), which are *learning orientation, market orientation*, and *entrepreneurial orientation*. This research positioned those antecedent as an inseparable part of the tendency to innovate dimension of innovativeness in this research, thus constructed them into scales of innovativeness.

Secondly, the other dimension of innovativeness, which is *the capacity/capability to innovate*, was not used explicitly in the selected studies. Instead, they used the variables that are the element of capacity to innovate in this research. The *number of innovation adopted, timing of innovation adoption,* and *consistency of the timing of innovation adoption* variables in this research was adapted directly from Subramanian and Nilakanta (1996). Meanwhile most of other studies used the other variable of capacity to innovate in this research, which is *degree of newness of product/service*.

This *degree of newness of product/service* variable still need to be investigated for its relevancy in measuring firm's innovativeness. The reason is because, as argued by Garcia and Calantone (2002), a highly innovative product does not mean that the firm can also be automatically considered a highly innovative firms. Firms can just duplicate or imitate existing product, but they adopt it relatively early and improve if further.

In short, this research extended the commonly used *tendency to innovate* scales in previous studies with the addition of *capacity to innovate* dimension of innovativeness.

4.4.Measurements for Environmental Turbulence

Environmental turbulence concept was used in several innovation studies but not specifically in BMI. Hence, due to the lack of quantitative empirical studies in BMI, the use of environmental turbulence was also rare. As a result, it was not covered in the selected quantitative empirical studies in the meta analysis. What this research did was to look for studies which included environmental turbulence (or dimensions of it) as a reference. The list of the studies can be found on **table D4 in Appendix D.**

The environmental turbulence variables used in the studies listed on **table D4 in Appendix D** were typically used for investigating its effects toward the outcome of product and technological innovation. None of them were specifically used to investigate their moderating effect towards the relationship between BMI and business performance.

This research argued that business model innovation still shares the same attribute and determinant of other innovations, thus several variables from the studies in **table D4 in Appendix D** were used as the measurement for environmental turbulence in this research. The variables used are *Market Turbulence, Technology Turbulence,* and *Competitive Intensity*. According to Zahra & Bogner (2000), *Market Turbulence* and *Technology Turbulence* can represent Environmental Dynamism, while *Competitive Intensity* can represents into Environmental Hostility.

Taking a look at **table D4 in Appendix D** again, it can be said that the these variables have adequately represented the result from existing studies. It was further confirmed by less rejection/debate given by judges during face validation process, compared to other scales. In other words, this research agrees with the variables from previous research.

4.5.Measurements for Business Model Innovation (BMI)

Developing measurements for BMI is the main focus of this research as it is a relatively new concept in the area of innovation. After going through two steps face validation process, this research suggested several variables as can be seen in **table 3** below.

Table 3 - Suggested BMI variables

BMI Dimension	BMI Variable
BM element change - *Novel Value Proposition*	New Product/Service
	New Target Customer
BM element change - *Novel Business System*	New Value Network
	New Resources
	New Processes
BM element change - *Novel Value Capture*	New Value Delivery
	New Revenue Model
	New Cost Structure
BMI steps - *BMI Design*	Use of BM Ontology
	Use of BM Tooling
BMI steps - *BMI Implementation*	General Process
	Use of Operating Model
	Use of Enterprise Architecture
BMI steps - *BMI Outcome*	BMI Radicalness
	BMI Disruptiveness
	BM Originality
BMI Driver	Internal BMI Driver
	External BMI Driver

Next, we shall compare this research's BMI variables with the BMI variables used in existing studies that were selected in the meta analysis. The list of variables in the selected studies can be found in **table D5 in Appendix D**.

The high degree of variability of the variables used in the selected existing studies is the first thing that can be noticed by looking at **table D5 in Appendix D**. There can be two explanations for this high variability. First, as previously mentioned, BMI is a new concept in the area of innovation, thus reliable and valid measurements have not yet been developed or widely used. Thus there is no "common language" in the way research or firms measures BMI.

Second explanation is still related to this BMI concept "newness". Because BMI is relatively new, it would be beneficial to explore as many variable option as possible to be further analyzed and filtered. Thus, this research selected studies that were not only explicitly mentioned BMI as the variable (Abd Aziz & Mahmood, 2011; Aspara et al., 2010; Cheng et al., 2014; Cucculelli & Bettinelli, 2015; Hartmann et al., 2013; H.-C. Huang et al., 2012; Velu, 2015; Zott & Amit, 2007, 2008) but also studies that used other variables which are similar or may represent BMI (Clausen & Rasmussen, 2012; Kim & Min, 2015; Su et al., 2009). Even though BMI has various variables, to some extent, most of them are covered in this research's suggested variables.

If we take a look at the variables used in the selected studies, it can be identified that most of previous studies operationalized BMI as the changes in the business model elements. The *BM element changes* was also the initial BMI dimension operationalized for this research. The use of this dimension is aligned with the BMI definition from Barjak and colleagues (2014) which highlights the changes in three components of business model (and was previously defined in chapter 2). This was also supported by the definitions of BMI from other studies (Demil & Lecocq, 2010; Hartmann et al., 2013; Heikkilä et al., 2010; Lindgardt et al., 2009; Mitchell & Coles, 2003). For the detail of the definitions, please refer to **table A3 in Appendix A**

This dimension was then extended by adding *BMI steps* (design, implementation, outcome) and *BMI drivers* dimension in this research. These additional dimensions were part of Envision project requirement and can potentially give additional insights in measuring BMI. The downside is on the questionnaire length, which is longer than existing BMI questionnaire. This might increase respondent's fatigue in completing the questionnaire and increase the risk of *satisficing* and *acquiescence* behavior.

4.6.Threats to measurement's validity

Showing validity of the measurements requires evidence (Downing, 2003). This research has done face validation on the measurements, but it is not enough. Face validity only assesses the validity on the superficial level (or on the appearances) and it is not a sufficient evidence of validity (Downing & Haladyna, 2004). As this research has not yet completed the validation process for the new measurements, the measurement's validity is still exposed to threats.

According to Messick (1989), as cited in Downing and Haladyna (2004), there are two major threats to assessment validity: *Construct under-representation (CU)* and *Construct irrelevant-variances (CIV).* CU is related to undersampling of the content domain of the measurement instrument, while CIV is related to systematic errors (Downing & Haladyna, 2004). CU can be caused by using too few items in representing the domain and also having low scores in the reliability of these items. CIV can be caused by making the items too easy or too difficult. This research has aims to use multiple items to assess a single construct, which is important in addressing CU. Furthermore, the iterative feedback given by Envision project members and also experts evaluation in face validation should have also provided the initial foundation to address CIV.

CIV can also be caused by systematic inter-rater error (Downing, 2005). Rater's variance is the threat to rating scales validity (Downing, 2005), which is used in this research as Likert scale. This research were using six judges in the first stage of face validation, which have already assessed for its inter-rater reliability using Fleiss Kappa method, and it yielded a slight agreement on the evaluation. Meanwhile, due to time limitation, second stage face validation only used a single judge, which may not be reliable enough because there is no other judge as comparison. The result on the two stage face validation shows that the measurements are still exposed to threat to validity. A high agreement among raters are needed to support the validity but inter-rater reliability is not sufficient on its own (Downing, 2005).

The effort to address CU & CIV and the slight agreement on the inter-rater reliability are not enough to show the validity of the measurements. The most obvious reason is because this research has not yet conducted *construct validity* assessment. Although there are other types of validity (Calder et al., 1982), construct validity is now considered as the sole type of validity because all assessment deal with constructs (Downing, 2003). Hence, maximizing construct validity is one way of overcoming threats in self-reported data such as questionnaire (Mickalide, 1997).

Bagozzi's Six Criteria of Construct Validity

To check whether the effort of maximizing construct validity has been done, Bagozzi's six criteria of construct validity can be used: *Theoretical Meaningful of Concepts, Observational Meaningful of Concepts, Internal Consistency of Operationalization, Convergent Validity, Discriminant Validity, Nomological Validity* (Papoutsakis, 2008). There are also other construct validity criteria suggested by different authors but the

criteria by Bagozzi is more similar to the measurement instrument procedure by Churchill (1979), which this research adopted.

The first criteria refers to the language and sentences used to represent a theoretical construct (Papoutsakis, 2008). This research used a deductive method by using theoretical definitions in generating the items, hence the first criteria is fulfilled. The second criteria refers to the relationship between theoretical construct and the operationalization result (Papoutsakis, 2008). This research have conducted extensive literature review and meta-analysis to seek measurements that have been validated in terms of operationalization. These measurements were the basis of the initial items in this research, thus it can be said that the second criteria has already been fulfilled.

The third criteria is related to the internal consistency of measurements, which suggested the use of multi-item measurements for each construct. This research already used a minimum of three items per scale on each concept, thus it should have followed the third criteria, although the Cronbach Alpha reliability value has not yet been assessed.

The fourth, fifth, and sixth criteria is related to the use of more than one theoretical constructs (Papoutsakis, 2008). This research used four different constructs (BMI, innovativeness, business performance, and environmental turbulence), which should be sufficient to indicate whether the measurements are measuring the same concept (fourth criteria), measuring different concepts (fifth criteria), and each of them are connected in a nomological network (sixth criteria). Factor analysis and SEM technique should be used to test these last three criteria.

Other validity threats

Next, validity threats can also come from other type of validity mentioned by Cook and Campbell (1979), cited by Calder and colleagues (1982): *statistical conclusion validity, internal validity*, and *external validity*.

Statistical conclusion validity (SCV) is closely related to the statistical procedures and assumptions used to analyze the data (Shadish, Cook, & Campbell, 2002). This type of validity is related to Type-I error (incorrect rejection of a true null hypothesis) and Type-II error (failure to reject a false null hypothesis) (García-Pérez, 2012). Thus, one of the threats to SCV is when statistical tests used do not match with research design, (García-Pérez, 2012).

This research has not done any statistical procedures yet as data has not yet been collected, but it will be used in future research, especially factor analysis. This statistical method is a proper method for new measurement development which has exploratory nature. Exploratory factor analysis (EFA) can help in identifying latent constructs and removing "bad items", while confirmatory factor analysis (CFA) can help in confirming the "goodness of fit" and the relationship between concepts (Kline, 2013).

The most important aspect in the research design that should be taken into consideration is sample size, thus future research should follow a recommended sample size in previous studies (Hinkin, 1998; Kline, 2013; Tabachnick & Fidell, 2007). Previous studies in measurement development also used these statistical tests (Churchill Jr., 1979; Rattray & Jones, 2007; Salisbury, Chin, Gopal, & Newsted, 2002; Suhonen et al., 2000), hence showing that future research will have statistical conclusion validity when using factor analysis as the statistical method.

Internal validity has several meaning in different studies. In some studies, it was being related to causal relationship between constructs (Altmann, 1974; Calder et al., 1982; Campbell & Stanley, 1967; Malhotra & Grover, 1998; Roe & Just, 2009; Shadish et al., 2002), while in other studies it was being related to reliability (internal consistency) or test of unidimensionality (Krippendorff, 1980; Olsen, Jensen, Noerholm, Martiny, & Bech, 2003). This research tends to agree with the first definition as finding relationship between construct is one of the focus of this research.

Threat to internal validity can come from several aspects (Campbell & Stanley, 1967) but it is mainly related on the sampling design decision (Altmann, 1974; Malhotra & Grover, 1998). This research has not done

any sampling, but in future research, control could be added to prevent the emergence of additional hypothesis (Altmann, 1974). Homogenizing samples could also be done to increase internal validity (Malhotra & Grover, 1998), with the risk of losing external validity (Altmann, 1974).

The extensive literature review and meta-analysis done in this research may increase internal validity, as it can accurately included variables that may have causal effects. Furthermore, control variables were also introduced, which is deemed important in survey research (Ihantola & Kihn, 2011). In future research, structural equation modeling (SEM) technique can be used to assess this internal validity.

External validity is related to internal validity as the increase in one may resulted in the decrease of the other one (Altmann, 1974; Campbell & Stanley, 1967). There are three sources of threat to external validity (Ihantola & Kihn, 2011): *population validity*, *time validity*, and *environmental validity*. This research only aims to measure BMI implication in SMEs, but not larger firms, thus having a problem in population validity. The future application of this research would be used annually, which may address time validity. Lastly, the measurement instrument was specifically designed for SMEs in European region, which might have different environmental settings than other regions in the world, hence, it will not achieve environmental validity.

This research do not see generalizabilty of the result as the primary focus. Instead, a research that aims to develop a measurement instrument is typically more interested in putting construct validity as the primary focus, which can be achieved without achieving external validity (Calder et al., 1982). Furthermore, while internal validity is deemed the minimum validity, external validity is considered a nice addition if it is applicable (Calder et al., 1982; Campbell & Stanley, 1967). In short, this research was focusing more on internal and construct validity, which made the research exposed to the threat to external validity.

5 Future Validation Plan

5.1.Shortening the questionnaire after Face Validation

First, from the general feedback given by the judges during two stage face validation in **Table C12** and **Table C19** in **Appendix C**, it has been identified that *questionnaire length* is one of the most problematic issue. The questionnaire has more than 100 items and more than 10 pages long, which can be cumbersome for the respondents to fill it. Given the current length, the questionnaire will be exposed to the danger of satisficing and acquiescence behavior from respondents (Krosnick & Presser, 2010). Hence, reducing the items and making the questionnaire shorter is a must to minimize these response bias (Hinkin, 1998).

To reduce the items, it can be done in two steps. The first step is reducing the items based on the face validation result and revisiting the literature, and the second is by using exploratory factor analysis (EFA). The first step can potentially be faster because this research has already possessed the feedbacks on each items, thus can make selection on which items to be deleted. The second step requires a data collection step first before it can be conducted.

Now we shall take a look how the questionnaire was shorten based on the face validation result. From the first face validation, 13 items were deleted because they were not clear enough or not relevant, while at the same time added two new items. Meanwhile the second face validation deleted eight items and added one new item. In total, the questionnaire was reduced by 18 items from the two stage face validation result.

To have a more significant reduction, this research could do it based on the framing provided by the literature. BMI concept has the most items as it is the focus of this exploratory research, thus it can be the main target for reduction. What this research could do is by reducing the number of scale, thus reducing the number of item. BMI part was divided into several subpart in the questionnaire: BM changes, BM steps, and BM drivers. This research could potentially make reduction from BM changes and BM steps subpart as they contain the most items compared to BM drivers.

In BM changes subpart, this research used the elements of BMI from Barjak and colleagues (2014) at the early stage of BMI scale development: *novel value proposition*, *novel business system*, and *novel value capture*. This research was then specifying and expanding each elements with other components of business model mentioned by other researchers to provide more understanding. Thus after the more specific items have been generated, this research could group them back to the elements mentioned by Barjak and colleagues (2014).

Table 4 shows how the current scales could be grouped into larger scales based on Barjak and colleagues (2014). The number of items in each of the new scales should not be less than three to have internal consistency reliability (Hinkin, 1998). The new scales should have at least one item from the previous scales.

Table 4 - Suggested reduction on BMI changes sub-part scales

Current Scales	Number of Items	New Scales *(Barjak and colleagues (2014) Scales)*	Hypothetical number of items	Potential Item Reduction
New Product/Service	4	New Value Proposition	3	5
New Target Customer	4			
New Value Network	3	New Business System	5	7

Current Scales	Number of Items	New Scales *(Barjak and colleagues (2014) Scales)*	Hypothetical number of items	Potential Item Reduction
New Resources	3			
New Processes	3			
New Value Delivery	3			
New Revenue Model	3	New Value Capture	3	3
New Cost Structure	3			
Total	**26**		**11**	**15**

This step however might suffer from internal consistency reliability if the selection and grouping of the items was not based on good judgment. Thus, this step would need input from experts among the Envision project members to determine which items are relevant to be put into the new scales.

Other subpart of BMI, which is BMI steps also has many items, thus it can be potentially reduced also. BM tooling scale has most of the items in this subpart because it asks different types of BM tooling to the respondents in terms of familiarity, frequency of use, and also their preferences. This research would keep these items as it may offer useful insights on this less common concept. This subpart came from the requirement of the Envision project, thus it would be better to consult with the member of the project when making reduction and grouping the items. **Table 5** shows the potential reduction in BM steps scales.

Table 5 - Suggested reduction on BM Steps sub-part scales

Current Scales	Number of Items	New Scales (BM Steps)	Hypothetical number of items	Potential Item Reduction
Use of BM Ontology	1	BM Design	14	0
Use of BM Tooling	13			
General Process	5	BM Implementation	5	15
Use of Operating Model	3			
Use of Enterprise Architecture	9			
BMI Radicalness	3	BM Outcome	4	2
BMI Disruptiveness	3			
BM Originality	3			
Total	**40**		**23**	**17**

The same way can also be applied to the scales in Innovativeness part of the questionnaire. This part also has most of the items, second to BMI part, due to its complexity. The scales can be grouped into the two dimensions of innovativeness (which is capacity to innovate and tendency to innovate), making it into only two scales. Furthermore, the *degree of product/service newness scale* can also be deleted as it might not guarantee firm's innovativeness (Garcia & Calantone, 2002). **Table 6** shows the potential number of items that can be reduced by this grouping. The same with previous step, the changes in innovativeness scale should ask the judgment of experts to ensure internal consistency reliability.

Table 6 - Suggested reduction on Innovativeness scales

Current Scales	Number of Items	New Scales *(Innovativeness Dimensions)*	Hypothetical number of items	Potential Item Reduction
Number of innovation adoption	4	Capacity to Innovate	4	9
Time of innovation adoption	3			
Consistency of innovation adoption	3			
Degree of product/service newness	3			
Customer Orientation	3	Tendency to Innovate	9	16
Competitor Orientation	3			
Commitmment to Learning	3			
Shared Vision	3			
Open-Mindedness	3			
Entrepreneurial Orientation	3			
External Collaboration	4			
Strategic Emphasis on Innovation	3			
TOTAL	**38**		**13**	**25**

From both steps described above, it can potentially shorten the questionnaire by 57 items in total. That is a 36% reduction (from the total 165 items to 108 items), which will be useful in reducing the respondent's fatigue, thus minimizing satisficing and acquiescence behavior.

The next step would be to further refine and reduce these measurements by the means of exploratory factor analysis (EFA) and confirmatory factor analysis(CFA) (Floyd & Widaman, 1995) . The result of factor analysis can also be used to check the reliability (Tabachnick & Fidell, 2007) and construct validity (Dimitrov, 2012; Gerbing & Anderson, 1988) of the measurements. To conduct factor analysis, data needs to be collected beforehand. The sample size would be the crucial factor as factor analysis, especially CFA, is a large sample technique (Hinkin, 1998; Kline, 2013; Tabachnick & Fidell, 2007).

The details and overview of data collection procedure, factor analysis, reliability assessment, construct validity assessment, and norm development will be discussed in subsequent sections.

5.2.Data Collection / Pre-testing

After preliminary measurement instrument items have been validated by panel of judges, the research goes into the second phase. The first step of the second phase is pre-testing the measurement instrument by collecting data from small samples. This step will be followed up by, data purification/reduction and data finalization in subsequent steps.

5.2.1. The purpose of data collection / pre-testing

The items that were retained after Face Validation step will be pre-tested to a set of respondents, with self-administered method using questionnaire. Pre-test can help in evaluating the reliability and clarity of the items (Suhonen et al., 2000; Waltz et al., 2010). This is done by means of item analysis (Rattray & Jones, 2007), which the main objective is to retain or delete the some of the initial items using exploratory factor analysis (EFA). Having a reasonable questionnaire length is important to prevent response bias because of boredom and fatigue (Del Greco & Walop, 1987; Hinkin, 1998). In addition, after the items have been reduced, the structure and relationship between latent variables can be determined through confirmatory factor analysis (CFA). Respondents can also comments on the item format and also the design of the questionnaire (Suhonen et al., 2000).

The data collected from this step will be processed and analyzed statistically using factor analysis. One of the strict requirement, especially for confirmatory factor analysis is the sample size, which should have more than 100 samples (Rattray & Jones, 2007) or following the rule of thumb of 10:1, one item should have ten respondents (Hinkin, 1998; Kline, 2013). Due to the time limitation of this research, the sample size might be smaller than the recommended, thus it might not be feasible to do the factor analysis, or it will be done with limitations.

5.2.2. Survey Protocol

As previously mentioned, the purpose of this pretesting is to evaluate the reliability of the questionnaire and item reduction / purification by the means of factor analysis. The fulfillment of this purpose can be shown by the use of Likert scales as the item measurement scale selected for most of the items. Most of the items are using 7-point-Likert scale, seeking agreement/disagreement about a statement, and only a few of them are using open-ended question. Likert-scaled items can provide better reliability than dichotomous-scaled-items (Krosnick & Presser, 2010) and it is one of the most suitable scales for factor analysis (Hinkin, 1998).

Based on the result of face validation, the measurement instrument has 31 variables, which were constructed into multi-item scales. The scales are divided into four major parts which represent the concepts measured in this research. First part consists of18 scales aimed to measure BMI, second part consists of eight scales aimed to measure innovativeness, third part consists of three scales which were intended to measure environmental turbulence, and fourth part consists of two main scales which were intended to measure business performance.

There is an additional part before the first part and after the fourth part. Before the first part, respondents will be measured on their level of knowledge and involvement in the firm. It can provide additional insights for comparing the results of the questionnaire. The fifth part of the questionnaire is mainly related to the control variables such as age and size of the firm, timing of entry, current organization phase, ownership structure, female involvement, geographic location, and business sector of the firm. The summary of variables or scales can be seen in chapter two.

The scores from these multi-item scales will be input into SPSS to be processed using factor analysis. A smaller set of general summary scores with maximal variability and reliability can be generated from these large set of measured variables by finding the their optimal weightings in exploratory factor analysis (Floyd & Widaman, 1995). After data has been reduced, construct validity (the structure and relationships between variables) can be assessed by confirmatory factor analysis. The detail of factor analysis will be described in next sections.

5.2.3. Selection of respondents and distribution

Criteria of respondents

The **first criteria** in respondent selection for this measurement instrument is that they should be selected from SMEs in European Union countries. To determine which firm can be categorized as SME, this research follows the guidance from European Commission (2005) as can be found in **table 7**. From that table, two criteria determine the categorization: headcount and annual turnover. To make it clear, headcount includes employees working full time, part-time, and seasonal. It can also be the owner or partners that are regularly engaged in the firm's activity. Meanwhile annual turnover can be calculated by subtracting rebates from the income received from selling products or services. Value added tax (VAT) and other indirect taxes should also be excluded (European Commission, 2005).

Table 7 - SME Categorization

Enterprise Category	Headcount	Annual Turnover
Medium-Sized	< 250	≤ €50 million
Small	< 50	≤ €10 million
Micro	< 10	≤ €2 million

As for the **second criteria**, the respondents should be people with strategic knowledge of the firm, most-likely someone in the top management level in the SMEs. For micro-enterprises, due to small number of employees, it is most-likely the owner. The necessity of possessing strategic knowledge is based on the high-level nature of the concepts being measured in the measurement instrument.
The choice of business model reflects the strategy of the firm (Casadesus-Masanell & Ricart, 2010), which is most-likely formulated by the top management. The decision to innovate, which contributes to firm's innovativeness, also related to strategic orientation of the firm (Ireland et al., 2009, 2003; Miles & Snow, 1978). For business performance, the numbers might be found on the company annual reports or other financial-related reports, but accessing it might need authorization from a high ranking employee in the firm. Lastly identifying the turbulence in the external environment is normally done by people that formulate strategy in the firm, as strategy is the way of the firm to align itself with the environment (George & Bock, 2011; Porter, 1991).

The **third criteria** is the location of the firm. Because this research's and Envision project's scope is to help European Union SMEs, the sample must be SMEs from European Union region. This is also to control the environmental effect, which will be measured as the environmental turbulence. Meanwhile, other criteria that might be found in other studies, such as the firm's business sector and firm's age, will not be restricted in the research.

Sampling frame can be useful as it can provide a list of elements in the population but researchers need to be aware of incompleteness due to lack of update (Sekaran & Bougie, 2013). For this research, a list of employee working in SMEs can be the sampling frame. This sampling frame might be available to be acquired from Ministry of Social Affairs & Employment, Chamber of Commerce, Statistical Offices, or from the SMEs itself.

Selecting Sampling Design

Sampling design can be chosen from either probabilistic sampling or non-probabilistic sampling (Sekaran & Bougie, 2013). Looking at the criteria of respondents mentioned above this research suggests the use non-probabilistic sampling for pretesting the questionnaire, more specifically using *Purposive-Judgment Sampling*. In Purposive Sampling, it will use people who are in the best position to provide the required information (Sekaran & Bougie, 2013), in this case employees that are working in SMEs. Although purposive sampling might lack representativeness, it is still can be used as there is no consensus whether the respondents in pretesting stage should be represent the actual target respondents or not (Hunt, Sparkman, & Wilcox, 1982).

Determining Sample Size

There is no clear guidance in determining the number of pre-testing samples (Del Greco & Walop, 1987) but it can be a small sample size (Hunt et al., 1982; Waltz et al., 2010). The number of pre-testing samples can be around 10-50 samples (Del Greco & Walop, 1987), 20-50 samples (Bradburn, Sudman, & Wansink, 2004) or even lower than that, around 12-25 samples (Zukerberg, Von Thurn, & Moore, 1995).

Thus, this research can suggest a moderate number of 30 samples for pretesting the questionnaire items, which is adequate according to Backstrom and Hursch (1963) as cited by Hunt and colleagues (1982). Although there is no pre-determined number of sample size, small sample size must be used with caution in statistic as it may yield some problems. A small sample size might cause the problem of external validity, distributions of data, and statistical significance (Norman, 2010), especially for factor analysis.

When it comes to factor analysis, sample size is very important (Hinkin, 1998). A rule of thumb is provided in previous study that indicates 150-300 respondents are deemed minimum for exploratory factor analysis, while 200 respondents are required for confirmatory factor analysis (Hinkin, 1998). Another study stated a similar rule of thumb of minimum 300 respondents for factor analysis (Vanvoorhis & Morgan, 2007).

As a benchmark, Gatignon, et.al. (2002) used 141 respondents in their research of developing new measures for innovation concept. When the research has time limitation, then a small sample size of 30 respondents can be used (de Winter*, Dodou*, & Wieringa, 2009; Kline, 2013). To mitigate statistical conclusion error that might occur from smaller sample size, it may be necessary to use fewer items (Hinkin, 1998).

Selecting questionnaire distribution channel

For the distribution channel, due to the rapid development of internet, this research can consider using online channel on top of a more traditional offline channel. There are several distribution methods available when using online channel but web-based survey is probably the best method by looking at the richness of features (Gunter, Nicholas, Huntington, & Williams, 2002).

Collecting data via online channel has its advantages over offline channel such as "snail mail". It is less expensive, faster distribution, faster response from respondents, weaker social desirability effect, and richer response in open-ended questions (Gunter et al., 2002). Despite the advantages, it also has its drawbacks such as lower response rate, large number of non-delivered questionnaire and lower representativeness (Gunter et al., 2002; McDonald & Adam, 2003).

These drawbacks are closely related to some of the components of survey quality, which are *coverage error, non-response error,* and *sampling error* (Groves, 1987). *Coverage error* can occur because some members in the population were not included in the sampling frame (Groves, 1987). The use of online distribution method requires the respondents to be have access to Internet and able to use it (Gunter et al., 2002), thus not all the member of population can be represented. In a way, it can be said to be caused by the method of questionnaire distribution.

Non-response error can arise when member of the sample were not responding to the survey, thus they were not measured. Meanwhile, *sampling error* can occur due to the deliberate exclusion of some members of the population from the survey, which should have been included (Groves, 1987). It is also based on the number of samples that are randomly surveyed (Dillman & Bowker, 2002).These three type of errors are also related to external validity.

As mentioned before, this research suggests a non probability sampling methods, which is purposive sampling. This sampling method will contribute more to the internal validity than external validity as the result only relevant for the population of interest in the study (Tongco, 2007). Thus, external validity is not the main concern in developing this questionnaire, because it is specifically designed for SMEs in Europe, not generalized for larger firms or SMEs outside Europe.

Moreover, Hunt and colleagues (1982) argued that, according to several other research in their study, no consensus has been achieved regarding the obligation of having representative sample in measurement instrument pretesting stage. Nevertheless it would still be beneficial if the research can get representative sample, where pretesting respondents are similar to the actual survey target respondents. This shows that online channel cannot completely replace traditional offline channel in collecting the data. Thus this research will use the combination of the two methods (online and offline).

This research would suggest to make three methods available: web-based questionnaire, email with questionnaire attached, and paper-and-pencil format questionnaire. With this three methods available, this research can balance the trade-off of the online and offline methods: balancing representativeness with the speed and quality of response. To support the distribution, future research can ask for the assistance of other researchers from other European Union countries that are related to this research. They can provide

assistance in contacting the local SMEs in their area, and the SMEs can come from different business sectors. To provide better assessment, it is better to distribute the questionnaire to more than one sample per SME, or also known as *triangulation* method (Malhotra & Grover, 1998).

Additional tasks for questionnaire distribution
An additional task that might be needed before distributing the questionnaire is translating the questionnaire. Questionnaire translation is usually needed when a region or country has more than one official languages (Harkness & Schoua-Glusberg, 1998). This questionnaire will be used in European Union region, which consists of countries with various official languages, thus translation might be needed.

In addition, SMEs, especially micro enterprises, might only dealing with local customers using their local languages, thus it lower their incentive to try to use and understand foreign language such as English. This research might ask for the help of other researchers that lives in the target countries for translating the questionnaire or using guidelines from existing study (Forsyth, Kudela, Lawrence, Levin, & Willis, 2006).

One problem regarding data collection is the possibility of answer or data distortion by respondents (Fowler Jr, 1995). These distortions might occur due to the existence of social desirability of a good answer (Fowler Jr, 1995; Krosnick & Presser, 2010). Respondents might want to answer in a way that make them look good or to manage their self-image. Some strategies can be implemented to reduce these distortions: ensuring confidentiality of responses, clear communication regarding the importance of response accuracy, and minimizing the role of interviewer (Fowler Jr, 1995).

5.2.4. Scoring the responses

Initial analysis on the result of the data collection can be made by scoring the responses. For norm-referenced measurements, such as the ones developed in this research, using a simple and direct scoring procedure is recommended (Waltz et al., 2010), which is by summing the items (Nunnally & Bernstein, 1994). In summative type of scoring: " *one assigns a score to each individual item according to a conceptual scheme and then sums over the individual item scores to obtain a total score*" (Waltz et al., 2010).

In Likert scale, higher numbers represent more favorable situation (Bowling, 2009), thus the total summative score can represent how favorable the situation in each firm. This applies for all scales that used Likert scale in this research. Meanwhile, at a quick glance, Environmental Turbulence might be seen as a unfavorable situation thus it might have to use reverse scoring. But because it is preferable to have a turbulent environment to have a return on innovation (Miller et al., 1988), the environmental turbulence scales do not need a reverse scoring.

As previously discussed, the measurements are norm-referenced, and the score of a respondent in a norm-referenced case will be meaningful when it is compared with other scores in reference group (Waltz et al., 2010). It can be seen from by comparing the score to the central tendency of distribution of scores which can be displayed by table, graph or polygon (Waltz et al., 2010). While the scoring of the responses are good to gain descriptive insights on current measurements, it is not the end of the measurement instrument development. Next, factor analysis has to be conducted in order to reduce remove invalid and unreliable measurements and also provide structures to them.

5.3.Factor Analysis

After data has been collected with the pilot testing, the questionnaire items can be purified with the use of factor analysis. It is one of the most common methods in developing measures that were designed to measure attitudes, cognitive schema, and other psychological constructs (Floyd & Widaman, 1995). Purification can be done with two main method of factor analysis: *Exploratory Factor Analysis (EFA)* and *Confirmatory Factor Analysis (CFA)*. Both methods are related to factors, which is also known as latent

constructs or latent variables (Ullman, 2006), and it represent a combination of observed indicators or measured variables (Nunnally & Bernstein, 1994).

There are several differences between EFA and CFA (Kline, 2013), but the most notable one is that researchers must explicitly define the factors and their relations in CFA, while they do not have to do it in EFA. In EFA, researchers explore and uncover the hypothesized structure that binds a set of variables, which will be tested in CFA on the later part of the research (Ullman, 2006). There will be a data reduction in EFA, while CFA is primarily a way to assess construct validity of the measures (Floyd & Widaman, 1995). This is why EFA is usually done in preliminary stage when there are no known factors and measurements, while CFA will be used in later stage when factors are already identified and need to be confirmed (Kline, 2013). Another difference is that EFA uses correlations while CFA uses covariances (Ullman, 2006).

Using the right type of data is required to get optimum result from factor analysis (Floyd & Widaman, 1995). The measurement scale used in the instrument (for measured variables) is an important consideration for factor analysis. It is expected to use interval or quasi-interval data in factor analysis (Floyd & Widaman, 1995). *Likert-scale*, which is commonly used in a measurement instrument, is an ordinal scale which often considered as a quasi interval scale in practice (Floyd & Widaman, 1995). Problem may arise in factor analysis when the data is a binary data or using dichotomous scale (Dimitrov, 2012; Floyd & Widaman, 1995), although a study argued that it is still possible (Yong & Pearce, 2013).Furthermore, researchers should carefully select the items, use multi-item scales, and pilot-testing the items. These data should also have multivariate normal distribution to produce a clear and replicable factor pattern (Floyd & Widaman, 1995).

Perhaps the most pressing problem for factor analysis is the sample size (Hinkin, 1998; Kline, 2013; Tabachnick & Fidell, 2007). Large sample size is needed so the result of the grouping is not an effect of sampling error (Nunnally & Bernstein, 1994) and correlations are reliably estimated (Tabachnick & Fidell, 2007). Although there is no consensus on the number of minimum sample size, the ratio of 10:1 is the most common method used (Kline, 2013). It means that for every item, it would need 10 samples. Based on previous studies in his research, Hinkin (1998) described that 150 samples are sufficient for EFA, and 200 samples are required for CFA. It is also recommended to follow absolute number of sample size of 300 samples according to Comrey and Lee (1992) as cited in other studies (Williams, Brown, & Onsman, 2012; Yong & Pearce, 2013).

5.3.1. Exploratory factor analysis (EFA)

This first factor analysis is commonly used for reducing the number of items from the initial item pool (Gerbing & Anderson, 1988) and identifying latent variables that underlie scales in measurement instrument (Floyd & Widaman, 1995). These latent variables are the cause or the predictor for measured variables. These predictions are represented by factor loadings (Floyd & Widaman, 1995). The basic principle of EFA is to group a set of items into a factor based on the resulting factor loadings. The typical minimum value for factor loading is 0.4, and when a set of items have this value on a factor, then it can be constructed into a scale. Items can be deleted when it fail to load to any factor or load to two or more factors (Floyd & Widaman, 1995).

There are five common steps in conducting EFA (Williams et al., 2012), which can be seen on **figure 15** below. The first thing to look for before starting EFA is to check the suitability of the data (Williams et al., 2012). Some *measurement scales* attached to the data might not be suitable for factor analysis. Data with dichotomous or binary scale can be problematic in factor analysis. It can create two problems which are attenuated correlations and creation of a artificial factors, also known as difficulty factors (Floyd & Widaman, 1995).

According to Dimitrov (2012), items with polytomous scale such as Likert scale can also cause the same problem as dichotomous-scaled items. EFA in SPSS is using Pearson correlation which is suitable for continuous variable but not dichotomous or polytomous variables (likert scale). Nominal scale

(dichotomous) and ordinal scale (likert scale) use biserial or tetrachoric coefficient to estimate what the correlation between variables would be if they are continuous and have normal distribution (Nunnally & Bernstein, 1994; Waltz et al., 2010). Thus, he argued that it is inappropriate to use SPSS for running EFA in the case of dichotomous and polytomous data. Instead, he gave reference from several studies that used other software such as Mplus to run EFA for dichotomous and polytomous data.

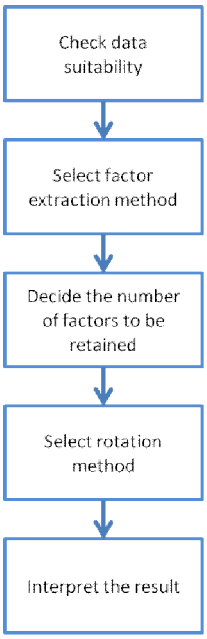

Figure 15 - Five common steps of EFA (Williams et al., 2012)

Next thing that researchers need to check is the *sample size*. For EFA, this research suggested the use of 30 samples if future research has time constraint, which might serve as the limitation of the research. The usage of small sample size might be applied when each factor has 3 items and they have a minimum average communalities of 0.70 (Kline, 2013). A study by Guadagnoli and Velicer (1988), as cited by Floyd and Widaman (1995), emphasized on size of factor loadings, total sample size, and number of indicators per factor to determine the stability of the factor loadings. The sample size can be as few as 50 when the factor loadings are 0.80, while 150 samples might be needed when the factor loadings are in the range of 0.60. It was shown from this study that using a small sample size is possible in factor analysis as long as certain conditions are met.

Another study also shown this possibility of using small sample size, especially for EFA (de Winter* et al., 2009). The data should be well conditioned to produce a reliable EFA result with small sample size. A well conditioned data is characterizes by high factor loading, low number of factors, and high number of variables (de Winter* et al., 2009).

Before conducting the main steps of EFA, there are several tests that should be conducted to check the appropriateness of the data (Dimitrov, 2012). The first test is *Bartlett's Test of Sphericity*, which tests the significance of the correlation matrix of the analyzed variables. It basically tests the null hypothesis of "a correlation matrix is an identity matrix", and the null hypothesis should be rejected in order to start factor analysis. This test is important especially when the ratio between samples or cases per variable is less than five (Dimitrov, 2012).

The second test is the *Kaiser-Meyer-Olkih (KMO) Measure of Sampling Adequacy*. This test is important to assess the factorability of the correlation matrix. It based on a logic of the degree of common variance between variables. When KMO value is 1.0, it means that the variables share a same factor, thus it is preferable. The general cut-off value for the KMO value to be warranted for factor analysis is 0.60 or higher (Dimitrov, 2012; Tabachnick & Fidell, 2007).

When Bartlett's Test of Sphericity indicates that the correlation matrix is not an identity matrix and KMO value is over 0.60, then the next issue to be confirmed is the issue of *multicollinearity*. This multicollinearity problem may arise when the independent variables or predictors are highly intercorrelated (Nunnally & Bernstein, 1994). To idenfity the variables that have multicollinearity, researchers can look at *Squared Multiple Correlation* (SMC) value (Yong & Pearce, 2013).

SMC is one of the common method to estimate communalities (Floyd & Widaman, 1995). When SMC shows value close to 1.0, then it indicates the existence of multicollinearity in the variable, which should be removed from the dataset (Yong & Pearce, 2013). In SPSS, it can be checked by looking at variables which have correlations above 0.90 in correlation matrix. In addition, a determinant score of more than 0.00001 also indicates the non-existence of multicollinearity (Yong & Pearce, 2013).

After data suitability has been determined, then the procedure should follow three common steps of EFA as follows (Kline, 2013):

Selecting factor extraction method. Researcher can choose either using *principal axes factoring (PAF)* or *principal components analysis (PCA)*. PAF also known as common factor analysis or principal factor analysis (Floyd & Widaman, 1995). While factors in PCA are considered composites of combinations of items, PAF are taking account of measurement error to provide latent variables in the factors. Some viewed PCA only primarily as a data reduction technique (Floyd & Widaman, 1995), but not for determining latent variables. Meanwhile common factor analysis or PAF can be used to assess the relationships between measured variables (Floyd & Widaman, 1995). When there are low reliability scores on the items, then it is suggested to use PAF.

Another difference between PAF and PCA is their relation to communality. Communality of a variable is defined as "*the variance that variable shares with latent variables underlying the set of observed measures*" (Floyd & Widaman, 1995). PCA tries to represent all the variance in the observed or measured variables, while PAF or common factor analysis will only represents common variance of each variable. Between the two, PAF or common factor analysis provides a more accurate final estimation of communalities (Floyd & Widaman, 1995).

The differences between PCA and PAF can disappeared when items show high reliability, have large sample, and communalities are high (Kline, 2013). In contrast, when the reliability is low, sample size is small, and communalities are low, common factor analysis or PAF is strongly preferred to PCA (Floyd & Widaman, 1995). This is because common factor analysis or PAF produces a more accurate estimates of factor loadings and correlations.

Deciding how many factors to be retained. This step's main purpose is to choose whether to used theoretical or statistical basis on determining the retained factors (Kline, 2013). When using statistical basis, researchers can use *eigen value*, *scree plot*, or *parallel analysis*. Eigen value is denoted by ə-and factors should be retained when they have ə>1.0. But researcher must be aware that eigen value rule can only be applied when PCA is used instead of PAF. Using eigen value also counted as using mathematical and psychometric criteria (Floyd & Widaman, 1995).

A scree plot is a visualization of eigen value and the number of factors to be retained is determined by the last number of factor before the graph shows a sudden drop. It can also be said that researchers are using a "rule of thumb" when they are using scree plot to decide the factors to be retained (Floyd & Widaman, 1995). In parallel analysis, the factors can be retained only if they have greater values in original scores than in randomized scores. These randomized scores can be generated using computer. One additional method to retain the factors is by using *Tucker-Lewis reliability coefficient*, which should have a minimum value of 0.95 to be retained (Floyd & Widaman, 1995).

Selecting rotation method and interpreting the resulting factors. It is desirable to have a simple solution of factors so it could be easily interpreted by researchers. Unfortunately, often the initial solution is complex and difficult to be interpreted, thus it needs to be modified by the means of rotation. There are two

main types of rotation: *orthogonal rotation* and *oblique rotation*. The main differences between the two is that orthogonal rotation assumes the factors are uncorrelated while oblique factors allow the factor to have correlations or covary. The most common method in orthogonal rotation is varimax, while in oblique rotation is promax or oblimin.

After the factors have been identified, next, researcher would have to check its reliability by looking at its internal consistency (Churchill Jr., 1979). This reliability aspect will be discussed after a brief overview on CFA.

5.3.2. Confirmatory factor analysis (CFA)

After items have been reduced and scales or factors are generated in EFA, the ideal next step is to evaluate this scales by conducting CFA. A standard model of CFA uses the hypothesis of unidimensional measurement (Kline, 2013). Testing unidimensionality of measurement is important in theory testing and development (Anderson & Gerbing, 1988), and it is the focus of this research. Furthermore, the *measurement model* in CFA will specify the relation between measures/indicators to its concept, while *structural model* in CFA will specify the causal relation between the concepts (Anderson & Gerbing, 1988; Gefen, Straub, & Boudreau, 2000).

Unidimensionality means that a set of indicators or observable variables only share a single factor or concept (Anderson & Gerbing, 1988; Gerbing & Anderson, 1988). Furthermore, a relationship between concepts are shown by several sets of unidimensional measures (Gerbing & Anderson, 1988). Multiple-indicator measurement model is usually used to represent the relationship between these measures to their concepts. Estimated concept is represented by at least two indicators and each of them will only estimate one concept (Gerbing & Anderson, 1988). If the measurement model contains indicators that estimate more than one concept, then it does not represent unidimensional concept measurement and can complicate the meaning of the concept (Anderson & Gerbing, 1988).

The necessary conditions for achieving unidimensionality of scales are internal consistency, external consistency, and reliability (Anderson & Gerbing, 1982). Internal consistency means that a set of items should measure the same concept or dimension, while external consistency means that one item should only measure no more than one concept (Anderson & Gerbing, 1982; Steenbergen, 2000). There should be a minimum of four measures or scales for assessing internal consistency, and if this condition cannot be met then external consistency will be the sole criterion to assess unidimensionality (Anderson & Gerbing, 1982). After unidimensionality of scales has been established, their composite score should be assessed for its reliability (Gerbing & Anderson, 1988), which indicated by Coefficient or Cronbach alpha value (Cronbach, 1951; Nunnally, 1967).

Item-to-total correlation method, such as in EFA, were also commonly used to established unidimensionality. The downside of this method is that it does not assess external consistency. This could be a problem because the same indicators or variables might measure different concepts also (Gerbing & Anderson, 1988). Hence, multiple-indicators measurement model in CFA is needed to show this external consistency.

Structural Equation Modelling (SEM)

One of the confirmatory method for assessing theoretical model in CFA is *structural equation model (SEM)* (Anderson & Gerbing, 1988). It offers advantages over regression (Karimimalayer, Alavifar, & Anuar, 2012) as it can study relationship between latent constructs, applicable to experimental and non-experimental data, and can also applicable to both cross-sectional and longitudinal data (Lei & Wu, 2007). Another advantage is that SEM acknowledge the imperfection in the measures because it specifies the error (Suhr, 2006). Furthermore, this research's conceptual model also has several feedback loop or reciprocal relationship between its concepts, which can also be covered by SME technique (Lei & Wu, 2007).

It has several important characteristics (Kline, 2011). First, a model or set of hypothesis must be pre-determined or given at the start. Second, there are two kinds of variables in SEM, which are observed and latent variables. Observed variables are the ones that researchers collect, while latent variables are hypothetical constructs or factors which are explanatory in nature. Third, covariance is the basic statistic of SEM. This covariance shows the strength of relationship between two variables. Fourth, SEM technique will require large amount of samples to provide accurate statistical estimates and prevent technical problems. The number of samples will depends on the number of parameter in the model, type of estimation algorithm, and distributional characteristics of the data.

SEM can provide assessment both for structural model and measurement model (Anderson & Gerbing, 1982; Lei & Wu, 2007; Ullman, 2006). A structural model can also be called path model, which models the structural relations among variables (Lei & Wu, 2007; Suhr, 2006), more specifically, between two constructs (Ullman, 2006). The structural relations can come from the hypothesis about causal relationship between variables.

Meanwhile measurement model will assess the unobserved latent variables that cannot be measured directly, through CFA (Lei & Wu, 2007). These latent variables will be inferred by several observable variables or indicators. Items on a measurement scale can serve as these observed variables or indicators (Ullman, 2006). The factors that was previously known (from EFA) will correspond to latent constructs in structural model (Bagozzi, Yi, & Phillips, 1991; Lei & Wu, 2007).

Causal relationships are represented by line and arrows, observed variables are represented by boxes, and latent constructs or latent constructs are represented by ellipses. A line might have one or two arrows, where one arrow represents a direct relationship and two arrows represent covariance (Ullman, 2006). In the model, latent constructs have an arrow going out to the indicators or observed variables, which means indicators are predicted by latent constructs or factors (Ullman, 2006). There would also be residual or error on the indicators because factors cannot predict them perfectly (Ullman, 2006).

The application of SEM can be for theory testing and development, and also for making prediction (Anderson & Gerbing, 1988). For theory testing and development, it is suggested that researchers use maximum likelihood (ML) or generalized least squares (GLS) program, while for making prediction, partial least squares (PLS) should be used.

The use of small sample size might be more problematic in CFA than in EFA, as sample size in CFA are related to larger number of issues (Dimitrov, 2012). A study argued that the use of small sample size can resulted in non-convergent and improper solution of CFA (Anderson & Gerbing, 1984). Furthermore, the same study also described how the use of small sample size can cause a bias in the goodness-of-fit result. This is especially because the statistic that used for evaluating goodness-of-fit of the model, chi-square (χ^2), is sensitive to sample size. Thus it is concluded to be dangerous for using sample size less than 100 in CFA, and it is recommended to use a sample size of at least 200 samples.

5.4.Assessing Reliability

Reliability is closely related with one of the cause of measurement error, which is random errors that can influence an observed measurement (Waltz et al., 2010). An observed measurement consists of a true score and error score. When a measurement is reliable, the observed score will closely reflect its true score because random error (and error score) is minimal, and it will produce a repeatable measurement (Waltz et al., 2010). This error should have a normal distribution and it is commonly known as standard error of measurement (SEM) (Dimitrov, 2012; Waltz et al., 2010).

The reliability of the measurements will be assessed mainly by *Cronbach Alpha*, as an indicator of internal consistency (Nunnally, 1967) and it should be calculated after "bad items" have been removed in EFA and CFA step (Hinkin et al., 1997). Alpha value will indicate whether the items are measuring the same concept

or domain (Rattray & Jones, 2007). Internal consistency assessment is the most basic step for assessing reliability before other means of assessing reliability can be used (Nunnally, 1967). Some advantages of using this Alpha value as the indicator of internal consistency reliability are discussed in a study by Waltz and colleagues (2010).

For developing new questionnaires, a minimum alpha value of 0.60 should be achieved (Nunnally, 1967). Meanwhile, as a benchmark, other studies stated the minimum value alpha of 0.70 should be achieved in order to have a good internal consistency (Rattray & Jones, 2007; Yoo & Chon, 2008). Each dimension or factor formed from EFA should be evaluated for its Cronbach alpha value as the indicator of overall internal consistency. If alpha value is low then it means there are items that do not measure the same construct or have little similarities.

For dichotomous-scored items, internal reliability coefficient can be calculated by using *Kuder Richardson Formula 20 (KR-20)* (DeVellis, 1991; Waltz et al., 2010). To find the items that caused the alpha value to be low, it can be by looking at the *item-to-total correlation* (Churchill Jr., 1979; Malhotra & Grover, 1998). If there are items with low or zero correlation, then these items should be eliminated. When the item is using dichotomous scale, which is a nominal scale, it is recommended to use *point-biserial correlation* to identify item-to-total correlation score (Bowling, 2009; Dimitrov, 2012).

5.5.Assessing Construct Validity

One of the most significant source of errors to be addressed in measurement development are systematic and random measurement error, as it can influence the conclusion of the measurement (Bagozzi et al., 1991; Nunnally & Bernstein, 1994). Systematic error is related to the measurement method, while random errors affect the relationship between variables, which can arise from various factors such as researcher's bias, mood, or prejudice (Nunnally & Bernstein, 1994).

As mentioned in chapter 3, measurement error can be addressed by validation processes. One of the most common validation process is *construct validation*, as it is considered as the heart of scientific process (Malhotra & Grover, 1998). Construct validation needs to be done when a measure of a construct has not been defined (Cronbach & Meehl, 1955) to ensure the measurement instrument are measuring the right concepts (Bagozzi et al., 1991; Malhotra & Grover, 1998).

Having high degree of reliability can also reduce random measurement error. Freedom of random error or repeatability is a definition of reliability (Nunnally & Bernstein, 1994). This repeatability is important to provide scientific generalization as science is mainly related with repeatable phenomena. Although reliability is necessary but validity still need to be established as reliability does not ensure validity (Nunnally & Bernstein, 1994).

There are three types of validity tests that should be done in order to establish construct validity: *convergent validity, discriminant validity,* and *nomological validity* (Anderson & Gerbing, 1988; Cronbach & Meehl, 1955). When CFA cannot be conducted due to the limitation of sample, construct validity can also be assessed by EA. There were studies argued that construct validity cannot be achieved without achieving external validity (Calder et al., 1982). This argument was later on rejected after construct validity was actually achieved in several studies without having external validity (Calder et al., 1982).

5.5.1. Convergent and Discriminant Validity

Convergent validity, defined by Campbell and Fiske (1959) as cited by Bagozzi and colleagues (1991), is "*the degree to which multiple attempts to measure the same concept are in agreement*". Several measures of a same concept should covary if they are valid. Meanwhile, discriminant validity, by definition, is "*the degree to which measures of different concepts are distinct*". Each concept is unique and it is expected that their measures do not have high correlation.

As mentioned before when there are limitation of the sample size, future research might use EFA instead of CFA. In assessing construct validity, EFA is primarily used for assessing validity of an existing scale or for finding evidence in the early phase of scale development (Dimitrov, 2012). The process would involve marker scales, which some are known to measure the construct of interest and some are known to measure other constructs. In this research, when BMI scale under validation (target scale) and BMI marker scales of converged into BMI factor, then it is said to provide evidence of convergent validity. On the contrary, when the items on BMI scale did not load highly on innovativeness factor, then it provided evidence for discriminant validity. Ideally, a CFA should be used as a follow up for assessing construct validity after EFA (Dimitrov, 2012), which can be done in when the sample size is sufficient.

The use of measurement model together with structural model in CFA can give assessment on construct validity, which is essential in theory building and testing (Gerbing & Anderson, 1988). Construct validity can be established by assessing convergent and discriminant validity to provide unidimensionality, and also nomological validity to assess the relationship between constructs in the theory (Anderson & Gerbing, 1982). Discriminant and convergent validity in CFA can be assessed with chi-square difference tests, size of factor loading for traits (or factors), and estimates for factors correlations (Bagozzi et al., 1991). When convergent and discriminant validity has been established, then it will give the base for nomological validity assessment confirmation (Anderson & Gerbing, 1988).

Taking both systematic error and random error into account, CFA offers several advantages compared to other method such as Campbell-Fiske's Criteria in assessing construct validity (Bagozzi et al., 1991). In CFA, constructs can intercorrelate freely and methods can affect measures of traits or factors, which cannot be done in Campbel-Fiske's procedure that uses multitrait-multimethod matrix (Bagozzi et al., 1991). Thus it can be said that CFA is a more powerful technique than Campbell-Fiske's procedure.

5.5.2. Nomological Validity

A concept will have a meaning if it occur in a nomological network, which means it is related to other concepts as postulated in a theory (Cronbach & Meehl, 1955). To examine this nomological network, new developed measures, especially for BMI, should be administered together with existing measurements that are known to measure other concepts (Hinkin, 1998). The measurement instrument that were developed in this research have included measurements that are known to measure innovativeness, business performance, and environmental turbulence, thus it should be sufficient to test nomological validity for BMI measurements.

To assess this cause and effect relationship, or nomological validity, SEM technique can be used (Salisbury et al., 2002; Yang, 2003). Because SEM is a technique of CFA, SEM also require a large sample. Alternatively, when the sample size is too small, a simple correlational analysis might be used to test the hypothesized relationship, but this method is not as rigor as SEM in assessing nomological validity (Wang, Tang, & Tang, 2001).

Nomological validity is related to the relationship between concept of interest to other concept. In a sense, it is similar to internal validity, which is related to the cause and effect relationships between the concepts (Calder et al., 1982; Sekaran & Bougie, 2013). Moreover, internal validity can also be assessed by SEM technique (Malhotra & Grover, 1998), the same technique for assessing nomological validity. The difference is that internal validity put strong emphasize on research or experimental control (it might be in the form of control variables) (Altmann, 1974). This is to prevent the emergence of alternate hypothesis. In other words, it is for researcher to be really sure that the causal relationship is only emerged due to the independent and dependent variables defined in the research.

5.6.Developing Norms

After the measurement scales are developed, next thing to do is to develop norms on it (Churchill Jr., 1979). According to Nunnally and Bernstein (1994), a norm is "*a statistical information that describes the scores earned by members of defined population or reference group (or generated from a defined set of observations) with which the score earned by a particular individual (or generated from a given observation) can be compared*".

It is the way of evaluating the position of the individual score on the characteristics being measured compared to the total distribution of scores by other people (Churchill Jr., 1979; Wang et al., 2001). In other words, norms provide a mental standard on evaluating some characteristics. The larger the number of samples and the more representative they are, the more stable and robust the norm will be (Churchill Jr., 1979).

Some steps for establishing norms are: selecting representative samples, administer the final measurement instrument to these respondents, plot the raw scores into frequency distribution and make descriptive statistics, make decisions regarding statistical units that will be used to establish norms and compute these statistics using t-scores or Z-scores, and in the end the norms should be displayed using tables or graph (Nunnally & Bernstein, 1994).

Wang and colleagues (2001) shown that norms can be shown by making percentile scores. It can give a clear indication on the position of an individual score, whether it is on the lower percentile or on the higher percentile. It provide the basis for comparison of individual results and it will prevent a "grey area" in an argument. Norms also need to be updated periodically due to the changes in the population, which changes the distribution (Waltz et al., 2010).

More details on norm development can be found on the study by Nunnally and Bernstein (1994) and also Waltz and colleagues (2010). Because data cannot be collected in this research, due to time constraint, norm development cannot be done.

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6 Conclusion, Limitation, and Recommendation for Future Research

Within this section, this research will try to answer the research questions posed in the first chapter. Some limitations that were imposed will also be described, which will serve as the basis for further research.

6.1.Main Findings

Next, this research shall try to provide answers to the research questions of this study. This research aims to develop a face valid measurement instrument in order to be able to measure SME's BMI and its implication to their business performance and innovativeness, with the moderation of environmental turbulence. When measurements are available, researchers and practitioners can get better understanding on the nature of BMI. Hence, to see whether the research objective has been achieved or not, we will try to answer the research questions based on the findings in this research.

First Central Research Questions:
What are the suggested initial measurement instrument criteria for assessing the existing measurements from previous studies?

The suggested initial measurement instrument criteria was represented in a form of a measurement instrument blueprint. This blueprint consists of contents or areas of interest that will be further specified, the objective of the measurements, the item format, and also the proportion of each areas of interest.

Nine areas of interest have been identified from domain specification step: *Changes in Business Model elements, Business Model Steps, Business Model Drivers, Tendency to Innovate, Capacity to Innovate, Competitive Intensity, Market Turbulence, Technological Turbulence, Profitability, and Sales Growth.*These areas of interest will be used to fulfill the objective of the measurement, which is to provide evaluation of the firm's situation. Variables identified from meta-analysis are then used to drill down these areas of interest.

Meanwhile, meta-analysis has identified related variable, concepts, and existing measurements as the basis for further specifying the areas of interest. The inconsistencies of the strength of BMI relationship with business performance found in meta-analysis also justified the use of environmental turbulence concept as moderating variable in the measurement instrument. This meta-analysis has also found that most of the existing measurements were using Likert-scale as its item format, thus it was chosen as the primary item format in the questionnaire blueprint. It was found out from the literature that using seven point in Likert scale is the optimum way to achieve reliability.

The BMI part accounted for the biggest proportion because this research would like to explore as many scales as possible due to the newness and complexity of the concept. Innovativeness are also considered a complex concept, thus it has the second biggest proportion, followed by business performance and environmental turbulence. This proportion could be changed in later development stages.

Second Central Research Questions will be related to component (b):
What are the new face validated measurements that can be used to measure the implication of BMI to both business performance and innovativeness of SMEs, with the moderating effect of Environmental Turbulence?

The answer to this question will be given in each sub-questions below.

Sub-question 1:
What are the measurements for assessing Business Performance?

There were a lot of business performance measurements available in previous studies, which not only on a financial performance but also on operational performance. Business performance can also be categorized into realized performance and also expected performance. From these various indicator of business performance, this research aim to select indicators that are best suited to the type of the firm that is the focus of this research, which is SMEs.

Looking at the nature of SMEs, not all of the measurements available in existing studies are suitable. Most of SMEs (around 97%) do not seek high growth, thus do not seek external funding from venture capitalists. It eliminates the use of expected performance such as market value as the indicator. Thus profitability is the main business performance indicator selected in this research. Sales growth was also selected because it has been identified as one of the most common business performance indicators in existing studies. The use of these two indicators can give more insights than only using a single indicator. Using multiple scales to measure a single concept is also a form of triangulation to increase reliability.

Profit can act as a fuel to growth without the help of external funding. Without the involvement of external investor, then market value of the firm will the least priority for the firm. Thus the use of profitability and sales growth indicate the use of realized financial performance, instead of expected financial performance such as market value. Realized performance will be relevant for most SMEs that are internally funded.

The final items can be found on **Table C22 in Appendix C** and on the final version of the questionnaire in **Table C23 in Appendix C**.

Sub-question 2:
What are the measurements for assessing Innovativeness?

Most of the studies were only emphasizing on the *tendency to innovate* dimension of innovativeness concept, while this research acknowledged another dimension, the *capacity to innovate*. Although it is rare, the acknowledgement of these two dimensions is not a new thing, as it also can be found in the study by Siguaw and colleagues (2006).

Tendency to innovate represent the willingness of the firm in opening up to new ideas, either internally or externally. This dimension, in turn, will influence the firm's capacity to innovate as firms will be more willing to invest in innovation and less reluctant to changes. The tendency to innovate may reflected from the firm orientation towards two important aspect of the market: their customer and their competitor. Furthermore, it can also be shown from their commitment in continuous learning. Sharing the firm's vision on innovation throughout the firm can also make innovation implementation smoother. Employees should also be encouraged to try new things or suggest new ideas. These new ideas can also come from external collaboration, which often come with risks, and the propensity to accept risks also show the willingness to innovate. Lastly, the firm's strategic orientation on innovation can also reflect this willingness, whether the firm is a "prospector" (which favors innovation) or simply a "reactor" (does not have consistent strategy).

Firm's capacity to innovate can be shown by firm's ability to successfully make or adopt innovation. The higher the number of innovations that were successfully created or adopted, the higher the innovativeness level of the firm. But adopting high number of innovation itself is not enough, as firm must also show that they are the early adopters of these innovations. Moreover, consistency of this timing of innovation adoption will further give credibility to the level of firm's innovativeness.When a firm can adopt high number of innovation but only in that particular year and cannot do the same in the following year, then it cannot be said to have high capacity to innovate.

Another indicator that can show the capacity to innovate is the degree of product/service newness that is being offered by the firm. This is based on the notion that innovative firm is the firm that successfully

implemented new innovation, including product/service innovation. But it is still a debate whether this indicator is suitable as product/service innovativeness might be imitated from other firm, thus does not guarantee the firm's innovativeness. The firm might be good imitators, which follows "analyzer" strategy, but not good innovator, which should have followed "prospector" strategy.

The final items can be found on **Table C22 in Appendix C** and on the final version of the questionnaire in **Table C23 in Appendix C**.

Sub-question 3:
What are the measurements for assessing Environmental Turbulence?

The measurements in environmental turbulence part were adapted from existing studies with minimum modification during discussion with Envision project members. Business model innovation is another type or subject of innovation, thus it has some innovation determinants in general, including external determinant. This is why this research used existing environmental turbulence measurements that were often used in other existing innovation studies. This research has found that environmental hostility and environmental dynamism are two major dimension of environmental turbulence. Environmental hostility can be represented by the competitive intensity in the market, while environmental dynamism can be represented by the turbulence in the market and also turbulence in the technology that is available in the industry.

The final items can be found on **Table C22 in Appendix C** and on the final version of the questionnaire in **Table C23 in Appendix C**.

Sub-question 4:
What is the result of the comparison between existing BMI measurements and suggested BMI measurements?

The measurement instrument blueprint suggested a more specific and comprehensive measurements than the measurements that are available from existing studies. Most of existing BMI studies were only taking changes in the business model elements into account, while there might be other dimensions that are relevant. This research proposed two additional dimensions: *BMI steps* and *BMI drivers*.

Another finding is that the existing measurements were mostly vague and not clear enough. This might hamper the reliability of the measurements, especially when the respondents are not familiar with the terms used, such as SMEs employees. Thus, most of the measurements are newly developed (based on existing measurements) to improve its clarity and relevancy.

For BM element change dimension, this research is using the elements of a business model as the basis of the measurement development. The elements were identified in previous qualitative BMI studies, and even though there are different terms to describe the elements, it was found out that they are referring to the same elements. Thus several business model most common elements were used for this dimension.

In the BMI steps dimension, it has been identified that there are three main step of BMI: design, implementation, and outcome. Design is the initial phase of the formulation of a new business model. It involves the use of business model ontology such as Canvas, STOF, etc. The formulation can also be assisted by business model tooling, which can be in a form of a post-it note, software, and many others. Business model ontology and tooling are not common terms, thus the measurements were frequently modified during the item generation process. Meanwhile, BMI implementation step can be assisted by the use of experimentation, Enterprise Architecture and Operating Model. Furthermore, this research has identified three type of BMI outcome: radicalness of business model, disruptiveness of business model, and the originality of business model. Implementing BMI is not an easy task, thus measuring the process might help in identifiying the gap in the process. As it was not found in existing quantitative studies, this dimension is a new addition to BMI literatures.

From the literatures, it also has been found out that there are drivers of BMI, which can come from internal part of the firm or from the external environments. These drivers were not assessed by existing measurements. Adding this dimension to the measurements can yield additional insights. Prediction can be made whether the firm have to conduct business model innovation when signs of these drivers have emerged. This will create awareness for decision makers in SMEs to put attention on each drivers.

BMI is a relatively new and complex concept which might not be easily measured using existing measurements. Thus this research has formulated additional dimensions and measurements to provide more understanding to the concept.

The final items can be found on **Table C22 in Appendix C** and on the final version of the questionnaire in **Table C23 in Appendix C**.

Sub-question 5:
What is the result of the reliability testing of the suggested measurements?

Although (internal consistency) reliability testing has been planned, unfortunately this research did not have the chance to conduct it due to the limitation of time. What this research had done was ensuring that most scales have three items to ensure internal consistency reliability, following the suggestion mentioned in the study by Hinkin (1998). Multiple scales were also utilized to measure a single construct to increase reliability. Moreover, this research has also used seven point Likert scales for most of the items to ensure adequate internal consistency reliability estimates. Because data has yet to be collected, the Cronbach Alpha values (as the indicator for internal consistency reliability) for each scale are still unknown and further reliability assessments are needed.

Sub-question 6:
What is the result of validity testing of the suggested measurements?

As suggested by Churchill (1979), at the end of measurement development, on top of reliability assessment, validity assessment must be conducted. Unfortunately, due to lack of time available for this research, these assessment cannot be completely conducted. The only assessment made was on the Face Validity, as per research objective, which was using panel of judges to evaluate whether the measurements are actually measuring the concept.

The reliability of the interjudge assessment in the first stage of face validation was done and yielded a slight agreement level. This result is based on the result of Fleiss's Kappa method (Fleiss, 1971) and arbitrary classification table by Landis & Koch (1977). In the second stage face validation, reliability of interjudge assessment cannot be made in the second stage because of the use of a single judge. The final version of the questionnaire can be found on **Table C23 in Appendix C**.

Most of the items generated are new items and there should have been further subsequent test of validity, especially construct validity. This assessment of validity could have been done using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), if only time permitted. Thus it can be said that the items generated in this research have "face validity" but not "construct validity". Hence, this research can conclude that the suggested measurements should only be used for further development, not for an immediate actual measurement. The summary of measurement validity assessment can be found in the **table 8** below.

Table 8 - Summary of measurement's validity

No.	Validity	How it was addressed in this research
1	Face Validity	Two stage face validity was conducted, with 6 judges in first stage and a single judge in second stage. Interrater reliability was assessed in the first stage, yielding slight agreement
2	Construct Validity	
	Theoretical Meaningfulness of Concepts	Used an extensive literature review to built the items based on theoretical definitions
	Observational Meaningfulness of Concepts	Used a previously validated items/scales, identified by the method of meta-analysis, together with new items that have been face validated
	Internal Consistency of Operationalizations	Employed multi-item scales, but still have to be assessed for the internal consistency (cronbach alpha)
	Convergent Validity	Multiple constructs were used in order to see if they are converging or discriminating. Still need to be further assessed by using factor analysis
	Discriminant Validity	Multiple constructs were used in order to see if they are converging or discriminating. Still need to be further assessed by using factor analysis
	Nomological Validity	Multiple constructs were used in order to see if they are have relationships, Still need to be further assessed by using factor analysis, mainly SEM technique
3	Statistical Conclusion Validity	Cannot be determined yet as the procedure has yet to be done. In the future, the use of proper sample size might add power to the statistical conclusion
4	Internal Validity	Selecting SMEs in Europe as the focus of the research and adding control variables will increase internal validity. Further assessment need to be done by using SEM
5	External Validity	This research is lacking in external validity as it does not have population validity (specific to SMEs) and environmental validity (specific to European region).

Final Conclusions

This research has found that there are no standardized existing scales for measuring BMI. Gaps were identified based on questionnaire blueprint, and the feedbacks were used to construct new BMI scales. While most BMI studies only incorporated *BM element changes*, this research has two additional dimension: *BM steps* and *BM drivers*, which also part of the requirement of Envision project.

Meanwhile, innovativeness concept has broader definition in this research than in most existing studies, thus innovativeness concept has more scales in this research than in existing studies. Environmental turbulence and business performance scales has the least proportion as they were quite clear in definitions and existing scales were adequate to be used. Only slight modification was made to improve clarity on these two concepts.

Although the final questionnaire produced in this research has yet to complete the validation procedures, due to time limitation, it already followed a strict practical guideline in the initial item generation to ensure its validity and reliability. Judges have also given their evaluation in two stage face validation process, which helped in removing "bad items" and improving the items clarity as well as relevancy.

In the end, the objective of generating face validated measurements has been achieved. Nevertheless, scales and items generated in this research should be further validated in future research. It would develop the BMI theory further, and eventually be used for practical application in Envision project (or other EU projects).

6.2.Theoretical and practical implication

6.2.1. Theoretical Implication

This study adds some contribution to the existing literatures. **First**, a contribution was made to the BMI literatures by offering a unified conceptual model. It consists of a set of hypotheses of relationships between BMI, business performance, innovativeness, and environmental turbulence. These hypotheses were formulated based on information found from existing studies. Most of the support for the hypothesis came from qualitative studies which provide rich information on the construct of interest due to its nature of providing understanding (Firestone, 1987; Jick, 1979).

The investigation of the relationship between the four concepts were done separately in past studies, thus it was fragmented and offered partial insights. Most BMI literatures were just focusing on its relationship with business performance, but still little research connect it to innovativeness. Environmental turbulence were also more commonly connected to product innovation, not specifically to BMI. By connecting the concepts and investigating the relationships between them, a new theory can be formulated.

Hence, through the proposed unified conceptual model, this research provides a set of testable hypothesis, formulated based on existing qualitative studies .These hypothesis can be tested in future quantitative research, which is especially important, considering the lack of empirical quantitative BMI research. Empirical result in quantitative studies is important to supplement qualitative findings (Jick, 1979).

Secondly, the meta-analysis done in this research served as the basis for providing more clarity to BMI concept. A qualitative meta-analysis was performed to help identifying concepts, variables, and measurements that are related to BMI. Network analysis was also utilized in this meta-analysis to visually represent these relationships. The result of this meta-analysis provided initial evidence for the relationships of BMI with other concepts, as largely described in qualitative research.

This research's meta-analysis is different than most meta-analysis studies in innovation domain in the past. Previously, existing meta-analysis did not touch the concept of BMI, and more focused on other aspect of innovations such as innovation process effect to performance (Rosenbusch et al., 2011), innovation characteristics effect on innovation adoption (Tornatzky & Klein, 1982) and organization innovation (Damanpour, 1991). These studies may give insights on the outcome of innovation in general but not specifically on the outcome of BMI.

There were also some existing meta-analysis in business model domain. Morris and colleagues (2005) tried to classify business model definitions and made standardized framework for characterizing business model based on their level of decision making. Meanwhile Al-Debei and Avison (2010) tried to connect business model to other concept such as strategy, business process and information system. Other study by Zott, Amit, and Massa (2011) aims to compare existing business model literatures by its purpose, its antecedent, the mechanism, and outcomes of business model. These meta-analysis are useful in gaining insights on business model itself, but it did not explore more on the business model innovation and its effect on business performance or innovativeness.

This research's meta-analysis is very specific in BMI, not only innovation in general or business model. This research focuses on the innovation that was done on the business model, thus both concept formed a new single concept. By putting specific context in understanding BMI, it can help in ensuring measurement's validity. Measuring BMI with invalid measurements may yield wrong conclusion, thus hampering future decision making. This is crucial, especially because BMI can be seen as a composite innovation type, which consists of many other innovations such as product, process, marketing, and organization innovation. In short, BMI is a complex concept which needs a specific and thorough investigation.

The use of meta-analysis, helps to disentangle the complexity in existing qualitative BMI research. It has been shown through the meta-analysis that BMI are connected to other concepts such as innovativeness

and business performance, which are more common concepts. It has also been identified that BMI has inconsistent relationship with business performance, most-likely due to another moderating variable. Moreover, Various non-standard existing BMI measurements were also identified in meta-analysis. These meta-analysis findings indicate that BMI is indeed a new and complex concept that needs to be clarified. Hence,through meta-analysis, this research shows the importance of quantitative studies in BMI field, which are still very limited.

Quantitative studies can synthesize findings and provide generalization to existing knowledge in BMI, which are mostly generated by qualitative studies. Survey result, with the help of statistical analysis, can check the causality between concepts and variables described in qualitative studies. Although the number of quantitative studies included in this research's meta-analysis are still very few, this meta-analysis is still a significant contribution to BMI literature, since there has not been a decent meta-analysis study specifically for BMI.

Third contribution of this research would be the introduction of the environmental turbulence to the relationship between BMI and business performance. This moderator was introduced in the conceptual model due to the inconsistencies of the relationship between BMI and business performance found in the meta-analysis. Some studies reported weak correlations (Cucculelli & Bettinelli, 2015; Hartmann et al., 2013; Kim & Min, 2015; Velu, 2015), but there are also studies that reported moderate (Abd Aziz & Mahmood, 2011) and strong correlations (H.-C. Huang et al., 2012; Zott & Amit, 2007, 2008). These inconsistencies were the indicator of the need of moderating variables (Hunter & Schmidt, 1990; Sharma et al., 1981; Walsh et al., 2008).

The hypothesized moderating effect of environmental turbulence to the relationship between BMI and business performance was not found in other existing studies.The research by Siguaw and colleagues (2006) have used environmental turbulence as moderator but it is not between BMI with business performance, but between innovation orientation and business performance. Another research by Calantone and colleagues (1997) was using environmental hostility as a moderator between product innovation to the product performances. Meanwhile, the research by Zahra & Bogner (2000) investigated the role of a competitive environment in affecting technology strategy relationship with business performance. Hence, this hypothesized moderating effect of environmental turbulence to BMI is a new development in the domain of innovation and open up new agenda for future research.

Fourth, the measurements in this research were specifically developed for SMEs. This was considerably different from existing quantitative studies selected in meta-analysis, especially for BMI and business performance measurements. Most of these studies have large firms or a mix between large firms and SMEs as their samples, thus the level of questionnaire difficulty might not be completely adjusted for people working in SMEs. In this research, the words, sentences, terms, type of questions (open-ended or closed-ended) were frequently discussed among fellow researchers/member of the Envision project by taking SME's respondent's level of comprehension into account. The questionnaire went through several iteration of revisions to ensure high level of clarity.

The selection of profitability as the main variable to measure business performance and the exclusion of market value were also based on the nature of most SMEs. This thinking was adapted from the study of Brannback and colleagues (2014) which argued that most SMEs will not be thinking of growth, but rather on profitability. This is different from the thinking of Zott & Amit (2007, 2008) which used market value as its business performance indicator for SMEs.

They used market value based on the thinking that the expected performance of a firm in the future might be more suitable to be used compared to relatively small current realized performance (such as profitability and sales). Hence, the measurement instrument developed specifically for SMEs might provide better level of comprehension from the respondents perspective, and can provide more useful insights for the survey administrator.

Fifth, from the **perspective of Management of Technology (MOT)** , the topic (BMI) and result of this research is very relevant for the program. It connects several aspects, have multi-actors involved, and taking societal impact into consideration.

Innovating solely in technology without a good business model to commercialize it is considered less beneficial as good business model can beat good technology (Chesbrough, 2007). When firms cannot formulate a good business model to capture the value of technological innovation, then it will less likely improve their business performance. Furthermore, if the innovation in technology cannot be commercialized, less companies will adopt it, thus there will be less societal impact.

Business model can act as a "device" to communicate firm's technological innovation and its value to the investors, business partners in the network, and customers (Doganova & Eyquem-Renault, 2009). When those stakeholders can understand the value of the technological innovation, then firms will have the possibility of capturing the value the innovation. Furthermore, a business model can act as a "template" or "recipe" to understand a success of a firm (Baden-Fuller & Morgan, 2010). When a "recipe" is available, then business model can be imitated or replicated by other firms, thus improving other firm's business performance as well. Looking from a bigger perspective, new startups or firms can emerged with the adoption of these "recipes", which can increase employment rate, and improve economic growth.

This business model could be changed due to internal or external circumstances, through business model innovation process. Knowing that business model is crucial for firms and the society, then it is necessary to understand what a business model innovation is. One way to provide this understanding is by measuring it using valid measurements. The development of BMI measurements was done deductively, which relied heavily on theoretical definitions, especially on business model, innovation, and BMI literatures. Furthermore, face validation was conducted to improve the clarity and relevancy of measurements. Both of these procedures are essential to ensure overall validity of the measurements, especially construct validity. Hence, this research have provided a way to get better understanding of BMI, which in turn will help in creating greater societal impact.

6.2.2. Practical Implication

Sixth, this research served as an initial exploratory research for Envision project. The project needs a measurement instrument that can be used to annually assess the effect of BMI to business performance and innovativeness. Even though there are still more steps that should be done in validating the measurements suggested in this research, it can still be served as a basis for further development.

This research has done several important initial steps for Envision project, such as extensive literature review and meta-analysis. These steps reflect the deductive method of measurement development in this research, which are known to be time consuming. Thus, this research has saved a considerable amount of research time for the Envision project.

When the measurements have been fully developed in future research (perhaps by Envision members), it can potentially give the European Commission a valid and reliable tool to improve their policy making. Annual survey on BMI in SMEs can be conducted and the result can be utilize as the evidence to formulate certain policies.

These new policies might be tailored to SMEs needs as the measurement instrument was designed according to SMEs characteristics. It should provide a strong addition to the current Small Business Act (SBA) policy. In the research background, it has been shown that *access to finance*, *entrepreneurship*, and *skills and innovation* are three of the most significant SBA challenges for SMEs. The problem of entrepreneurship is more on the lack of financial support, which also closely related to access to finance.

Policies that support the innovation in business model can potentially addressed the three main SBA challenges. Developing a sound business model will increase the chance for SMEs and entrepreneurs to attract investors. Innovating the business model in terms of the value network can also provide SMEs with

new business partners that can provide other resources to compensate lack of financial resources. Furthermore, when the innovation in business model can be facilitated through policies support, it may help SMEs in converting innovation ideas into a commercial product/service offering. Without facts and evidences as the basis of formulating the BMI policies, the policy makers might find it hard to justify the new policies.

Communicating the concept of BMI and the use of measurement instrument is another challenge. Most of SMEs are micro enterprises, which may not consider a sophisticated term such as BMI. They may rely on the common best practices that were used since years ago, especially if it is a family business. Creating a success story might work well to communicate the advantages of BMI and persuade the SMEs in implementing BMI. The annual survey that would be conducted by Envision project should help in providing these facts. This research believes that communication about BMI should be done continuously by the European Commisison and the governments in each country. It would need a lot of time, money, and effort, but it would be beneficial in the long term.

In the long term, if the BMI survey can be continuously conducted and the result can be widely published, it may increase the awareness of the BMI importance to SMEs. Decision makers in SMEs might develop a greater awareness on the strength and weaknesses of their business model. Thus, the tendency to conduct BMI can be larger in the future and BMI implementation will be more common.

Meanwhile, the **seventh implication** can be seen from the perspective of SMEs itself.In the research background, it has been shown that SMEs main problem is finding customers, aside from the access to financial capital. They need to find different customers that are interested in their product/service offerings or they might have to change their current product/service offerings. Moreover, it might not be the only factor that hindered them in finding customers, but also caused by other elements of business model.

Firms are not operating in a vacuum environment, but instead, they are operating in an ecosystem where there are other actors as well. This notion of ecosystem is especially relevant for SMEs. A high performance SMEs are associated with their effort in accessing scarce resources through external collaboration. This shows the importance of value network element in business model.

Firms might not be able to find customers because of their current partners cannot provide the necessary components in a lower price, thus making the product/service pricing unappealing to customers. The lack of access to different kind of resources from external partners can also hinder them in making product/service innovations, making it similar to competitors without a competitive advantage. In short, there is a need to change the business model in SMEs.

The result of this research would be a foundation for measuring the changes in SMEs business model, and its effect to their business performance. SMEs can make a self-assessment using this measurement instrument to identify whether they have implemented BMI in their firms, and whether it has an effect in their business performance. Annual self-assessment should be conducted to see the trends and to provide more meaningful insights.

Using the measurement instrument itself would not change the condition in SMEs. It can only served as the basis for strategic decision making. The result of the survey or assessment would need to be analyzed and followed up. Top management or owner support and involvement is particularly important. BMI will involve changes within the firms, which might yield internal resistance. Constant communication, ensuring transparency, leading by example, and conducting feedback sessions might ease the resistance from employees.

If SMEs can utilize the measurement instrument well, they might be able to change their business model into a disruptive business model. This kind of business model enables them to target unserved customers that are not the focus of large firms. The measurement instrument can be the initial solution to the most pressing problem of SMEs (of finding customers), if it can be well communicated and well implemented. In

the long term, disruptive business model innovation in many SMEs can create large-scale disruption in the industry and may mark the beginning of the industry renewal period.

6.3.Limitations of the research

The **first** limitation is on the limited procedure that can be done for validating the questionnaire, due to time constraint. The validation procedure was only done until Face Validation, as per research objective. Meanwhile, there are still some crucial steps that could have been done: data collection, factor analysis, reliability and construct validity assessment, and norm development. As discussed in chapter 5, as datas has not yet been collected, statistical conclusion validity, construct validity, and internal validity are that are still under threat due to this incomplete procedure. Therefore, although it is already face valid, the measurements developed in this research still cannot be guaranteed for its reliability and validity.

Second limitation came from the design of the research. This research is targeting SMEs in EU region as its main subject, which is aligned with Envision project objective. Hence, the design of the questionnaire, selection of variables, and wording of the items were all adjusted to European SMEs respondents. There might be other variables that could have been included if the research targets larger firms or if the firms are located in other region. Thus this research might not be generalizable, have less impact on a larger population and suffering lack of external validity.

Third, there was a limitation also on face validation step. This research has only found limited number of judges, especially for the second stage of face validation. While the first stage of face validation used a reasonable number of six judges, the second stage of the face validation was only using a single judge due to time limitation. Hence, the judgment made in second stage might suffer from reliability because it cannot be compared to other judges in the same stage.

Fourth limitation is on the quantitative approach used in this research. BMI is a concept that can be further drilled down into two different concepts, business model and innovation. Business model has many definitions and elements which can affect our understanding. Innovation also has many characteristics and determinants which are complex enough to be discussed on its own.. Each of these concepts are complex on its own, hence it is more complex when they are combined.

There are many aspect connected in BMI.The implementation of BMI is related to many other external parties, on top of its own internal capabilities. There are also several steps of implementing BMI, which should be carefully planned by the top management. Involvement and support from all employee throughout the firm is also crucial on the success of BMI implementation. BMI implementation should also fit with the external environment so the resulted new business model will be sustainable for the long term. These interconnections made BMI a complex concept that might need extensive investigation to fully understand it.

The set of proposed variables and measurements in this research may not be enough to tackle the complexity of BMI concept. There might be missing variables or measurements that should have been included in this research. This shows that BMI is a complex concept that might not be sufficiently analyzed by quantitative approach alone.

6.4.Recommendation for future research

After identifying the limitations of this research, future research direction can be described. The **first**, and most important future step that can be taken is to continue the validation processes. Data should be collected from small group of sample. This data can be used to conduct a factor analysis. If both EFA and CFA would be done, then it is important to have a large sample size. The result of EFA and CFA should be then assessed for its reliability and construct validity. The last step would be developing norms to provide

mental standard of evaluating the result of actual survey using the finalized measurement instrument. The details of steps that need to be taken can be found in the previous chapter.

Secondly, this research should look into the other work package of the Envision project, especially Work Package 5. This work package can provide additional insights as it used qualitative method in finding relevant variables of BMI and the pattern of BMI practices in SMEs. These findings can be used for further revision of the questionnaire as there might be new variables that were not included in this research. Work package 2 can also used the result of this research, especially in identifying the kind of BM tooling that SMEs prefer or frequently used. It will be the basis in developing new kind of BM tooling in the future.

The addition of qualitative approach on top of quantitative approach in understanding BMI indicates the use of triangulation or mixed methods (Jick, 1979). Looking from validity perspective, triangulation provides cross-validation on the result, especially on external validity.There are several design of this mixed method, and two of them can be suggested for the follow up of this research: convergent-parallel design and explanatory sequential design (Creswell & Clark, 2007). As can be seen from its name, the prior is a parallel process while the latter is a sequential process.

In convergent-parallel design, the result of this research's quantitative approach can be compared to other qualitative research that might have been done in parallel by other Envision project members. Future researchers can then assess whether both research have same agreement on BMI implication to business performance and innovativeness. Additional variables might also be identified from qualitative research, which might have not been used in quantitative research. Meanwhile in explanatory sequential design, the abstract level resulted from quantitative method can be further explained by the richness of information from qualitative method (Firestone, 1987). When there is an unexpected result, future researchers can conduct additional interviews with SMEs employees to seek deeper explanation.

Third, when BMI has become a more common topic in the future and more studies are available, a quantitative meta-anaysis can be conducted. This will bring additional insights, complementing the qualitative meta-analysis result in this research, to the BMI literatures. Some relationships (between BMI and other concepts) might be found as less significant than what researchers might have think of from this research.

As suggested by Burns and Burns (2008), future researchers need to identify relevant variables and locate the relevant studies first before conducting meta-analysis. The heart of meta-analysis is the statistical combination of studies, which can be by comparing or combining effect sizes of those studies. The effect size is more preferred than p-values because it can provide better estimate of the impact of a variable (Burns & Burns, 2008). Employing *r* as effect size estimate is more preferable than standardized mean differences *d* (Rosenthal, 1991) and also more preferable than r^2 (Hunter & Schmidt, 1990). Other detailed principles and procedure of conducting meta-analysis can be found in other studies (Egger, Smith, & Phillips, 1997; Hunter & Schmidt, 1990; Rosenthal, 1991).

Fourth, future research might want to add another step of face validation. The second stage face validation of this research was only using a single judge, thus its reliability might be compromised. Adding several other judges (perhaps four or five more judges) can improve the reliability. To select the judges, future researchers can follow the guidance from Nevo (1985): people who will actually fill in the questionnaire, people who will use the result (for analysis, etc), or people from the general public.

There are several method of measurements in face validation: using dichotomous scale (Suhonen et al., 2000), three point scale (Zaichkowsky, 1985), or five point scale (Nevo, 1985). A decision rule to drop or retain items should also be determined. Hardesty and Bearden (2004) suggested the use of "sumscore" or "complete" decision rule, where "sumscore" will assign a value for each rating while "complete" will only assign a value to the highest rating. For more detail on decision rule, please refer to the study by Hardesty and Bearden (2004).

The inter-rater reliability for face validation that involves nominal scale and two judges can be assessed using Cohen Kappa formula (Fleiss, 1971; Rücker, Schimek-Jasch, & Nestle, 2012). When the face validation involves nominal scale but has more than two judges, Fleiss Kappa can be used (Fleiss, 1971). For ordinal or interval measurement level, assessing interrater reliability is more complex as it differentiate interrater reliability and interrater agreement (Tinsley & Weiss, 1975). For ordinal level, Finn's *r* can be used, while intraclass correlation (*R)* can be used for interval level (Tinsley & Weiss, 1975).

Fifth, future research can be improved on its generalizability or its external validity. This research only focused on SME in EU region, which is a relatively specific scope. Future research can try to consider three type of validity to improve external validity: population validity, time validity, and environmental validity (Ihantola & Kihn, 2011).

Adding large firms into the sample selection can improve population validity. Furthermore, using large sample size and using random sampling will also increase population validity. Meanwhile, increasing time validity is important especially when the relationship between constructs of interest can change over time. Conducting longitudinal survey may improve the time validity as it will assess the relationship in different point of time.

Last but not least, future research can try to use samples from firms from other region outside Europe. This will set a different environmental settings for the research to assess the environmental validity. By improving these three type of validity,generalizability of the result might be improved also. When the findings are more generalizable, the impact can be greater for wider society as well.

It might be challenging for a single researcher to achieve these three type of validity, especially in finding the samples. Hence, future researcher might need to seek assistance from fellow researchers, either from their own university or from other university. Some other bodies might also be instrumental, such as statistical offices which might help in distributing annual survey for achieving time validity. Seeking help from others might be helpful in achieving better external validity.

6.5.Reflection

Finally, this section will give a reflection to the overall process and result of this research. It will highlight the obstacles and personal findings on the research. Some notes on this self-reflection are listed below.

The "newness" and complexity of the concept.
This research aims for developing measurements, especially for BMI because it is a relatively new concept. Even though BMI is a very interesting concept, this concept has a broader context than other type of innovation. In fact, Barjak and colleagues (2014) said that BMI are a composite type of innovation, made of the combination of other type of innovations such as product innovation, process innovation, organization innovation, and marketing innovation.

Furthermore, the quantitative empirical research in BMI is also still lacking, thus it is quite hard to find relevant previous research that can be used in quantitative meta-analysis. Thus, in a sense, it is not easy to get a thorough understanding of the concept at the initial stage of the research. Even though, it emphasizes the importance of this research to further develop the theory that are related to BMI.The qualitative meta-analysis that was used may not be the perfect method, but it was needed to speed up the process of understanding the concepts of BMI. Relationships and variables were identified and were qualitatively analyzed. These aspects provided some basis for the development of the initial questionnaire items.

On the other hand, innovativeness was also quite a complex concept. At first, this research only related it to the "tendency to innovate". But after reviewing more and more literatures, it can also be related to the "capacity to innovate". Previous research have already used a scale of innovativeness, especially on the

tendency to innovate, but this research tried to divided it more into several scales to get more understanding on the concept. In the end it might be too specific, and needs to be grouped back into a more general scales to reduce the length of the current questionnaire.

The difficulty of developing questionnaire items

In generating the initial items based on the blueprint, this research encountered several challenges. **First**, the existing items from existing studies were mostly deemed unsatisfactory. This is because the items were too general, thus might cause ambiguous meaning for the respondents. In addition, some double-barreled items were also found in existing studies. Therefore, existing available items were modified, aside from totally the newly created items. **Secondly**, because the measurement instrument is intended for people who work in SMEs, which may not familiar with sophisticated term such as business model, extensive time-consuming iterations were made to find simpler words to represent the concepts

Some authors from previous studies (Hinkin, 1998; Martin, 2006) said that developing a questionnaire items are more of an art than science. This was actually true, looking at the series of revision iterations that the items have gone through in this research. At first, it might look simple to write some sentences as the questionnaire items. But it is not that simple to make everybody understand that sentence, especially when the sentence is related to a difficult concept that is hard to explain. This is especially true when the target respondents have various educational background and level. Thus, we recommend researchers to develop some experience in developing questionnaire items, and asking advice from some of the more experienced researchers.

The use of Face Validation

This validation method is the only validation step conducted in this research. This is the best step this research could have taken, considering the time limitation. It has been known from the start of the research that developing new measurements might take a long time, especially when the concept is relatively new. Deductive method used (which relies on theoretical definition) requires a significant amount of time as researcher need to fully understand the definitions, dimensions, attributes of the concepts. Even though it is not enough, face validation can increase the probability of achieving construct validity in future research.

Nevertheless, efforts has been done to maximize reliability and validity. Measurements were developed based on theoretical definitions and previously validated existing measurements, multi-item measures were generated to be able to increase scale reliability, multiple concepts were used to be able to check convergent, discriminant, and nomological validity, Fleiss Kappa formula was used to assess inter-rater reliability, and control variables were used to increase internal valildity. These efforts will be useful particularly when the measurement instrument is going to be further validated in future research.

The limited generalizability

Looking from validity perspective, external validity is probably the biggest concern in this research. But this research does not see it as a problem because the objective of this research is indeed specific for European SMEs. Different from large firms which have 'material or resource advantages', SMEs have 'behavioural advantage'. This may affect their perception and decision towards innovation, more specifically, business model innovation. The location of the SMEs also affected the measurement instrument design. Every country or region has their own culture and culture, thus the context of the items might be understood differently in different regions.

Decreasing degree of external validity can in turn increase the degree of internal validity. The result of this research can be fully maximized to gain deep insights regarding BMI implication to business performance and innovativeness in European SMEs environment. After all, from the research background, we have seen that SMEs are the main engine of economic growth, thus it is important to support them.

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APPENDIX A - Definitions & Operationalization Tables

Table A1 - Definitions of Business Model

Author	Definition	Keywords
Timmers, 1998	The business model is “an architecture of the product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; a description of the sources of revenues”	architecture, business actor, benefit, source of revenue
Linder & Cantrell, 2000	"A business model, strictly speaking, is the organization's core logic for creating value" :When people say "business model," they're really talking about three different kinds of things: components of business models, real operating business models, and what we call change models."	creating value, components, operating models, change models
Afuah & Tucci, 2001	"Business Model Is about the value that a firm offers its customers, the segment of customers it targets to offer the value to, the scope of products/services it offers to which segment of customers, the profit site it chooses, its sources of revenue, the prices it puts on the value offered its customers, the activities it must perform in offering that value, the capabilities these activities rest on, what a firm must do to sustain any advantages it has, and how well it can implement these elements of the business model."	value that firm offers, customers, scope of products/services, profit site, source of revenue, price, activities to create value, capabilities required, advantage sustainability
Amit & Zott, 2001	The business model depicts “the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities”	transaction content, transaction structure, transaction governance
Winter & Szulanski, 2001	The formula or business model, far from being a quantum of information that is revealed in a flash, is typically a complex set of interdependent routines that is discovered, adjusted, and fine-tuned by "doing."	interdependent routines
Chesbrough & Rosenbloom, 2002	The business model is “the heuristic logic that connects technical potential with the realization of economic value”.	technical potential, realization of economic value
Magretta, 2002	Business models are “stories that explain how enterprises work. A good business model answers Peter Drucker’s age old questions: Who is the customer? And what does the customer value? It also answers the fundamental questions every manager must ask: How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?”	customer, customer value, how to make money, value delivery

Author	Definition	Keywords
Mangematin et al, 2003	"A business model describes a category of firm in relation to the market it targets, its expected growth, its modes of governance, and the organisation of its activity." "Each business model has its own development logic which is coherent with the needed resources—customer and supplier relations, a set of competencies within the firm, a mode of financing its business, and a certain structure of shareholding."	target market, growth, governance, organization activity, resource, external relation, internal competencies, mode of financing, shareholder structure
Mitchell & Coles, 2003	A business model comprises the combined elements of "who", "what", "when", "why", "where", "how", and "how much" involved in providing customers and end users with products and services.	elements, customers, providing products and services
Rajala et al, 2004	"business model spells out how a company makes money by specifying where it is positioned in the value chain, or a value net."	how to make money, value chain, value net
Morris et al., 2005	A business model is a "concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets". It has six fundamental components: Value proposition, customer, internal processes/competencies, external positioning, economic model, and personal/investor factors.	decision variables, strategy, architecture, economics, competitive advantage, Value proposition, customer, internal processes/competencies, external positioning, economic model, and personal/investor factors.
Downing, 2005	"..the idea of a business model, which is a set of expectations about how the business will be successful in its environment"	expectation, environment
Shafer, 2005	we define a business model as "a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network."	core logic, strategic choices, value creation, value capture, value network
Osterwalder & Pigneur, 2005	"a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams".	business logic, value offering, customer, architecture, network of partners, value creation, value marketing, value delivery, relationship capital, profitable and sustainable revenue stream
Johnson, Christensen, & Kagermann, 2008	Business models "consist of four interlocking elements, that, taken together, create and deliver value". These are customer value proposition, profit formula, key resources, and key processes.	interlocking elements, value proposition, profit formula, key resources, key processes

Author	Definition	Keywords
Doganova & Eyquem-Renault, 2009	"… business model works as both a calculative and a narrative device. It allows entrepreneurs to explore a market and to bring their innovation – a new product, a new venture and the network that supports it – into existence."	calculative device, narrative device, expore market, innovation, network
Lindgardt, Reeves, Stalk, & Deimler, 2009	"A business model consists of two essential elements- value proposition and operating model. The value proposition answers the question, What are we offering to whom? The operating model answers the question, How do we profitably deliver the offering?"	value proposition, operating model
Casadesus-Masanell & Ricart, 2010	Business Model refers to "the logic of the firm, the way it operates and how it creates value for its stakeholders"	operational logic, value creation, stakeholders
Teece, 2010	“A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value”	value proposition, customer, structure of revenue and cost, value delivery
Osterwalder & Pigneur, 2010	"the rationale of how an organization creates, delivers, and captures value"	value creation, value delivery, value capture
Baden-Fuller & Morgan, 2010	"The notion of a business model as a recipe captures something quite essential about a firm’s behaviour. The concept ‘business model’ can be said to define the business’s characteristics and its activities in a remarkably concise way, in other words, in a way that matches the generic level that defines a kind or type of behaviour (neither too general nor too particular in its detail) but that also suggests why it works, because it embodies the essential elements and how they are to be combined to make them work."	recipe, firm's behaviour, business characteristic, combination of elements
Doz & Kosonen, 2010	"Business models can be defined both objectively and subjectively. Objectively they are sets of structured and interdependent operational relationships between a firm and its customers, suppliers, complementors, partners and other stakeholders, and among its internal units and departments (functions, staff, operating units, etc). But, for the firm’s management, business models also function as a subjective representation of these mechanisms, delineating how it believes the firm relates to its environment. business models stand as cognitive structures providing a theory of how to set boundaries to the firm, of how to create value, and how to organise its internal structure and governance."	relationships between firm and stakeholders, boundaries, environment, value creation, internal structure, governance

Author	Definition	Keywords
Itami & Nishino, 2010	"a business model is composed of two elements, a business system and a profit model, hence the term business model. A business system is the 'system of works' (the production/delivery system) that a firm designs - within and beyond its boundaries - to deliver its products or services to its target customers. A profit model is a pattern of the firm's intention about how it will make a profit in its given business, i.e. how it plans to increase sales and/or reduce costs."	business system, profit model, product and service delivery, target customer, profit, sales increase, cost reduction

Table A2 - Business Model Elements

Author	Elements
Timmers, 1998	architecture, business actor, benefit, source of revenue
Linder & Cantrell, 2000	Pricing Model, Revenue Model, Channel Model, Commerce process model, Internet-enabled commerce model, Organizational Form, Value Proposition
Afuah & Tucci, 2001	value that firm offers, customers, scope of products/services, profit site, source of revenue, price, activities to create value, capabilities required, advantage sustainability
Amit & Zott, 2001	transaction content, transaction structure, transaction governance
Chesbrough & Rosenbloom, 2002	value proposition, market segment, value chain, cost structure & profit potential, value network, competitive strategy
Hedman & Kalling, 2003	customers, competitors, offering, activities & organization, resources, supply factor & production inputs, scope of management
Morris et al., 2005	Value proposition, customer, internal processes/competencies, external positioning, economic model, and personal/investor factors.
Shafer, 2005	Strategic Choices, Value Creation, Value Network, Value Capture
Osterwalder & Pigneur, 2005	value proposition, target customer, distribution channel, relationship, value configuration, core competency, partner network, cost structure, and revenue model
Johnson, Christensen, & Kagermann, 2008	value proposition, profit formula, key resources, key processes
Bouwman, De Vos, & Haaker, 2008	Service, Technology, Organization, Finance
Doganova & Eyquem-Renault, 2009	Value Proposition, Architecture of Value, Revenue Model
Lindgardt, Reeves, Stalk, & Deimler, 2009	Target segments, product or service offering, revenue model, value chain, cost model, organization
Teece, 2010	value proposition, customer, structure of revenue and cost, value delivery
Itami & Nishino, 2010	business system, profit model, product and service delivery, target customer, profit, sales increase, cost reduction
Giesen et al, 2010	What value is delivered to customer, How the value is delivered, How revenue is generated, How the company positioned itself in the industry
George & Bock, 2011	resource structure, transactive structure and value structure
El Sawy & Pereira, 2013	value proposition, interface, service platforms, organizing model, revenue model

Table A3 - Definitions of Business Model Innovation

Author	Definition
Mitchell & Coles, 2003	"A business model comprises the combined elements of "who", "what", "when", "why", "where", "how", and "how much" involved in providing customers and end users with products and services.. A business model replacement entails improving at least four of these business model elements versus the competition. When a company makes business model replacements that provide product or service offerings to customers and end users that were not previously available, we refer those replacements as business model innovations."
Pohle & Chapman, 2006	"Innovation in the structure and/or financial model of the business"
Markides, 2006	"Business-model innovation is the discovery of a fundamentally different business model in an existing business "
Lindgardt, Reeves, Stalk, & Deimler, 2009	"Innovation in business model is more than mere product, service, or technological innovation. It goes beyond single-function strategies, such as enhancing the sourcing approach or sales model." "Innovation becomes BMI when two or more elements of a business model are reinvented to deliver value in a new way"
Demil & Lecocq, 2010	The observable sign of BM evolution is "a substantial change in the structure of its costs and/or revenues - from using a new kind of resource, developing a new source of revenues, reengineering an organizational process, externalising a value chain activity - whether triggers deliberately or environmentally."
Heikkila et al, 2010	"… for innovating and expressing prospective business models, it should include the following components: customers, service, organization, finance, technology".
Teece, 2010	"Changing the firm's business model literally involves changing the paradigm by which it goes to market, and inertia is likely to be considerable."
Doz & Kosonen, 2010	"We have observed successful business model renewal and transformation as being one of the main outcomes of strategic agility: Strategic Sensitivity, Leadership Unity, Resource Fluidity"
Casadesus-Masanell & Zhu, 2013	"At root, business model innovation refers to the search for new logics of the firm and new ways to create and capture value for its stakeholders"
Hartmann & Oriani, 2013	"we define business model innovation as the modification or introduction of a new set of key components – internally focused or externally engaging – that enable the firm to create and appropriate value."
Barjak et al, 2014	"..we consider business model innovations (BMI) as changes of all three components of business models, 1) value creation, 2) business systems, and 3) revenue generation."
Cortimiglia et al, 2015	"There is no precise definition of BMI (Schneider and Spieth, 2013), but studies on the topic revolve around two themes: BM design (entrepreneurs creating new BMs from scratch) and BM development (managers improving current BMs) (Zott and Amit, 2010; Schneider and Spieth, 2013; Ghezzi et al., 2014)."

Table A4 - Result of Business Model Element Counting

Adjusted Category	Author																	TOTAL
	Timmers, 1998	Linder & Cantrell, 2000	Afuah & Tucci, 2001	Amit & Zott, 2001	Chesbrough & Rosenbloom, 2002	Hedman & Kalling, 2003	Morris et al., 2005	Shafer, 2005	Osterwalder & Pigneur, 2005	Johnson, Christensen, & Kagermann, 2008	Bouwman, De Vos, & Haaker, 2008	Doganova & Eyquem-Renault, 2009	Lindgardt, Reeves, Stalk, & Deimler, 2009	Teece, 2010	Itami & Nishino, 2010	Giesen et al, 2010	George & Bock, 2011	El Sawy & Pereira, 2013	
value proposition		x	x		x	x	x		x	x		x	x	x		x		x	**12**
revenue model	x	x	x						x			x	x	x	x	x		x	**10**
target segment			x		x	x	x		x				x	x					**7**
value network	x				x			x	x				x						**5**
cost structure					x				x				x	x	x				**5**
organization		x				x					x		x						**4**
resources						x			x	x							x		**4**
internal capabilities			x				x		x										**3**
value delivery														x	x	x			**3**
channel		x							x										**2**
processes									x	x									**2**

Table A5 - Business Model Innovation Operationalization Result

BMI Dimension	BMI Variable	Definition	Source
Novel Value Proposition	New Product/Service	"A Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer" (Osterwalder, 2004).	Osterwalder, 2004
	New Target Customer		Beane & Ennis, 1987; Osterwalder, 2004
Novel Business System	New Internal Capabilities	"A capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer" (Osterwalder, 2004). "The term 'core competency' is used to capture an internal capability or skill set that the firm performs relatively better than others" (Morris et al., 2005).	Osterwalder, 2004; Morris et al, 2005
	New Value Network	Value network is the link between the firm and its suppliers, customers, complementors and competitors (Chesbrough & Rosenbloom, 2002). The firm (and each other business actors) will have a certain role in this network (Shafer et al., 2005).	Chesbrough & Rosenbloom, 2002; Moore, 1993; Shafer, Smith, & Linder, 2005
	New Resources	Key resources are "the resources needed to deliver the customer value proposition profitably. It might include people, technology, products, equipment, information, channels, partnerships, alliances, brand" (Johnson et al., 2008). Firm's resources can be classified into three categories: physical capital resources, human capital resources, and organizational capital resources (Barney, 1991).	Barney, 1991; Johnson, Christensen, & Kagermann, 2008
	New Processes	Key processes are "the processes as well as rules, metrics, and norms that make the profitable delivery of the customer value proposition repeatable and scalable" (Johnson, Christensen, & Kagermann, 2008).	Johnson, Christensen, & Kagermann, 2008
	New Value Delivery	Value delivery is related to value chain and channels. Value chain answers the question, "how are we configured to deliver on customer demand? What do we do in-house? What do we outsource?" (Lindgardt, Reeves, Stalk, & Deimler, 2009). "A distribution channel is a means of getting in touch with the customer" (Osterwalder, 2004)	Itami & Nishino, 2010; Lindgardt, Reeves, Stalk, & Deimler, 2009; Osterwalder, 2004
Novel Value Capture	New Revenue Model	"The revenue model describes the way a company makes money through a variety of revenue flows" (Osterwalder, 2004). It can reflected from its revenue streams, promotion/marketing technique, and pricing mechanism	Osterwalder, 2004
	New Cost Structure	"The Cost Structure is the representation in money of all the means employed in the business model" (Osterwalder, 2004). It consists of fixed costs and variable costs.	Osterwalder, 2004
BMI Design	Use of BM Ontology	A business model (BM) ontology can be defined as "a set of elements and their relationships that aim at describing the money earning logic of a firm" (Osterwalder, 2004).	Osterwalder, 2004

BMI Dimension	BMI Variable	Definition	Source
	Use of BM Tooling	"Business Model (BM) tooling aims at analyzing Business Model in terms of its viability and feasibility, focusing on one or more operational aspects of Business Model implementation" (Solaimani, 2014).	Solaimani, 2014
BMI Implementation	General Process	Related to strategy of the firm and experimentation	Sosna et al; 2010; Teece, 2010; Clausen & Rasmussen, 2012; Doz & Kosonen, 2010; Ireland, Covin, & Kuratko, 2009; Ireland et al., 2003; DaSilva & Trkman, 2013
	Use of Operating Model	Operating model is "the necessary level of business process integration and standardization for delivering goods and services to customers" (Ross, Weill, & Robertson, 2006, p. 8). It can also be defined as "a high-level design of the organization that defines the structure and style which enables it to meet its business objectives" (Slack, Chambers, Johnston, & Betts, 2009).	Ross, Weill, & Robertson, 2006; Slack, Chambers, Johnston, & Betts, 2009
	Use of Enterprise Architecture	EA can be defined as "the organizing logic for business processes and IT infrastructure, reflecting the integration and standardization requirements of the company's operating model" (Ross, Weill, & Robertson, 2006).	Ross, Weill, & Robertson, 2006
BMI Outcome	BMI Radicalness	The change in majority of business model components can be considered a radical innovation, while the change in only one component regarded as incremental innovation (Hartmann, Oriani, & Bateman, 2013). Existing core processes will be changed in radical business model innovation, but it will be still retained in incremental business model innovation while adding or removing certain processes (Cavalcante, Kesting, & Ulhøi, 2011).	Cavalcante, Kesting, & Ulhøi, 2011; Hartmann, Oriani, & Bateman, 2013
	BMI Disruptiveness	Disruptive innovation introduces products or services that are underperforming compared to existing products or services but can be simpler, cheaper or more convenient for customers. (Christensen & Raynor, 2003). Eventually, this disruption can paralyze the industry leaders because they might have less flexibility or motivation to defend low end or new market (Christensen & Raynor, 2003). Thus, it can be said that disruptive innovation is the innovation that is new to the industry/market.	Christensen & Raynor, 2003
	BM Originality	"An incumbent firm may commit to original business model innovation by creating a new business model derived from its own technological breakthrough or endogenous reconfiguration of ways of doing business" (Kim & Min, 2015).	Aspara, Hietanen, & Tikkanen, 2010; Kim & Min, 2015
BMI Driver	Internal BMI Driver	"Internal factors include the outcomes of top (or middle) managers' teleological decision processes, but also the consequences of the dynamics within or between core components" (Demil & Lecocq, 2010).	Demil & Lecocq, 2010; Giesen, Riddleberger, Christner, & Bell, 2010

BMI Dimension	BMI Variable	Definition	Source
	External BMI Driver	"External factors refer to constraints occasioned by environmental changes, or to external 'jolts' which may disrupt the organization's usual functioning more abruptly" (Demil & Lecocq, 2010).	Demil & Lecocq, 2010; Han, Kim, & Srivastava, 1998; Jaworski & Kohli, 1993; Moore, 1993; Teece, 2010

Table A6 - Innovativeness Operationalization Result

Innovativeness Dimension	Variable	Definition	Source
Capacity to Innovate	Mean number of innovation adoption	Total number of innovation adoptions divided by the number of years when the adoptions occur (Subramanian & Nilakanta, 1996)	Subramanian & Nilakanta, 1996
	Mean Time of innovation adoption	How early the firm adopt the innovations. Early adopters will have higher scores than late adopters (Subramanian & Nilakanta, 1996)	
	Consistency of innovation adoption	How consistent the firms being early or late adopters (Subramanian & Nilakanta, 1996)	
	Degree of product/service newness	"'Innovativeness' is most frequently used as a measure of the degree of 'newness' of an innovation. 'Highly innovative' products are seen as having a high degree of newness and 'low innovative' products sit at the opposite extreme of the continuum" (Garcia & Calantone, 2002).	Garcia & Calantone, 2002
Tendency to Innovate	Market Orientation	A set of ongoing behaviors and activities related to generation, dissemination, and responsiveness to market intelligence (Jaworski & Kohli, 1993; Hult, Hurley & Knight, 2004)	Jaworski & Kohli, 1993; Hult, Hurley & Knight, 2004
	Learning Orientation	Organization-wide activity of creating and using knowledge to enhance competitive advantage (Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002).	Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
	Entrepreneurial Orientation	An entrepreneurial firm is one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with "proactive" innovations, beating competitors to the punch (Atuahene-Gima & Ko ,2001; Li, Liu, & Zhao, 2006; Naman & Slevin, 1993) .	Atuahene-Gima & Ko (2001); Li, Liu, & Zhao (2006); Naman & Slevin (1993)
	External Collaboration	Crucial resource such as financial capital required for developing and commercializing new products can be met with means of collaboration (Teece, 1996; Giesen et al., 2007, 2010; Pohle & Chapman, 2006; Moore, 1993).	Teece, 1996; Giesen et al., 2007, 2010; Pohle & Chapman, 2006; Moore, 1993
	Strategic Emphasis on Innovation	When the firm is following a strategy that is strategy-oriented, it is most likely that they will have high innovativeness (Aspara et al, 2010; Miles & Snow,1978)	Aspara et al, 2010; Miles & Snow,1978

Table A7 - Business Performance Operationalization Result

Business Performance Dimension	Variable	Definition	Source
Financial-based performance	Profit	Profit can be operationalized as Earnings Before Interest and Tax (EBIT) (Brannback et al., 2014)	Venkatraman & Ramanujam, 1986 ; Hult, Hurley, & Knight, 2004; Brannback et al., 2014
	Sales Growth	The change in company sales or revenue in a certain period of time, expressed in percentage	Venkatraman & Ramanujam, 1986 ; Hult, Hurley, & Knight, 2004

Table A8 - Environmental Turbulence Operationalization Result

Environmental Turbulence Dimension	Variable	Definition	Source
Environmental Hostility	Competitive Intensity	"Competitive intensity, can be defined as the magnitude of effect that an organization has on its rivals' life chances" (Barnett, 1997)	Jaworski & Kohli, 1993; Barnett, 1997
Environmental Dynamism	Market Turbulence	"…market turbulence reflects rapidly changing buyer preferences, wide-ranging needs and wants, ongoing buyer entry and exit from the marketplace, and constant emphasis on offering new products" (Hult et al., 2004).	Jaworski & Kohli, 1993; Hult et al., 2004;
	Technological Turbulence	Technology turbulence is "the rate of technological change" (Jaworski & Kohli, 1993).	Jaworski & Kohli, 1993

Table A9 - Summary of Variables

Concept	Type of Variable	Variable
Business Model Innovation (BMI)	Independent Variable/Mediating Variable	New Product/Service
		New Target Customer
		New Internal Capabilities
		New Value Network
		New Resources
		New Processes
		New Value Delivery
		New Revenue Model
		New Cost Structure
		Use of BM Ontology
		Use of BM Tooling
		General Process
		Use of Operating Model
		Use of Enterprise Architecture
		BMI Radicalness
		BMI Disruptiveness
		BM Originality
		Internal BMI Driver
		External BMI Driver
Innovativeness	Independent Variable/Mediating Variable	Mean number of innovation adoption
		Mean time of innovation adoption
		Consistency of the time of adoption
		Degree of product/service newness
		Market Orientation
		Learning Orientation
		Entrepreneurial Orientation
		External Collaboration
		Strategic Emphasis on Innovation
Business Performance	Dependent Variable	Profit
		Sales Growth
Environmental Turbulence	Moderating Variable	Market Turbulence
		Technology Turbulence
		Competitive intensity

APPENDIX B - Meta Analysis Supporting Tables & Figures

Table B1 - List of Selected Studies

No.	Authors	Year	Paper	Journal	Keywords	Times Cited - 3 Mar 2015 (Scopus)	Times Cited - 3 Mar 2015 (Web of Science)	Research Object	Sample Size	The reason for inclusion	Related Hypotheses
1	Hartmann, M., Oriani, R., & Bateman, H.	2013	The Performance Effect of Business Model Innovation: An Empirical Analysis of Pension Funds	35th DRUID Celebration Conference 2013	"Performance effect", "business model innovation", "empirical analysis" in Google Scholar	No information	No information	Large Firms	220	Directly tested the relation between BMI and Business Performance	H1a
2	Zott, C., & Amit, R	2007	Business Model Design and the Performance of Entrepreneurial Firms.	Organization Science	business model, performance	139	119	SMEs	158	Directly tested the relation between BMI and Business Performance	H1a
3	Zott, C., & Amit, R	2008	The fit between product market strategy and business model: Implications for firm performance	Strategic Management Journal	business model, performance	190	156	Large Firms and SMEs	161	Tested the relation between BMI and Performance but with the influence of Business Strategy	H1a

No.	Authors	Year	Paper	Journal	Keywords	Times Cited - 3 Mar 2015 (Scopus)	Times Cited - 3 Mar 2015 (Web of Science)	Research Object	Sample Size	The reason for inclusion	Related Hypotheses
4	Hult, G. T. M., Hurley, R. F., & Knight, G. a.	2004	Innovativeness: Its antecedents and impact on business performance	Industrial Marketing Management	Innovativeness, Performance	382	247	Large Firms	181	Understanding market orientation, having learning orientation and entrepreneurial orientation is process of developing new business models (BMI) (Giesen, Berman, Bell, & Blitz, 2007; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010; Teece, 2010).	H3a
5	Clausen, T. H., & Rasmussen, E.	2012	Parallel business models and the innovativeness of research-based spin-off ventures	Journal of Technology Transfer	business model, innovativeness	0	1	Startups	82	This parallel use of business model can be seen as a process of implementing BMI (Chesbrough, 2007).	H2a
6	Aspara, Jaakko Hietanen, Joel Tikkanen, Henrikki	2010	Business model innovation vs. replication: Financial performance implications of strategic emphases	Journal of Strategic Marketing	business model, performance	8	No information	Large Firms and SMEs	545	Indirectly tested the relation between BM and Business Performance	H1a
7	Cheng, Colin C J Shiu, Eric C C Dawson, John A	2014	Service Business Model and Service Innovativeness	International Journal of Innovation Management	business model, innovativeness	0	No information	Not explicitly define - most probably large firms	211	Directly tested the relation between BM and Innovativeness	H2a

No.	Authors	Year	Paper	Journal	Keywords	Times Cited - 3 Mar 2015 (Scopus)	Times Cited - 3 Mar 2015 (Web of Science)	Research Object	Sample Size	The reason for inclusion	Related Hypotheses
8	Su, Yu Shan Tsang, Eric W K Peng, Mike W.	2009	How do internal capabilities and external partnerships affect Innovativeness	Asia Pacific Journal of Management	business model, innovativeness	42	32	Large Firms and SMEs	84	Indirectly tested the relation between BM and Innovativeness. This paper tested the relationship between internal capabilities and external partnership (which are the elements of business model) to innovativeness	H2a
9	Cucculelli, Marco Bettinelli, Cristina	2015	Business models, intangibles and firm performance: evidence on corporate entrepreneurship from Italian manufacturing SMEs	Small Business Economics	business model, performance	0	No information	SMEs	376	Directly tested the relation between BM changes (BMI) and Performance	H1a
10	Kim, Stephen K Min, Sungwook	2015	Business Model Innovation Performance: When does Adding a New Business Model Benefit an Incumbent?	Strategic Entrepreneurship Journal	business model innovation, performance	0	No information	Large Firms	131	Indirectly tested the relation between BMI and Performance. This paper tested if performance of incumbent firms will improve after they add new BM on top of existing BM (managed simultaneously)	H1a

No.	Authors	Year	Paper	Journal	Keywords	Times Cited - 3 Mar 2015 (Scopus)	Times Cited - 3 Mar 2015 (Web of Science)	Research Object	Sample Size	The reason for inclusion	Related Hypotheses
11	Huang, Hao-Chen Lai, Mei-Chi Kao, Meng-Chun Chen, Yi-Chun	2012	Target Costing, Business Model Innovation, and Firm Performance_An Empirical Analysis of Chinese Firms	Canadian Journal of Administrative Sciences	business model innovation, performance	3	3	Large Firms and SMEs	378	Tested the relation between BMI and Performance	H1a
12	Subramanian & Nilakanta	1996	Organizational innovativeness: Exploring the relationship between organizational determinants of innovation and measures of organizational performance	International Journal of Management Science	Innovativeness, Performance	214	137	Large Firms	143	It directly tested the relation between Innovativeness and Performance. It might also serve as an approach to test the relation between BM and performance as it uses organizational characteristics such as centralization, formalization, size, specialization	H3a
13	Abd Aziz, Sumaiyah Mahmood, Rosli	2011	The relationship between business model and performance of manufacturing small and medium enterprises in Malaysia	African Journal of Business Management	business model, performance	No information	0	SMEs	202	It tested the relation between various elements of BM to Performance	H1a
14	Velu, Chander	2015	Business model innovation and third-party alliance on the survival of new firms	Technovation	business model innovation	0	0	Startups	129	Tested the relation between BMI and Performance	H1a

Table B2 - Summary of The Selected Studies

No.	Hypothesis	Related Selected Studies
1	Hypothesis 1a: The relationship between Business Model Innovation and SME performance is positive	Abd Aziz & Mahmood, 2011; Aspara, Hietanen, & Tikkanen, 2010; Cucculelli & Bettinelli, 2015; Hartmann, Oriani, & Bateman, 2013; Huang, Lai, Kao, & Chen, 2012; Kim & Min, 2015; Velu, 2015; Zott & Amit, 2007, 2008
2	Hypothesis 1b: Poor business performance triggers BMI in the firm	not tested quantitatively in the selected studies
3	Hypothesis 2a: Business Model Innovation can positively affect firm's Innovativeness	Cheng, Shiu, & Dawson, 2014; Clausen & Rasmussen, 2012; Su, Tsang, & Peng, 2009
4	Hypothesis 2b: Firm's Innovativeness can positively affect the adoption or implementation of Business Model Innovation	not tested quantitatively in the selected studies
5	Hypothesis 3a: Firm's Innovativeness can positively affect Business Performance of a firm	Hult, Hurley, & Knight, 2004; Subramanian & Nilakanta, 1996
6	Hypothesis 3b: High Business Performance can positively affect Innovativeness of a firm	not tested quantitatively in the selected studies
7	Hypothesis 4: Environmental Turbulence has a moderating effect on the impact of BMI to Business Performance	not tested quantitatively in the selected studies

Table B3 - Estimated effect size from selected studies

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
1	Hartmann, M., Oriani, R., & Bateman, H.	2013	The Performance Effect of Business Model Innovation: An Empirical Analysis of Pension Funds	220	**Hypothesis 1:** Business model innovation has a positive influence on the performance of a firm	Positive	Supported	Business Model Innovation	Operational Performance		0.12	0.12		H1a
2	Zott, C., & Amit, R	2007	Business Model Design and the Performance of Entrepreneurial Firms.	158	**Hypothesis 1:** The more novelty-centered an entrepreneurial firm's business model design, the higher is the firm's performance.	Positive	Supported	Business Model Novelty	Firm Performance (Market Value)	0.47	0.69	0.85	Use Table 3 Panel B Model 2	H1a
3	Zott, C., & Amit, R	2008	The fit between product market strategy and business model: Implications for firm performance	161	**H1:** a marginal increase in the degree of product market differentiation will strengthen the marginal performance benefit of business model novelty (and vice versa)	Positive	Supported	Novelty x Differentiation	Firm Performance (Market Value)	0.52	0.72	0.91	Table 6	H1a
					H2: we could expect a positive joint effect of cost leadership and novelty-centered business model on Total Value Appropriated (TVA).	Positive	Supported	Novelty x Cost Leadership	Firm Performance (Market Value)	0.51	0.71	0.89	Table 6	

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
					H3: A greater emphasis on early market entry can also, on balance, enhance the marginal effect of a novelty-centered business model on TVA.	Positive	Supported	Novelty x Timing of Entry	Firm Performance (Market Value)	0.52	0.72	0.91	Table 6	
4	Hult, G. T. M., Hurley, R. F., & Knight, G. a.	2004	Innovativeness: Its antecedents and impact on business performance	181	**H1:** The magnitude of innovativeness is positively related to the magnitude of business performance.	Positive	Supported	Innovativeness	Business Performance		0.22	0.22		H3a
					H2: The magnitude of market orientation is positively related to the magnitude of innovativeness.	Positive	Supported	Competitor Orientation	Innovativeness		0.24	0.25		
								Customer Orientation	Innovativeness		0.36	0.38		
								Interfunctional Coordination	Innovativeness		0.3	0.31		
					H3: The magnitude of learning orientation is positively related to the magnitude of innovativeness	Positive	Supported	Learning Orientation	Innovativeness		0.51	0.56		
					H4: The magnitude of entrepreneurial orientation is positively related to the magnitude of innovativeness.	Positive	Supported	Entrepreneurial Orientation	Innovativeness		0.61	0.71		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
5	Clausen, T. H., & Rasmussen, E.	2012	Parallel business models and the innovativeness of research-based spin-off ventures	82	**H1:** The innovativeness of RBSOs is higher when the firm pursue business models aimed at broader range of applications (e.g. technology development) compared to business models aimed at a specific purpose (e.g. product or consulting).	Positive	Supported	Sum Busines Models (More than 1 BM)	Innovativeness	0.42	0.65	0.78		H2a
6	Aspara, Jaakko Hietanen, Joel Tikkanen, Henrikki	2010	Business model innovation vs. replication: Financial performance implications of strategic emphases	545								0.00	Cannot derive statistic, does not correlate the variables directly	H1a
7	Cheng, Colin C J Shiu, Eric C C Dawson, John A	2014	Service Business Model and Service Innovativeness	211	**H1:** The novelty-centred business model has a U-shaped influence on service innovativeness.	Positive	Supported	Novelty-centered model	Service Innovativeness		0.22	0.22		H2a
8	Su, Yu Shan Tsang, Eric W K Peng, Mike W.	2009	How do internal capabilities and external partnerships affect Innovativeness	84	**Hypothesis 3a:** Marketing capability and customer partnerships have a positive interaction effect on product innovativeness.	Positive	Supported	Marketing Capability x Customer Partnership	Product Innovativeness	0.66	0.81	1.13		H2a

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
					Hypothesis 3b: Manufacturing capability and supplier partnerships have a positive interaction effect on process innovativeness.	Positive	Supported	Manufacturing Capability x Supplier Partnership	Process Innovativeness	0.64	0.80	1.10		
					Hypothesis 3c: R&D capability and URI partnerships have a positive interaction effect on both product and process innovativeness.	Positive	Not Supported	R&D capability x URI Partnership	Product Innovativeness	0.62	0.79	1.07		
						Positive	Not Supported	R&D capability x URI Partnership	Process Innovativeness	0.62	0.78	1.05		
9	Cucculelli, Marco Bettinelli, Cristina	2015	Business models, intangibles and firm performance: evidence on corporate entrepreneurship from Italian manufacturing SMEs	376	**Hypothesis 1:** A firm's BM change positively affects its performance.	Positive	Supported	BM change	Sales Growth		0.39	0.41	Table 3	H1a
								BM change	Return on Sales (ROS)		0.30	0.31		
								BM change	Total Factor Productivity (TFP)		0.23	0.23		
					Hypothesis 4: The positive effects of BM change on performance increase with the innovation intensity of such changes and are positively moderated by investments in intangibles.	Positive	Supported	BM Change (Various Intensity) x Intangibles	Sales Growth	0.22	0.47	0.51		
								BM Change (Various Intensity) x Intangibles	Return on Sales (ROS)	0.18	0.43	0.46		
								BM Change (Various Intensity) x Intangibles	Total Factor Productivity (TFP)	0.11	0.33	0.34		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
10	Kim, Stephen K Min, Sungwook	2015	Business Model Innovation Performance: When does Adding a New Business Model Benefit an Incumbent?	131	**Hypothesis 1 (H1):** The earlier an incumbent endowed with greater complementary assets adds a new business model, the better its overall performance will be after the addition	Positive	Supported	Online Retail Addition (New Business Model)	Sales Revenue		0.16	0.16		H1a
11	Huang, Hao-Chen Lai, Mei-Chi Kao, Meng-Chun Chen, Yi-Chun	2012	Target Costing, Business Model Innovation, and Firm Performance_An Empirical Analysis of Chinese Firms	378	**H1:** Target costing implementations are positively related to business model innovations not involving target costing.	Positive	Supported	Target Costing	Business Model Innovation (BMI)		0.83	1.19		
					H4a: The educational diversity of the cross-functional product development team positively moderates the relationship between target costing implementations and business model innovation.	Positive	Supported	Target Costing x Educational Diversity	Business Model Innovation (BMI)	0.76	0.87	1.33		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
					H4b: The functional diversity of the cross-functional product development team positively moderates the relationship between target costing implementations and business model innovation.	Positive	Supported	Target Costing x Functional Diversity	Business Model Innovation (BMI)	0.60	0.78	1.05		
					H3: Business model innovation is positively associated with firm performance.	Positive	Supported	Business Model Innovation (BMI)	Firm's Performance (FP)		0.77	1.02		H1a
12	Subramanian & Nilakanta	1996	Organizational innovativeness: Exploring the relationship between organizational determinants of innovation and measures of organizational performance	143	**H1:** High levels of centralization and formalization will be associated with high levels of administrative innovativeness.	Positive	Supported	Centralization	Mean number of innovation adoptions (administrative)		-0.10	#N/A	From table 3 and table 4	
								Centralization	Mean time of innovation adoptions (administrative)		0.39	0.41		
								Centralization	Variability (Consistency) of time of innovation adoption (administrative)		-0.37	#N/A		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
								Formalization	Mean number of innovation adoptions (administrative)		0.33	0.34		
								Formalization	Mean time of innovation adoptions (administrative)		0.09	0.09		
								Formalization	Variability (Consistency) of time of innovation adoption (administrative)		-0.35	#N/A		
					H2: Low levels of centralization and formalization will be associated with high levels of technical innovativeness.	Negative	Partially Supported	Centralization	Mean number of innovation adoptions (technical)		-0.29	#N/A		
								Centralization	Mean time of innovation adoptions (technical)		-0.32	#N/A		
								Centralization	Variability (Consistency) of time of innovation adoption (technical)		0.13	0.13		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
								Formalization	Mean number of innovation adoptions (technical)		0.14	0.14		
								Formalization	Mean time of innovation adoptions (technical)		-0.01	#N/A		
								Formalization	Variability (Consistency) of time of innovation adoption (technical)		0.06	0.06		
					H3: High levels of specialization will be associated with high levels of technical innovativeness.	Positive	Supported	Specialization	Mean number of innovation adoptions (technical)		0.25	0.26		
								Specialization	Mean time of innovation adoptions (technical)		0.39	0.41		
								Specialization	Variability (Consistency) of time of innovation adoption (technical)		-0.30	#N/A		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
					H4: High levels of organizational slack will be associated with high levels of technical innovativeness.	Positive	Supported	Slack	Mean number of innovation adoptions (technical)		0.31	0.32		
								Slack	Mean time of innovation adoptions (technical)		0.40	0.42		
								Slack	Variability (Consistency) of time of innovation adoption (technical)		-0.28	#N/A		
					H5: Organizational size will be directly associated with technical and administrative innovativeness.	Positive	Supported	Size	Mean time of innovation adoptions (administrative)		0.23	0.23		
								Size	Mean time of innovation adoptions (administrative)		0.17	0.17		
								Size	Mean time of innovation adoptions (administrative)		0.04	0.04		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
								Size	Mean number of innovation adoptions (technical)		-0.09	#N/A		
								Size	Mean time of innovation adoptions (technical)		0.34	0.35		
								Size	Variability (Consistency) of time of innovation adoption (technical)		0.02	0.02		
					H6: There will be a direct association between administrative innovativeness and organizational efficiency.	Positive	Supported	Mean number of innovation adoptions (administrative)	Return on Asset (organizational efficiency)		0.24	0.25		H3a
								Mean time of innovation adoptions (administrative)	Return on Asset (organizational efficiency)		-0.10	#N/A		
								Variability (Consistency) of time of innovation adoption (administrative)	Return on Asset (organizational efficiency)		-0.02	#N/A		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
					H7: There will be a direct association between technical innovativeness and organizational effectiveness.	Positive	Supported	Mean number of innovation adoptions (technical)	Deposit Share (organizational effectiveness)		0.09	0.09		
								Mean time of innovation adoptions (technical)	Deposit Share (organizational effectiveness)		0.20	0.20		
								Variability (Consistency) of time of innovation adoption (technical)	Deposit Share (organizational effectiveness)		0.05	0.05		
13	Abd Aziz, Sumaiyah Mahmood, Rosli	2011	The relationship between business model and performance of manufacturing small and medium enterprises in Malaysia	202	**H1:** Stakeholders in the firm's business model are positively related to the firm's performance.	Positive	Not Supported	Stakeholders (SH)	Performance		0.39	0.41		H1a
					H2: Competencies in the firm's business model are positively related to the firm's performance	Positive	Supported	Competencies (CS)	Performance		0.43	0.46		
					H3: Value creation in the firm's business model is positively related to the firm's performance.	Positive	Not Supported	Value Creation (VC)	Performance		0.40	0.42		

No.	Authors	Year	Paper	Sample Size	Hypothesis	Expected Relationship	Hypothesis Result	Independent Var	Dependent Var	Effect Size (rsquare)	Effect Size (r)	Fisher Z Score	Remarks	Related Hypotheses
					H4: Value capture in the firm's business model is positively related to the firm's performance.	Positive	Not Supported	Value Capture (VP)	Performance		0.40	0.42		
14	Velu, Chander	2015	Business model innovation and third-party alliance on the survival of new firms	129	**Hypothesis1.** The relationship between a firm's survival timeand the degree of business model innovation is curvilinear (U-shaped), with maximum failure of firms occurring when an intermediate degree of business model innovation is exhibited.	Curvilinear	Supported	Business Model Innovation	Failure		-0.11	#N/A		H1a

Table B4 - Related Concept from Selected Studies

No.	Authors	Year	Paper	Related Concepts
1	Hartmann, M., Oriani, R., & Bateman, H.	2013	The Performance Effect of Business Model Innovation: An Empirical Analysis of Pension Funds	Business Model Innovation, Entrepreneurial Firms, Performance, Firm Size, Radical Innovation, Firm Experience
2	Zott, C., & Amit, R	2007	Business Model Design and the Performance of Entrepreneurial Firms.	Business Model Innovation, Business Model Design Theme, Performance, Entrepreneurial Firm, Environmental Condition (Munifecence, Dynamism, Complexity)
3	Zott, C., & Amit, R	2008	The fit between product market strategy and business model: Implications for firm performance	Business Model Innovation, Business Model Design Theme, Market Strategy, Performance, Total Value Appropriated (TVA), Competitive Advantage
4	Hult, G. T. M., Hurley, R. F., & Knight, G. a.	2004	Innovativeness: Its antecedents and impact on business performance	Innovativeness, Business Performance, Market Orientation, Learning Orientation, Entrepreneurial Orientation, Competitive Advantage, Administrative Innovation, Opennes to Innovation, Capacity to Innovate, Market Turbulence
5	Clausen, T. H., & Rasmussen, E.	2012	Parallel business models and the innovativeness of research-based spin-off ventures	Research-Based Spin Off (RBSO), Technology Transfer, Innovativeness, Business Model, Performance, Parallel Business Models
6	Aspara, Jaakko Hietanen, Joel Tikkanen, Henrikki	2010	Business model innovation vs. replication: Financial performance implications of strategic emphases	Business Model Innovation, Strategy Innovation, Innovativeness, Profitable Growth, Financial Performance, Business Model Replication, Customer Niches, Entrepreneurial Ventures, Competitive Advantage, Market Orientation, Entrepreneurial Orientation
7	Cheng, Colin C J Shiu, Eric C C Dawson, John A	2014	Service Business Model and Service Innovativeness	Business Model, Innovativeness, Service Business Model, Service Innovativeness, Business Model Design Themes, Strategy, Organisational Learning, Innovation Performance,
8	Su, Yu Shan Tsang, Eric W K Peng, Mike W.	2009	How do internal capabilities and external partnerships affect Innovativeness	Internal Capabilities, External Partnerships, Innovativeness, Open Innovation, Product Innovativeness, Process Innovativeness, Innovation Performance
9	Cucculelli, Marco Bettinelli, Cristina	2015	Business models, intangibles and firm performance: evidence on corporate entrepreneurship from Italian manufacturing SMEs	Business Model Innovation, Business Model Change, Performance, Competitive Advantage, Compelementary Effect, Intangibles, Strategic Entrepreneurship
10	Kim, Stephen K Min, Sungwook	2015	Business Model Innovation Performance: When does Adding a New Business Model Benefit an Incumbent?	Business Model, Entrepreneurial Firms, Incumbent Firms, Performance, Innovation Adoption, Complementary Asset, Conflicting Assets, Resource Based View, Firm's Managerial Choices, Original BMI, Imitative BMI, Incumbent Assets

No.	Authors	Year	Paper	Related Concepts
11	Huang, Hao-Chen Lai, Mei-Chi Kao, Meng-Chun Chen, Yi-Chun	2012	Target Costing, Business Model Innovation, and Firm Performance_An Empirical Analysis of Chinese Firms	Target Costing, Business Model Innovation, Performance, Value Innovation, Cross-Functional Team, Market Orientation, Competitive Advantage, Resource-Based View, Value Chain
12	Subramanian & Nilakanta	1996	Organizational innovativeness: Exploring the relationship between organizational determinants of innovation and measures of organizational performance	Innovativeness, Innovation Adoption, Organizational Characteristic, Firm Size, Centralization, Formalization, Specialization, Resource Slack, Organizational Strategy, Environment Effect, Organizational Performance, Administrative Innovation, Technical Innovation, Organizational Effectiveness, Organizational Efficiency
13	Abd Aziz, Sumaiyah Mahmood, Rosli	2011	The relationship between business model and performance of manufacturing small and medium enterprises in Malaysia	Busienss Model, Performance, Corporate Entrepreneurship, Entrepreneurial Orientation, Market Orientation, Strategic Planning, Innovation
14	Velu, Chander	2015	Business model innovation and third-party alliance on the survival of new firms	Business Model Innovation, Incremental Innovation, Radical Innovation, Performance, Strategy, Alliance

Table B5 - Related Variables from Selected Studies

No.	Authors	Year	Paper	Independent Variables	Control Variables	Moderating Variables	Mediating Variable	Dependent Variables	Original Questionnaire Items Included?
1	Hartmann, M., Oriani, R., & Bateman, H.	2013	The Performance Effect of Business Model Innovation: An Empirical Analysis of Pension Funds	NK-Model (transition to retirement product, in-house administration, unit pricing, online account access, online transactions, alternative investments, financial planning affiliate), Size of Firm, Firm Inexperience	Asset Growth of Fund, Public Offer Status, Fitness Value of BM			Operational Performance	no
2	Zott, C., & Amit, R	2007	Business Model Design and the Performance of Entrepreneurial Firms.	Design Efficiency Themed BM, Design Novelty Themed BM	Competitive Threat Level, Market Size, Firm Age, Firm Size, Country of Origin, R&D Expenditures, Advertising Expenditures, Capital Expenditures, Alternative BM Design Themes			Perceived Performance	yes
3	Zott, C., & Amit, R	2008	The fit between product market strategy and business model: Implications for firm performance	Design Efficiency Themed BM, Design Novelty Themed BM, Differentiation Strategy, Cost Leadership Strategy, Timing of Entry Strategy	Firm Age, Firm Size, Mode of Market Entry, Product and Market Scope, Degree of Competition, Market Size,			Perceived Performance	yes
4	Hult, G. T. M., Hurley, R. F., & Knight, G. a.	2004	Innovativeness: Its antecedents and impact on business performance	Market Orientation, Entrepreneurial Orientation, Learning Orientation,		Market Turbulence	Innovativeness	Innovativeness, Performance	implicitly

No.	Authors	Year	Paper	Independent Variables	Control Variables	Moderating Variables	Mediating Variable	Dependent Variables	Original Questionnaire Items Included?
5	Clausen, T. H., & Rasmussen, E.	2012	Parallel business models and the innovativeness of research-based spin-off ventures	Consulting Business Model, Technology Business Model, Product Business Model, Software Business Model, Sum of Business Model	Firm Age, Prior Experience, Academic Origin, Technology Field, TTO			Established Innovation	implicitly
6	Aspara, Jaakko Hietanen, Joel Tikkanen, Henrikki	2010	Business model innovation vs. replication: Financial performance implications of strategic emphases	Strategic Emphasis on BMI, Strategic Emphasis on BMR	Firm Size			Financial Performance	partially
7	Cheng, Colin C J Shiu, Eric C C Dawson, John A	2014	Service Business Model and Service Innovativeness	Design Efficiency Themed BM, Design Novelty Themed BM	Firm Size, Firm Age, Firm Capital, Market Turbulence, Competitive Intensity			Service Innovativeness	yes
8	Su, Yu Shan Tsang, Eric W K Peng, Mike W.	2009	How do internal capabilities and external partnerships affect Innovativeness	Internal Capabilities, External Partnerships				Product Innovativeness, Process Innovativeness	yes
9	Cucculelli, Marco Bettinelli, Cristina	2015	Business models, intangibles and firm performance: evidence on corporate entrepreneurship from Italian manufacturing SMEs	BM Change, Intangible Assets	Market share, leverage, firm age, value-added per capita, outsourced services on sales ratio	Intangibles Investment		Firm Performance	partially
10	Kim, Stephen K Min, Sungwook	2015	Business Model Innovation Performance: When does Adding a New Business Model Benefit an Incumbent?	Online BM Addition, Reputable Brand, Number of Stores, Delayed Time, Autonomous Business Unit (ABU)	SGA, Margin, Online Retailing Diffusion, Real GDP Growth, Book and Music, Consumer Electronics, Sporting Goods, Office			Sales Revenue	No, was using U.S. Securities and Exchange Commission (SEC) EDGAR Database

No.	Authors	Year	Paper	Independent Variables	Control Variables	Moderating Variables	Mediating Variable	Dependent Variables	Original Questionnaire Items Included?
					Supplies				
11	Huang, Hao-Chen Lai, Mei-Chi Kao, Meng-Chun Chen, Yi-Chun	2012	Target Costing, Business Model Innovation, and Firm Performance _An Empirical Analysis of Chinese Firms	Target Costing Implementation,	Team Size, Team Age, R&D Investment, Industry Types	Cross Functional Product Development Team Diversity	Business Model Innovation	Firm Performance	implicitly
12	Subramanian & Nilakanta	1996	Organizational innovativeness: Exploring the relationship between organizational determinants of innovation and measures of organizational performance	degree of centralization, degree of formalization, degree of specialization, amount of organizational slack resources, organizational size		Mean number of innovation adoptions, Mean time of innovation adoption, Consistency of the time of adoption,		Organizational Performance	yes
13	Abd Aziz, Sumaiyah Mahmood, Rosli	2011	The relationship between business model and performance of manufacturing small and medium enterprises in Malaysia	Competencies, Stakeholders, Value Creation, Value Capture				Business Performance	implicitly
14	Velu, Chander	2015	Business model innovation and third-party alliance on the survival of new firms	Business Model Innovation, Third Party Alliance	Type of Ownership, Degree of Competition, Diversification Strategy, Geographic Location, Size			Survival of Firms	partially

Table B6 - List of Unified Concepts from Selected Studies

No.	Concepts	No.	Concepts	No.	Concepts
1	BMI / BM Novelty / BM Change	17	Performance (Firm's Failure Rate)	33	External Partnership (URI)
2	Parallel Business Model	18	Organizational Effectiveness (Deposit Share)	34	Target Costing
3	Innovativeness	19	Organizational Efficiency (Return on Asset)	35	Cross-Functional Team Diversity (Educational)
4	Innovativeness (Service)	20	Strategy (Differentiation)	36	Cross-Functional Team Diversity (Functional)
5	Innovativeness (Product)	21	Strategy (Cost Leadership)	37	Org. Char. (Centralization)
6	Innovativeness (Process)	22	Strategy (Timing of Entry)	38	Org. Char. (Formalization)
7	Innovativeness (Number of Innovation Adoption - administrative)	23	Market Orientation (Competitor Orientation)	39	Org. Char. (Specialization)
8	Innovativenes (Time of Innovation Adoption - administrative)	24	Market Orientation (Customer Orientation)	40	Org. Char. (Resource Slack)
9	Innovativeness (Variability of Innovation Adoption - administrative)	25	Market Orientation (Interfunctional Coordination)	41	Org. Char. (Firm Size)
10	Innovativeness (Number of Innovation Adoption - technical)	26	Learning Orientation	42	Business Model (Stakeholders)
11	Innovativenes (Time of Innovation Adoption - technical)	27	Entrepreneurial Orientation	43	Business Model (Competencies)
12	Innovativeness (Variability of Innovation Adoption - technical)	28	Internal Capability (Marketing)	44	Business Model (Value Creation)
13	Performance	29	Internal Capability (Manufacturing)	45	Business Model (Value Capture)
14	Performance (Sales Growth)	30	Internal Capability (R&D)	46	Intangible Asset Investment
15	Performance (ROS)	31	External Partnership (Customer)		
16	Performance (TFP)	32	External Partnership (Supplier)		

Figure B1 - Network Diagram of Concepts

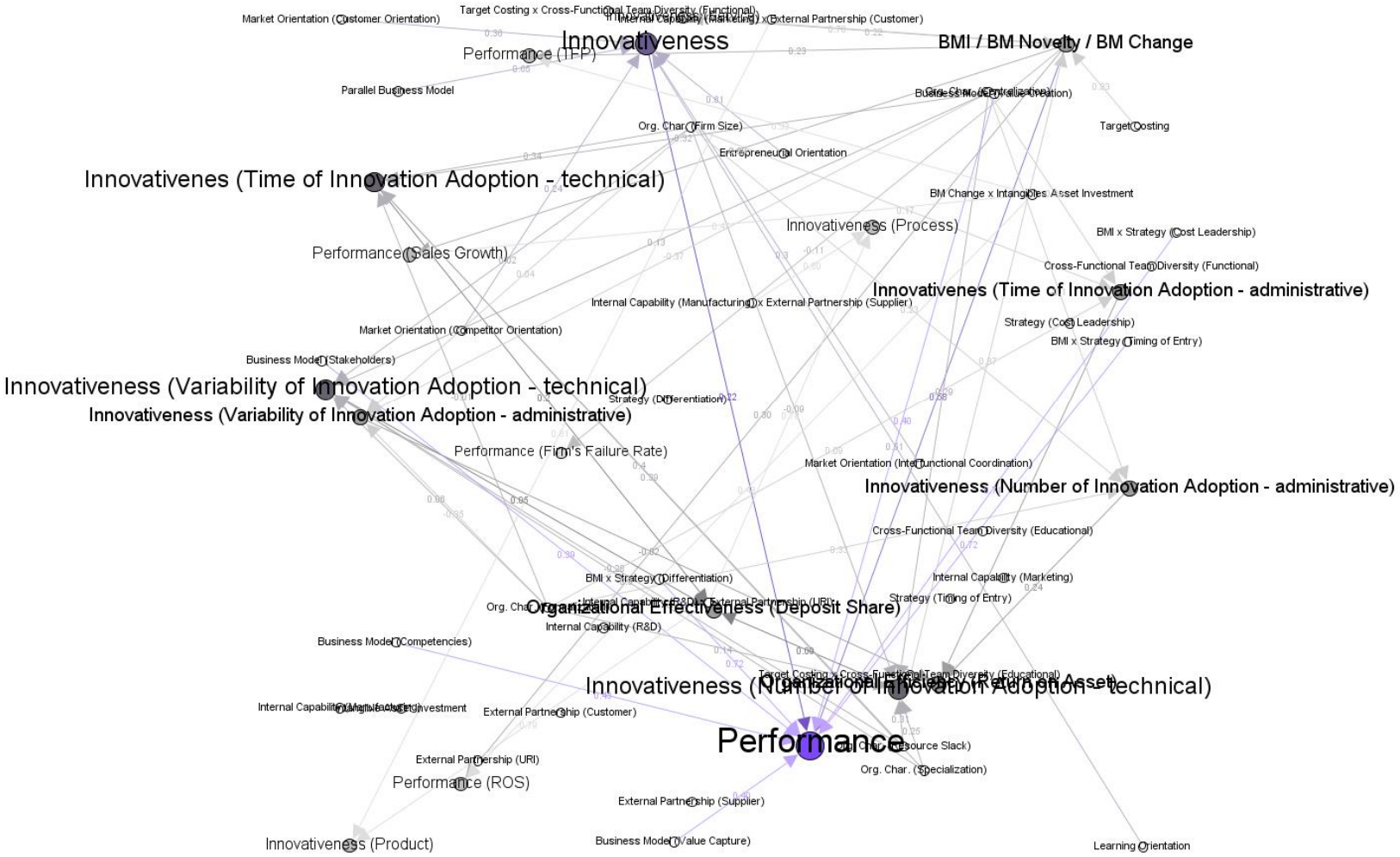
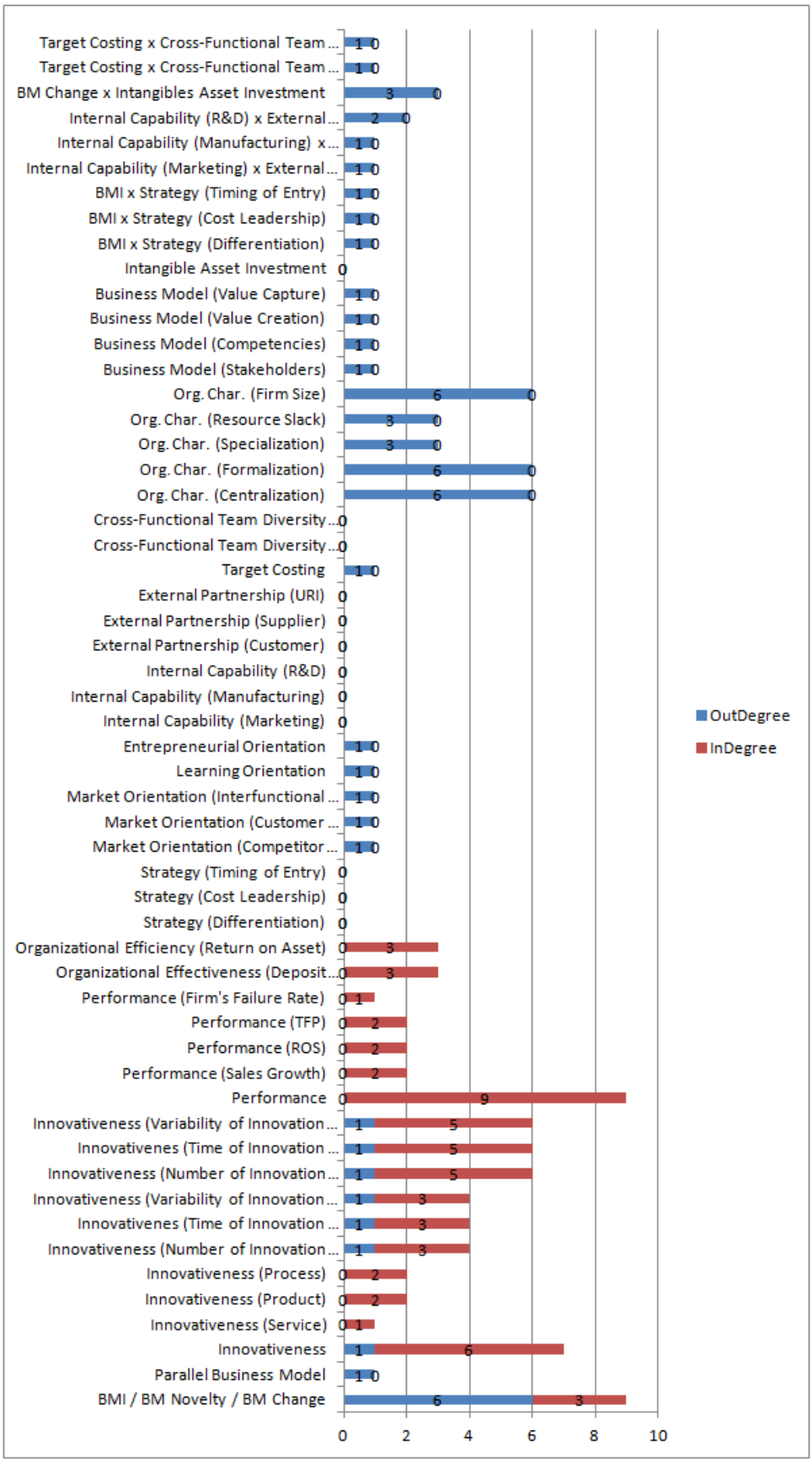


Figure B2 - Overview of Outdegree and Indegree of Network



APPENDIX C - Measurement Instrument Development Supporting Tables

Table C1 - Detailed Steps of Measurement Development

Phases & Steps	Activity	Methods/Data
Phase 1	**Preliminary Instrument Development**	
Step 1 - Construct's Domain	Specifying domains of the construct	Literature review
Step 2 - Instrument's Blueprint	Develop Blueprint of Instrument - *matching it with purpose*	
Step 3 - Item Generation	Generate an initial pool of items (new & existing combined)	Literature review
Step 4 - Scale Development	(1) Assess Content Validity / Face Validity - Stage 1 (2) Evaluate Clarity and Relevance of Items (3) Modify or remove items that are being judged as not clear or not relevant by at least 1 out of 6 experts	Judges Analysis, *n* = 6
	(1) Assess Content Validity / Face Validity - Stage 2 (2) Evaluate Clarity and Relevance of Items (3) Modify or remove items that are being judged as not clear or not relevant by at least 1 out of 6 experts	Judges Analysis, *n* = 6
		the end of this research
Phase 2	**Instrument Pre-testing**	
Step 1 - Pre-Testing/Data Collection	Pretesting of Research Instrument using convenience samples	Pilot Test, *n* = 30
Step 2 - Measure Purification/ Item Reduction	Purification of measures from problematic/unsatisfactory items	Exploratory Factor Analysis (factor loading, eigenvalue, scree plot, cronbach alpha)
Step 3 - Measure Finalization	Evaluate reliability and validity of items for the final scale *Convergent Validity* *Discriminant Validity* *Nomological Validity*	Confirmatory Factor Analysis (Structural Equation Modeling) Cronbach Alpha

Table C2 - Domain Specification of Business Model Innovation Concept

Domain / Attributes of Concepts	Elements	Background (Authors)
Business Model Domain	**Changes in BM Elements**	
	Value Proposition	
	Product/Service Offering	Amit & Zott, 2001; Morris et al, 2005; Johnson, Christensen, & Kagermann, 2008; Doganova & Eyquem-Renault, 2009; Teece, 2010; Giesen, 2010; Barjak et al, 2014; OECD, 2005; Osterwalder & Pigneur, 2005
	Target Customer/Market Segment	Chesbrough & Rosenbloom, 2002; Osterwalder & Pigneur, 2005; Teece, 2010; Lindgardt, Reeves, Stalk, & Deimler, 2009
	Business System	
	Internal Capability/Core Competency	Afuah & Tucci, 2001; Morris et al, 2005; Osterwalder & Pigneur, 2005; Doz & Kosonen, 2010; Barjak et al, 2014; OECD, 2005
	Value Network	Timmers, 1998; Amit & Zott, 2001; Chesbrough & Roosenblom, 2002; Osterwalder & Pigneur, 2005; Morris et al, 2005; Giesen, 2007; Amit & Zott, 2001; Itami & Nishino, 2010; Doz & Kosonen, 2010; Shafer, 2005; George & Bock, 2011; Barjak et al, 2014; OECD, 2005
	Value Delivery	Amit & Zott, 2001; Teece, 2010; Giesen, 2010; Barjak et al, 2014; OECD, 2005; Lindgardt, Reeves, Stalk, & Deimler, 2009; Osterwalder & Pigneur, 2005
	Key process	Johnson, Christensen, & Kagermann, 2008; Demil & Lecocq, 2010; Barjak et al, 2014; OECD, 2005; Osterwalder & Pigneur, 2005

Domain / Attributes of Concepts	Elements	Background (Authors)
	Key resource	Johnson, Christensen, & Kagermann, 2008; Demil & Lecocq, 2010; George & Bock, 2011; Osterwalder & Pigneur, 2005
	Value Capture	
	Revenue Model	Osterwalder & Pigneur, 2005; Johnson, Christensen, & Kagermann, 2008; Doganova & Eyquem-Renault, 2009; Itami & Nishino, 2010; Giesen, 2010; Barjak et al, 2014; OECD, 2005; Lindgardt, Reeves, Stalk, & Deimler, 2009
	Cost Structure	Chesbrough & Rosenbloom, 2002; Osterwalder & Pigneur, 2005; Lindgardt, Reeves, Stalk, & Deimler, 2009
Innovation Process Domain	**Driver of Innovation**	
	Internal BMI Driver	
	Performance	Demil & Lecocq, 2010
	Existing Asset	Demil & Lecocq, 2010
	New Product/Service	Giesen, Riddleberger, Christner, & Bell, 2010
	External BMI Driver	
	Market Potential	Han et al (1998)
	Market Preferences	Jaworski & Kohli, 1993; Teece, 2010
	Competitor Behavior	Jaworski & Kohli, 1993; Teece, 2010
	Technological Change	Jaworski & Kohli, 1993; Teece, 2010
	Regulation Setting	Jaworski & Kohli, 1993; Teece, 2010
	Changes in Partner's BM	Moore, 1993
	Innovation Step - Design	
	BM Ontologies	

Domain / Attributes of Concepts	Elements	Background (Authors)
	The use of BM ontologies and its variation	Osterwalder, 2004; Bouwman, De Vos, and Haaker, 2008; El Sawy & Pereira, 2013; Gordijn & Akkermans, 2003; Heikkila, Tyrvainen, and Heikkila, 2010
	BM Tooling	
	The use of BM ontologies and its variation	Solaimani, 2014
	Innovation Step - Implementation	
	Trial and Error Process / Experimentation	Sosna, Trevinyo-Rodríguez, & Velamuri, 2010; Teece, 2010
	BMI Practice	
	BMI as part of daily making strategy	Doz & Kosonen, 2010; Ireland, Covin, & Kuratko, 2009; Ireland et al., 2003
	Operating Model	
	The use of Operating Model and its elements	Ross, Weill, & Robertson, 2006; Lindgardt, Reeves, Stalk, & Deimler, 2009
	Enterprise Architecture (EA)	
	The use of Enterprise Architecture	Ross, Weill, & Robertson, 2006; Op't Land, Proper, Waage, Cloo, & Steghuis, 2009
	Innovation Step - Outcome	
	BMI Radicalness	Hartmann & Oriani, 2013; Cavalcante, Kesting, & Ulhøi, 2011; De Reuver, Bouwman, & Haaker, 2013; Linder & Cantrell, 2000
	BMI Disruptiveness	Christensen & Raynor, 2003; Johnson et al., 2008
	BMI Originality	Aspara, Hietanen, & Tikkanen, 2010; Kim & Min, 2015

Table C3 - Detailed Measurement Instrument Blueprint

Part	Concept	Variable	Source of Items / Background
Part 1	Business Model Innovation	**Novel Value Proposition**	
		Product/Service Offering	Zott & Amit, 2007; CIS 2008-2010; Huang et al, 2012; Cheng et al; 2014;
		Target Customer/Market Segment	Johnson, Christensen, & Kagermann, 2008; Linder & Cantrell, 2000; Zott & Amit, 2007; Chesbrough & Rosenbloom, 2002
		Novel Business System	
		Internal Capability/Core Competency	Morris et al., 2005; CIS 2008-2010,
		Value Network	Zott & Amit, 2007; CIS 2008-2010; Osterwalder & Pigneur, 2005
		Value Delivery	Lindgardt, Reeves, Stalk, & Deimler, 2009; Itami & Nishino, 2010; Zott & Amit, 2007; CIS 2008-2010
		Key process	CIS 2008-2010; Johnson, Christensen, & Kagermann, 2008; Itami & Nishino, 2010; Linder & Cantrell, 2000
		Key resource	Johnson, Christensen, & Kagermann, 2008; Zott & Amit, 2007; Mangematin et al, 2003
		Novel Value Capture	
		Revenue Model	Johnson, Christensen, & Kagermann, 2008; CIS 2008-2010;
		Cost Structure	Su,Tsang, & Peng, 2009; Lindgardt, Reeves, Stalk, & Deimler, 2009; Teece, 2010

Part	Concept	Variable	Source of Items / Background
		BMI Driver	
		Internal BMI Driver	Demil & Lecocq, 2010; Giesen, Riddleberger, Christner, & Bell, 2010
		External BMI Driver	Beise & Cleff, 2004; Head & Mayer, 2004; Malhotra, Sivakumar, & Zhu, 2009; Jaworski & Kohli, 1993; Teece, 2010; Moore, 1993
		BM Design	
		BM Ontologies	Osterwalder, 2004; Bouwman, De Vos, and Haaker, 2008; El Sawy & Pereira, 2013; Gordijn & Akkermans, 2003; Heikkila, Tyrvainen, and Heikkila, 2010
		BM Tooling	Solaimani, 2014
		BM Implementation	
		Experimentation / Trial & Error	Sosna et al; 2010; Teece, 2010; Clausen & Rasmussen, 2012
		BMI Processes/Practices	Doz & Kosonen, 2010; Ireland, Covin, & Kuratko, 2009; Ireland et al., 2003; DaSilva & Trkman, 2013; Osterwalder, 2004
		Operating Model	Ross, Weill, & Robertson, 2006; Lindgardt, Reeves, Stalk, & Deimler, 2009
		Enterprise Architecture (EA)	Ross, Weill, & Robertson, 2006; Op't Land, Proper, Waage, Cloo, & Steghuis, 2009; Bernus, Nemes, & Schmidt, 2003; Chen, Doumeingts, & Vernadat, 2008; Solaimani, 2014

Part	Concept	Variable	Source of Items / Background
		BM Outcome	
		BMI Radicalness	Hartmann & Oriani, 2013; Cavalcante, Kesting, & Ulhøi, 2011; De Reuver, Bouwman, & Haaker, 2013; Linder & Cantrell, 2000
		BMI Disruptiveness	Christensen & Raynor, 2003; Johnson et al., 2008
		BMI Originality	Aspara, Hietanen, & Tikkanen, 2010; Kim & Min, 2015
Part 2	Innovativeness	**Tendency to Innovate**	
		Market Orientation (Customer, Competitor Orientation)	Hult, Hurley & Knight, 2004; Su,Tsang, & Peng, 2009
		Learning Orientation (Commitment to learn, Shared Vision, Open-Mindedness)	Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
		Entrepreneurial Orientation	Atuahene-Gima & Ko (2001); Li, Liu, & Zhao (2006); Naman & Slevin (1993)
		Collaboration Effort	Su,Tsang, & Peng, 2009
		Firm's Strategic Emphasis	Aspara et al, 2010; Miles & Snow,1978
		Capacity to Innovate	
		Avg. Number of Innovation Adoption	Subramanian & Nilakanta, 1996;
		Avg. Time of Innovation Adoption	Subramanian & Nilakanta, 1996; Rogers, 1983
		Variability of Time of Innovation Adoption	Subramanian & Nilakanta, 1996

Part	Concept	Variable	Source of Items / Background
		Degree of product/service newness	Clausen & Rasmussen, 2012
Part 3	Environmental Turbulence	Competitive Intensity	Jaworski & Kohli (1993)
		Market Turbulence	Jaworski & Kohli (1993)
		Technology Turbulence	Jaworski & Kohli (1993) ;de Reuver, Bouwman, & MacInnes, 2009
Part 4	Business Performance	Sales Growth	Su,Tsang, & Peng, 2009
		Profitability Growth	Venkatraman & Ramanujam, 1986
		Performance Metric Importance to Managers	Molina-Castillo & Munuera-Alemán, 2009; Huang, Soutar, & Brown, 2004; Griffin & Page, 1996; Lee & O'Connor, 2003; Golder & Tellis, 1997
Part 5	General Information on the Firm	Firm Size	Su,Tsang, & Peng, 2009;
		Firm Age	Su,Tsang, & Peng, 2009;
		Organization Lifecycle	Jawahar & McLaughlin, 2001
		Timing of Entry	Golder & Tellis, 1993
		Ownership Structure	CIS 2008-2010; Brannback, Carsrud, & Kiviluoto, 2014
		Gender	Brannback, Carsrud, & Kiviluoto, 2014
		Geographic Location	CIS 2008-2010
		Cross-Collaboration	Weiller & Neely, 2013

Table C4 - Initial Item Pool

Code	Item
PRE001	I understand the product/service offerings of my enterprise
PRE002	I understand how my enterprise makes money
PRE003	I am involved in developing new products/services
BMI001	New Products
BMI002	New services
BMI003	More variation of products/services
BMI004	New to your enterprise? Your enterprise introduced a new good or service that was already available from your competitors in your market
BMI005	New to your market? Your enterprise introduced a new good or service onto your market before your competitors
BMI006	served new market segments
BMI007	expanded its market area geographically
BMI008	reach new target market
BMI009	created a completely new market segment
BMI010	methods for organising procedures
BMI011	production processes
BMI012	Capabilities that the enterprise perform better than others
BMI013	started to collaborate with new business partners
BMI014	has done transactions with new business partners
BMI015	introduced new ways of organising external relations with other enterprises
BMI016	introduced new ways to transact with customers
BMI017	introduced new ways of organising external relations with customers
BMI018	introduced new cooperative agreements with business partners regarding product/service delivery
BMI019	shared new responsibilities with our business partners regarding product/service delivery
BMI020	Introduced new information system that controls product/service delivery
BMI021	Introduced new distribution methods for our product/services
BMI022	New supporting activities for our business processes
BMI023	New business processes in the enterprise
BMI024	New information system that supports business processes
BMI025	Major changes in the core processes
BMI026	new resources were introduced
BMI027	The enterprise got access to new resources
BMI028	We did combine existing resources in a new way
BMI029	new ways to generate revenue in our enterprise
BMI030	new ways to be profitable in our enterprise
BMI031	New methods of setting price for products/services
BMI032	We introduced new ways to reduce running costs
BMI033	Some existing cost components were modified
BMI034	new cost structure was introduced
BMI035	We plan to experiment with our business model
BMI036	We have a specific team to handle business model experimentations
BMI037	We allocate specific budgets for business model experimentation
BMI038	Desired business model is tested before implemented
BMI039	a common discussion topic among the management
BMI040	used to gain competitive advantages

Code	Item
BMI041	designed in response to market circumstannces
BMI042	done in teams
BMI043	done with help of consultants
BMI044	derived from enterprise's strategy (BM Design)
BMI045	Poor Performance of our enterprise
BMI046	decreasing profit
BMI047	New use of existing assets
BMI048	New internal product/services
BMI049	new market potential
BMI050	changes in customer's preferences
BMI051	competitor behaviour
BMI052	technological change
BMI053	new regulation
BMI054	changes in partner's business model
BMI055	Business models can be described using an ontology, such as the Canvas model, STOF, etc. Have you ever used such business model ontology?
BMI056	If yes, please indicate which ontology….
BMI057	Are you familiar with BM tools such as sticky notes, Excel, etc?
BMI058	computer based tools
BMI059	paper based tools
BMI060	spread sheets
BMI061	board game
BMI062	sticky notes
BMI063	others, namely
BMI064	computer based tools
BMI065	paper based tools
BMI066	spread sheets
BMI067	board game
BMI068	sticky notes
BMI069	others, namely
BMI070	The processes to deliver product/service to customers are standardized
BMI071	The processes to deliver product/service to customers linked to each other
BMI072	Value Chain The way we divide the work between our internal enterprise and our external partners
BMI073	Cost Model The way we manage cost to be able to deliver product/service profitably
BMI074	Organization The way we organize our internal employee
BMI075	Our enterprise is familiar with (the use of) EA
BMI076	specify key processes
BMI077	design information system
BMI078	specify internal controls to monitor processes
BMI079	standardize business processes
BMI080	integrate business processes
BMI081	deliver applications based on business objectives
BMI082	deliver IT infrastructure based on business objectives
BMI083	define business/organization structure

Code	Item
BMI084	in the majority of business model components
BMI085	in the core components of the business model
BMI086	in the components of business model cannot be undone
BMI087	Are new to the industry
BMI088	Has never been implemented by competitors
BMI089	Cannot be found in the dominant business model in the industry
BMI090	is the result of internal formulation
BMI091	was not invented by other firm
BMI092	is not adapted from other existing business model
INN001	understand customer needs
INN002	has formulated customer satisfaction objectives
INN003	measures customer satisfaction
INN004	Our salespeople share competitor information
INN005	The enterprise responds rapidly to competitors' actions
INN006	Our managers discuss competitors' strategies
INN007	Our ability to learn is our key competitive advantage
INN008	Employee learning is seen as an investment
INN009	Employee learning is a top priority
INN010	Vision is being agreed upon across levels, functions, and divisions
INN011	Employees are considered partners of business unit
INN012	Sharing vision is considered important for management
INN013	Managers encourage employees to "think outside of the box."
INN014	Our corporate culture is not focused on constant innovation
INN015	Original ideas are highly valued
INN016	Accept risks
INN017	undertakes strategic planning activities
INN018	shows perseverance to make our enterprise reality
INN019	Is able to identify new opportunities
INN020	Suppliers
INN021	Customers
INN022	Competitors
INN023	Universities and Research Institutes (URI)
INN024	Challenging existing business models is central to our strategy
INN025	Providing new products/services for customers is central to our strategy
INN026	Creating changes in the industry is central to our strategy
INN027	In a hindsight, how many major changes your company experienced last year?
INN028	The enterprise aims to adopt multiple innovations annually
INN029	adopting more than one innovation at the same time is a common practice
INN030	The enterprise regularly adopted several innovations that are available in the industry
INN031	Our enterprise is one of the first adopters of innovations
INN032	Other enterprises often seek our advice before adopting innovations
INN033	Our enterprise often waits for some time before adopting innovations
INN034	Our enterprise only adopts innovations because of network pressure
INN035	Our enterprise is often the last one to adopt innovations
INN036	The enterprise has introduced innovations continuously

Code	Item
INN037	Our enterprise consistently is the first to adopt innovations
INN038	There were years when the enterprise did not introduce any innovations
INN039	Are very novel for industry
INN040	Challenging to existing ideas in industry
INN041	Are capable for generating ideas for other products
ENV001	Price competition is very high
ENV002	Product offerings are similar between enterprises
ENV003	Competitor's reactions to our initiatives are very frequent
ENV004	Customer preferences change very frequently
ENV005	Our clients look for new products all the time
ENV006	Our customer's needs are very different to traditional customers
ENV007	Technology in this sector is changing rapidly *
ENV008	A high number of advanced technological products have been developed lately *
ENV009	Technological development in this sector has increased rapidly
PER001	Very satisfied with the sales growth of the company
PER002	“How, approximately, did your company’s sales develop last year from the previous year?
PER003	Very satisfied with the profit growth of the company
PER004	“How, approximately, did your company’s profit develop last year from the previous year?
PER005	What is you net profit margin (%)?
PER006	Product/Services were launched on time
PER007	High speed to market was achieved
PER008	Market Share
PER009	Unit Sales
PER010	Penetration Rate
PER011	Customer Loyalty
PER012	Market Value
PER013	Net Income
PER014	Net Profit Margins
PER015	Return on Investment (ROI)
GEN001	How many years has it been since the enterprise first founded?
GEN002	How many employees in total did the enterprise have last year
GEN003	In which phase is your enterprise currently in? (startup, growth, mature, decline/transition)?
GEN004	Is your Enterprise the first to sell your current product/service in the market?
GEN005	monthly salary
GEN006	dividend
GEN007	other type of return
GEN008	How much money that the entrepreneur/owner can spend at the end of the month?
GEN009	Is the enterprise being managed by family members?
GEN010	Are entrepreneurs involved in the team as owners-managers?
GEN011	Is your enterprise part of an enterprise group?
GEN012	If the answer to previous question is 'yes', then in which country is the head office of your group located?
GEN013	Are females part of the owners/entrepreneurs?
GEN014	Are females involved in strategic decision making process?
GEN015	In which geographic markets did your enterprise sell goods and/or services?
GEN016	Does the enterprise collaborate with other enterprises from different industries?

Table C5 - Source/Background of Items

Code	NEW ITEM (or major modification)	EXISTING (or minor modification)	Source/Background
PRE001	X		*Discussion with experts*
PRE002	X		*Discussion with experts*
PRE003	X		*Discussion with experts*
BMI001	X		CIS 2008-2010
BMI002	X		CIS 2008-2010
BMI003	X		Wells & Gobeli, 2003
BMI004		X	CIS 2008-2010
BMI005		X	CIS 2008-2010
BMI006	X		Johnson, Christensen, & Kagermann, 2008
BMI007	X		Linder & Cantrell, 2000
BMI008	X		Wells & Gobeli, 2003
BMI009	X		Chesbrough & Rosenbloom, 2002
BMI010	X		CIS 2008-2010
BMI011	X		CIS 2008-2010
BMI012	X		Morris et al., 2005
BMI013	X		Zott & Amit, 2007
BMI014	X		Zott & Amit, 2007
BMI015	X		CIS 2008-2010
BMI016	X		Zott & Amit, 2007; Wells & Gobeli, 2003
BMI017	X		Osterwalder & Pigneur, 2005
BMI018	X		Lindgardt, Reeves, Stalk, & Deimler, 2009
BMI019	X		Itami & Nishino, 2010; Zott & Amit, 2007
BMI020	X		Itami & Nishino, 2010;
BMI021	X		CIS 2008-2010
BMI022	X		CIS 2008-2010
BMI023	X		Johnson, Christensen, & Kagermann, 2008
BMI024	X		Itami & Nishino, 2010;
BMI025	X		Linder & Cantrell, 2000
BMI026	X		Johnson, Christensen, & Kagermann, 2008
BMI027	X		Zott & Amit, 2007
BMI028	X		Johnson, Christensen, & Kagermann, 2008; Mangematin et al, 2003
BMI029	X		Johnson, Christensen, & Kagermann, 2008
BMI030	X		Johnson, Christensen, & Kagermann, 2008
BMI031	X		CIS 2008-2010
BMI032	X		Su,Tsang, & Peng, 2009
BMI033	X		Lindgardt, Reeves, Stalk, & Deimler, 2009
BMI034	X		Teece, 2010
BMI035	X		Sosna et al; 2010
BMI036	X		Sosna et al; 2010

Code	NEW ITEM (or major modification)	EXISTING (or minor modification)	Source/Background
BMI037	X		Sosna et al; 2010; Teece, 2010
BMI038	X		Sosna et al; 2010
BMI039	X		Doz & Kosonen, 2010
BMI040	X		Ireland, Covin, & Kuratko, 2009; Ireland et al., 2003
BMI041	X		Osterwalder, 2004
BMI042	X		Sosna et al; 2010
BMI043	X		DaSilva & Trkman, 2013
BMI044	X		Osterwalder, 2004
BMI045	X		Demil & Lecocq, 2010
BMI046	X		Demil & Lecocq, 2010
BMI047	X		Demil & Lecocq, 2010
BMI048	X		Giesen, Riddleberger, Christner, & Bell, 2010
BMI049	X		Beise & Cleff, 2004; Head & Mayer, 2004; Malhotra, Sivakumar, & Zhu, 2009
BMI050	X		Jaworski & Kohli, 1993; Teece, 2010
BMI051	X		Jaworski & Kohli, 1993; Teece, 2010
BMI052	X		Jaworski & Kohli, 1993; Teece, 2010
BMI053	X		Jaworski & Kohli, 1993; Teece, 2010
BMI054	X		Moore, 1993
BMI055	X		Osterwalder, 2004
BMI056	X		Osterwalder, 2004
BMI057	X		Solaimani, 2014
BMI058	X		*Discussion with experts*
BMI059	X		*Discussion with experts*
BMI060	X		*Discussion with experts*
BMI061	X		*Discussion with experts*
BMI062	X		*Discussion with experts*
BMI063	X		*Discussion with experts*
BMI064	X		*Discussion with experts*
BMI065	X		*Discussion with experts*
BMI066	X		*Discussion with experts*
BMI067	X		*Discussion with experts*
BMI068	X		*Discussion with experts*
BMI069	X		*Discussion with experts*
BMI070	X		Ross, Weill, & Robertson, 2006
BMI071	X		Ross, Weill, & Robertson, 2006
BMI072	X		Lindgardt, Reeves, Stalk, & Deimler, 2009
BMI073	X		Lindgardt, Reeves, Stalk, & Deimler, 2009
BMI074	X		Lindgardt, Reeves, Stalk, & Deimler, 2009
BMI075	X		Ross, Weill, & Robertson, 2006
BMI076	X		Ross, Weill, & Robertson, 2006
BMI077	X		Ross, Weill, & Robertson, 2006

Code	NEW ITEM (or major modification)	EXISTING (or minor modification)	Source/Background
BMI078	X		Op't Land, Proper, Waage, Cloo, & Steghuis, 2009
BMI079	X		Ross, Weill, & Robertson, 2006
BMI080	X		Ross, Weill, & Robertson, 2006
BMI081	X		Ross, Weill, & Robertson, 2006' Solaimani, 2014
BMI082	X		Ross, Weill, & Robertson, 2006; Solaimani, 2014
BMI083	X		Bernus, Nemes, & Schmidt, 2003; Chen, Doumeingts, & Vernadat, 2008; Solaimani, 2014
BMI084	X		Hartmann & Oriani, 2013
BMI085	X		Cavalcante, Kesting, & Ulhøi, 2011
BMI086	X		De Reuver, Bouwman, & Haaker, 2013; Linder & Cantrell, 2000
BMI087	X		Christensen & Raynor, 2003; Johnson et al., 2008
BMI088	X		Christensen & Raynor, 2003; Johnson et al., 2008
BMI089	X		Christensen & Raynor, 2003; Johnson et al., 2008
BMI090	X		Aspara, Hietanen, & Tikkanen, 2010; Kim & Min, 2015
BMI091	X		Aspara, Hietanen, & Tikkanen, 2010; Kim & Min, 2015
BMI092	X		Aspara, Hietanen, & Tikkanen, 2010; Kim & Min, 2015
INN001		X	Hult, Hurley & Knight, 2004
INN002		X	Hult, Hurley & Knight, 2004
INN003		X	Hult, Hurley & Knight, 2004
INN004		X	Hult, Hurley & Knight, 2004
INN005		X	Hult, Hurley & Knight, 2004
INN006		X	Hult, Hurley & Knight, 2004
INN007	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN008	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN009	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN010	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN011	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN012	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN013		X	Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN014	X		Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN015		X	Hult, Hurley & Knight, 2004; Calantone, Cavusgil, & Zhao, 2002
INN016	X		Atuahene-Gima & Ko (2001); Li, Liu, & Zhao (2006); Naman & Slevin (1993)
INN017	X		Atuahene-Gima & Ko (2001); Li, Liu, & Zhao (2006); Naman & Slevin (1993)
INN018	X		Atuahene-Gima & Ko (2001); Li, Liu, & Zhao (2006); Naman & Slevin (1993)
INN019	X		Atuahene-Gima & Ko (2001); Li, Liu, & Zhao (2006); Naman & Slevin (1993)
INN020		X	Su,Tsang, & Peng, 2009
INN021		X	Su,Tsang, & Peng, 2009
INN022		X	Su,Tsang, & Peng, 2009
INN023		X	Su,Tsang, & Peng, 2009
INN024	X		Aspara et al, 2010
INN025	X		Aspara et al, 2010
INN026	X		Miles & Snow,1978

Code	NEW ITEM (or major modification)	EXISTING (or minor modification)	Source/Background
INN027	X		Subramanian & Nilakanta, 1996
INN028	X		Subramanian & Nilakanta, 1996
INN029	X		Subramanian & Nilakanta, 1996
INN030	X		Subramanian & Nilakanta, 1996
INN031	X		Subramanian & Nilakanta, 1996; Rogers, 1983
INN032	X		Subramanian & Nilakanta, 1996; Rogers, 1983
INN033	X		Subramanian & Nilakanta, 1996; Rogers, 1983
INN034	X		Subramanian & Nilakanta, 1996; Rogers, 1983
INN035	X		Subramanian & Nilakanta, 1996; Rogers, 1983
INN036	X		Subramanian & Nilakanta, 1996
INN037	X		Subramanian & Nilakanta, 1996
INN038	X		Subramanian & Nilakanta, 1996
INN039		X	Clausen & Rasmussen, 2012
INN040		X	Clausen & Rasmussen, 2012
INN041		X	Clausen & Rasmussen, 2012
ENV001	X		Jaworski & Kohli (1993)
ENV002	X		Jaworski & Kohli (1993)
ENV003	X		Jaworski & Kohli (1993)
ENV004	X		Jaworski & Kohli (1993)
ENV005	X		Jaworski & Kohli (1993)
ENV006	X		Jaworski & Kohli (1993)
ENV007	X		Jaworski & Kohli (1993) ;de Reuver, Bouwman, & MacInnes, 2009
ENV008	X		Jaworski & Kohli (1993) ;de Reuver, Bouwman, & MacInnes, 2009
ENV009	X		Jaworski & Kohli (1993) ;de Reuver, Bouwman, & MacInnes, 2009
PER001		X	Su,Tsang, & Peng, 2009
PER002	X		Aspara et al, 2010
PER003	X		Venkatraman & Ramanujam, 1986
PER004	X		Aspara et al, 2010
PER005	X		Brannback, Carsrud, & Kiviluoto, 2014
PER006	X		Molina-Castillo & Munuera-Alemán, 2009; Huang, Soutar, & Brown, 2004
PER007	X		Molina-Castillo & Munuera-Alemán, 2009; Huang, Soutar, & Brown, 2004
PER008	X		Molina-Castillo & Munuera-Alemán, 2009; Griffin & Page, 1996
PER009	X		Molina-Castillo & Munuera-Alemán, 2009; Griffin & Page, 1996
PER010	X		Molina-Castillo & Munuera-Alemán, 2009; Lee & O'Connor, 2003; Golder & Tellis, 1997
PER011	X		Molina-Castillo & Munuera-Alemán, 2009; Lee & O'Connor, 2003
PER012	X		Molina-Castillo & Munuera-Alemán, 2009
PER013	X		Molina-Castillo & Munuera-Alemán, 2009; Griffin & Page, 1996
PER014	X		Molina-Castillo & Munuera-Alemán, 2009; Griffin & Page, 1996
PER015	X		Molina-Castillo & Munuera-Alemán, 2009; Griffin & Page, 1996
GEN001		X	Su,Tsang, & Peng, 2009
GEN002		X	Su,Tsang, & Peng, 2009

Code	NEW ITEM (or major modification)	EXISTING (or minor modification)	Source/Background
GEN003	X		Jawahar & McLaughlin, 2001
GEN004	X		Golder & Tellis, 1993
GEN005	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN006	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN007	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN008	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN009	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN010	X		Velu, 2015
GEN011		X	CIS 2008-2010
GEN012		X	CIS 2008-2010
GEN013	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN014	X		Brannback, Carsrud, & Kiviluoto, 2014
GEN015		X	CIS 2008-2010
GEN016	X		Weiller & Neely, 2013

Table C6 - Summary of First Stage Face Validation

Face Validation Result		
Number of judges gave particular evaluation	**"Not Clear" items**	**"Not Relevant" items**
1	33	7
2	24	0
3	9	0
4	5	0
5	0	0
6	1	0
Total	72	7

Table C7 - Items Marked "Not Clear" in first stage of Face Validation

Code	Item	CLARITY					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
PRE001	I understand the product/service offerings of my enterprise		x			x	
PRE002	I understand how my enterprise makes money			x	x		
PRE003	I am involved in developing new products/services			x			
BMI003	More variation of products/services		x	x	x		x
BMI006	served new market segments	x	x			x	x
BMI007	expanded its market area geographically		x				x
BMI008	reach new target market	x	x	x	x	x	x
BMI009	created a completely new market segment		x		x		x
BMI010	methods for organising procedures		x		x		x
BMI012	Capabilities that the enterprise perform better than others	x	x		x	x	
BMI014	has done transactions with new business partners				x		
BMI015	introduced new ways of organising external relations with other enterprises		x		x	x	
BMI016	introduced new ways to transact with customers		x			x	x
BMI017	introduced new ways of organising external relations with customers		x		x	x	
BMI019	shared new responsibilities with our business partners regarding product/service delivery	x	x				
BMI022	New supporting activities for our business processes			x			
BMI023	New business processes in the enterprise		x				
BMI024	New information system that supports business processes			x			
BMI025	Major changes in the core processes		x		x		
BMI026	new resources were introduced				x		x
BMI027	The enterprise got access to new resources				x		x
BMI028	We did combine existing resources in a new way			x		x	x
BMI029	new ways to generate revenue in our enterprise			x		x	
BMI030	new ways to be profitable in our enterprise			x		x	
BMI031	New methods of setting price for products/services					x	
BMI032	We introduced new ways to reduce running costs		x		x		
BMI033	Some existing cost components were modified				x		
BMI035	We plan to experiment with our business model					x	
BMI038	Desired business model is tested before implemented						x
BMI042	done in teams			x	x		
BMI043	done with help of consultants		x				

Code	Item	CLARITY					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI047	New use of existing assets	x					
BMI048	New internal product/services						x
BMI049	new market potential						x
BMI055	Business models can be described using an ontology, such as the Canvas model, STOF, etc. Have you ever used such business model ontology?		x	x		x	
BMI057	Are you familiar with BM tools such as sticky notes, Excel, etc?		x			x	
BMI058	computer based tools						x
BMI071	The processes to deliver product/service to customers linked to each other	x				x	
BMI072	Value Chain The way we divide the work between our internal enterprise and our external partners					x	x
BMI073	Cost Model The way we manage cost to be able to deliver product/service profitably					x	x
BMI074	Organization The way we organize our internal employee	x			x	x	x
BMI075	Our enterprise is familiar with (the use of) EA		x				x
BMI076	specify key processes	x					
BMI081	deliver applications based on business objectives	x		x			
BMI084	in the majority of business model components					x	
BMI085	in the core components of the business model		x		x	x	
BMI090	is the result of internal formulation		x				
BMI091	was not invented by other firm		x		x		
INN001	understand customer needs			x			
INN002	has formulated customer satisfaction objectives	x		x			
INN010	Vision is being agreed upon across levels, functions, and divisions	x					
INN017	undertakes strategic planning activities						x
INN018	shows perseverance to make our enterprise reality	x	x	x	x		
INN020	Suppliers						x
INN023	Universities and Research Institutes (URI)			x			
INN027	In a hindsight, how many major changes your company experienced last year?			x	x		
INN028	The enterprise aims to adopt multiple innovations annually						x
INN030	The enterprise regularly adopted several innovations that are available in the industry			x	x		
INN033	Our enterprise often waits for some time before adopting innovations				x		
INN034	Our enterprise only adopts innovations because of network pressure	x					

Code	Item	CLARITY					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
INN035	Our enterprise is often the last one to adopt innovations				x		
INN037	Our enterprise consistently is the first to adopt innovations						x
INN039	Are very novel for industry			x			
ENV003	Competitor's reactions to our initiatives are very frequent			x			
ENV006	Our customer's needs are very different to traditional customers	x			x		
PER001	Very satisfied with the sales growth of the company	x		x			
PER003	Very satisfied with the profit growth of the company	x		x			
PER006	Product/Services were launched on time*						x
PER008	Market Share			x			
GEN003	In which phase is your enterprise currently in? (startup, growth, mature, decline/transition)?	x		x	x		
GEN004	Is your Enterprise the first to sell your current product/service in the market?						x
GEN008	How much money that the entrepreneur/owner can spend at the end of the month?				x		

Table C8 - Items Marked "Not Relevant" in first stage of Face Validation

Code	Item	RELEVANCE					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI014	has done transactions with new business partners					x	
BMI027	The enterprise got access to new resources					x	
BMI031	New methods of setting price for products/services	x					
BMI088	Has never been implemented by competitors				x		
INN036	The enterprise has introduced innovations continuously				x		
INN037	Our enterprise consistently is the first to adopt innovations				x		
INN038	There were years when the enterprise did not introduce any innovations				x		

Table C9 - Feedback on the Measurement Instrument's Items in first stage of Face Validation

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
PRE001	I understand the product/service offerings of my enterprise		Unclear meaning of "understand"			Understand is very broad, I know which products/services are offered by my enterprise might be better (depends what you want to know with the question)			Questionnaire Clarity			Questionnaire Clarity	
PRE002	I understand how my enterprise makes money			Do you mean "how the enterprise generates its revenue" or 'the income sources of the enterprise"?						Questionnaire Clarity			
PRE003	I am involved in developing new products/services			What about "I have been or am involved in developing new products/service"?						Questionnaire Clarity			
BMI003	More variation of products/services		almost the same as q1 & q2	Variation = new or upgraded features/functions?	if you add services/products, you automaticly have more variation? - and vice versa		do not understand		Overlapping Questions	Questionnaire Clarity	Questionnaire Clarity		Questionnaire Difficulty

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI006	served new market segments	difference between target markets and market segments	distinction between items in this scale is unclear			You explain target customer above and now you mention market segments in your question. Better use target customer, or explain marget segment above	difficult, took long time to understand	Overlapping Questions	Overlapping Questions			Questionnaire Clarity	Questionnaire Difficulty
BMI007	expanded its market area geographically		distinction between items in this scale is unclear				difficult, took long time to understand		Overlapping Questions				Questionnaire Difficulty
BMI008	reach new target market	difference between target markets and market segments	distinction between items in this scale is unclear	reached. --> Is this really necessary? --> this point seems a bit overlapping with the previous point?	how does it differ from q1?	target a new market	difficult, took long time to understand	Questionnaire Clarity	Overlapping Questions	Overlapping Questions	Overlapping Questions	Questionnaire Clarity	Questionnaire Difficulty
BMI009	created a completely new market segment		distinction between items in this scale is unclear		how does it differ from q1?		difficult, took long time to understand		Overlapping Questions		Overlapping Questions		Questionnaire Difficulty
BMI010	methods for organising procedures		what is 'procedures'?				more related to process		Questionnaire Difficulty				Questionnaire Clarity

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI012	Capabilities that the enterprise perform better than others		what is 'capabilities'?		performs	how do you introduce new capabilities? This question is a bit confusing, in general people do not know what capabilities are.			Questionnaire Difficulty		Typo/Grammar	Questionnaire Difficulty	
BMI014	has done transactions with new business partners				how does it differ from q1?	why is done transactions different than collaboration which is already asked before					Overlapping Questions	Overlapping Questions	
BMI015	introduced new ways of organising external relations with other enterprises		"organising"?		what do you mean with organising?	organisasing external relations.. i do not have an immediate idea in my head what this could mean. Make it more specifc, new ways of negotiating, communicating, collaboration …			Questionnaire Clarity		Questionnaire Clarity	Questionnaire Clarity	
BMI016	introduced new ways to transact with customers		transact --> sell to			what do you mean with transact, maybe communicate	more related to sales channels		Questionnaire Clarity			Questionnaire Clarity	Measure the wrong concept

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
						or negotiate will be better for what you mean?							
BMI017	introduced new ways of organising external relations with customers		"organising"?		what do you mean with organising?	organisasing external relations.. i do not have an immediate idea in my head what this could mean. Make it more specifc, new ways of negotiating, communicating, collaboration …			Questionnaire Clarity		Questionnaire Clarity	Questionnaire Clarity	
BMI019	shared new responsibilities with our business partners regarding product/service delivery		"shared new responsibilities"?						Questionnaire Clarity				
BMI022	New supporting activities for our business processes			Perhaps put this point not upfront but at the end?						Sequence of items			
BMI023	New business processes in the enterprise		put explanation such as "supporting activities"							Lack of definitions			
BMI024	New information system that			supports' --> facilitates							Questionnaire Clarity		

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
	supports business processes												
BMI025	Major changes in the core processes		change core process to business process		how does it differ from q1,q2,q3?				Questionnaire Clarity		Overlapping Questions		
BMI026	new resources were introduced				difference q2?		resources ? Re-arrange the sequence (third into first)				Overlapping Questions		Questionnaire Difficulty
BMI027	The enterprise got access to new resources				difference q1?	I like this sentence more, but it is the same as the one before. Make the difference more distinct (like used vs. found but not yet used). but why do you want to know this difference?	resources ? Re-arrange the sequence (third into first)				Overlapping Questions	Questionnaire Clarity	Questionnaire Difficulty
BMI028	We did combine existing resources in a new way			did combine' --> combined		we combined..	resources ? Re-arrange the sequence (third into first)			Typo/Grammar		Typo/Grammar	Questionnaire Difficulty
BMI029	new ways to generate revenue in our enterprise			It is unclear what you mean by 'ways' --> accounting methods,		for simplicity i would change generate revenue in			Questionnaire Clarity			Questionnaire Clarity	

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
				production methods, or ??		make money							
BMI030	new ways to be profitable in our enterprise					Kind of the same as the one before, maybe better: new ways to reduce the costs (also has to do with profit)						Overlapping Questions	
BMI031	New methods of setting price for products/services	should it be for cost model scale?				In general: you mention revenue and profit in the same heading, while cost is separate. Profit and revenue are not the same. Profit is revenue minus costs. You should or all mention them under the same heading or all separate.		Measure the wrong concept				Measure the wrong concept	
BMI032	We introduced new ways to reduce running costs		running?						Questionnaire Clarity				
BMI033	Some existing cost components were modified				overlap?						Overlapping Questions		

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI035	We plan to experiment with our business model					What clasifies as an experiment, why do you want to know this? SME probably do not know what business model is (maybe change it to experiment with changing your business)						Questionnaire Clarity	
BMI038	Desired business model is tested before implemented						testing can be gradual?						Questionnaire Clarity
BMI039	a common discussion topic among the management						consider the scale?						Use of Scale
BMI040	used to gain competitive advantages						consider the scale?						Use of Scale
BMI041	designed in response to market circumstannces						consider the scale?						Use of Scale
BMI042	done in teams			internal or external teams or both?			consider the scale?			Questionnaire Clarity			Use of Scale
BMI043	done with help of consultants		"and other external partners"?				consider the scale?		Questionnaire Clarity				Use of Scale
BMI044	derived from enterprise's strategy (BM Design)						consider the scale?						Use of Scale

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI048	New internal product/services						need to specify 'internal'						Questionnaire Clarity
BMI049	new market potential						change 'potential' to 'opportunity'						Questionnaire Clarity
BMI055	Business models can be described using an ontology, such as the Canvas model, STOF, etc. Have you ever used such business model ontology?		"canvas and similar models". Do not use "ontology"	Are the respondents supposed to have a background knowledge of Canvas model, STOF etc. or are you going to provide a brief description about those models?					Questionnaire Difficulty	Questionnaire Difficulty			
BMI057	Are you familiar with BM tools such as sticky notes, Excel, etc?		use 7-point-likert (very unfamiliar-very familiar)			I think that reducing bm tools to sticky notes and excel does not capture the essence…			Use of Scale			Questionnaire Clarity	
BMI058	computer based tools						it's part of product innovation?						Questionnaire Clarity
BMI064	computer based tools		use 7-point-likert (very unfamiliar-very familiar)						Use of Scale				
BMI065	paper based tools		use 7-point-likert (very unfamiliar-very familiar)						Use of Scale				

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI066	spread sheets		use 7-point-likert (very unfamiliar-very familiar)						Use of Scale				
BMI067	board game		use 7-point-likert (very unfamiliar-very familiar)						Use of Scale				
BMI068	sticky notes		use 7-point-likert (very unfamiliar-very familiar)						Use of Scale				
BMI069	others, namely		use 7-point-likert (very unfamiliar-very familiar)						Use of Scale				
BMI071	The processes to deliver product/service to customers linked to each other	find simpler words				how can they not be linked?		Questionnaire Clarity				Questionnaire Clarity	
BMI072	Value Chain The way we divide the work between our internal enterprise and our external partners					the question is quite unclear, I first thought that it was about whether the value chain supports the operating model. but apparently the value chain is a operting model element? Please simplify	the sentence 'supported the goal of' is too difficult					Questionnaire Clarity	Questionnaire Difficulty

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI073	Cost Model The way we manage cost to be able to deliver product/service profitably					the question is quite unclear, I first thought that it was about whether the value chain supports the operating model. but apparently the value chain is a operting model element? Please simplify	the sentence 'supported the goal of' is too difficult					Questionnaire Clarity	Questionnaire Difficulty
BMI074	Organization The way we organize our internal employee	use "human resources" instead of "internal employee"				the question is quite unclear, I first thought that it was about whether the value chain supports the operating model. but apparently the value chain is a operting model element? Please simplify	the sentence 'supported the goal of' is too difficult; the sentence 'the way we organize our internal employee' is unclear					Questionnaire Clarity	Questionnaire Difficulty
BMI075	Our enterprise is familiar with (the use of) EA		use 7-point-likert (very unfamiliar-very familiar)				the word enterprise architecture is too difficult,		Use of Scale				Questionnaire Difficulty

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
							consider replacing it with IT						
BMI076	specify key processes	too general?						Questionnaire Clarity					
BMI081	deliver applications based on business objectives	define application		specify applications				Questionnaire Clarity		Questionnaire Clarity			
BMI084	in the majority of business model components					do you mean the three components you mentioned before, or can they have their own components (if you want to have a good impression define some components and let them say whether they had changes in these components or not)						Questionnaire Clarity	
BMI085	in the core components of the business model		what is the "core components" ?		switch with q1	are the three components not the core components, what components do you think of?		Questionnaire Clarity			Sequence of items	Questionnaire Clarity	

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
BMI087	Are new to the industry		"have" instead of "has"						Typo/Grammar				
BMI088	Has never been implemented by competitors				same as q1?						Overlapping Questions		
BMI090	is the result of internal formulation		q1 & q2 are similar?						Overlapping Questions				
BMI091	was not invented by other firm		q1 & q2 are similar?		same as q1?				Overlapping Questions		Overlapping Questions		
INN001	understand customer needs			understands						Typo/Grammar			
INN002	has formulated customer satisfaction objectives	need to be rephrased		has a clear formulation of customer satisfaction				Typo/Grammar		Typo/Grammar			
INN010	Vision is being agreed upon across levels, functions, and divisions	not "agreed" but "shared"				[redacted]		Questionnaire Clarity				[redacted]	
INN017	undertakes strategic planning activities						do not understand the word 'strategic'						Questionnaire Difficulty
INN018	shows perseverance to make our enterprise reality		"a reality"?	what do you mean? Is the enterprise not yet a reality?					Questionnaire Clarity	Questionnaire Clarity			
INN020	Suppliers		[redacted]				The scale was switched between 'strongly agree' and 'slightly agree';		[redacted]				Use of Scale

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
							consider adding 'partner'						
INN023	Universities and Research Institutes (URI)			What about strategic partners in addition to all the parties mentioned here?						Suggestion			
INN027	In a hindsight, how many major changes your company experienced last year?			In hindsight' (delete 'a')	what is major?					Typo/Grammar	Questionnaire Clarity		
INN028	The enterprise aims to adopt multiple innovations annually						small or big changes?						Questionnaire Clarity
INN030	The enterprise regularly adopted several innovations that are available in the industry			What about 'the enterprise regularly adopted several innovations that are unavailable in the industry'?	same as q3?					Suggestion	Overlapping Questions		
INN033	Our enterprise often waits for some time before adopting innovations				same as q1?						Overlapping Questions		
INN035	Our enterprise is often the last one to adopt innovations				same as q1?						Overlapping Questions		

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
INN036	The enterprise has introduced innovations continuously				how does all of this differ from 30?						Overlapping Questions		
INN037	Our enterprise consistently is the first to adopt innovations				how does all of this differ from 30?		not all innovation come from outside				Overlapping Questions		Questionnaire Clarity
INN038	There were years when the enterprise did not introduce any innovations				how does all of this differ from 30?						Overlapping Questions		
INN039	Are very novel for industry			Before these three points, there should be a statement such as "Our products/services:"						Lack of Introductions			
ENV003	Competitor's reactions to our initiatives are very frequent			frequent -> intense						Suggestion			
PER001	Very satisfied with the sales growth of the company	delete "very"		We are very satisfied with…						Typo/Grammar			
PER003	Very satisfied with the profit growth of the company	delete "very"		We are very satisfied with…						Typo/Grammar			
PER006	Product/Services were launched on time*						did not understand the word "level of agreement"						Questionnaire Clarity
PER007	High speed to market was				time to market						Suggestion		

Code	Item	Comments						Category					
		Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6
	achieved*												
PER008	Market Share			Starting from this point onward (market share to ROI), you can have an introductory statement such as: We achieved high:						Lack of Introductions			
GEN003	In which phase is your enterprise currently in? (startup, growth, mature, decline/transition)?			Will there be a selection of phases the respondent can choose from?	phases?					Questionnaire Clarity	Questionnaire Clarity		
GEN004	Is your Enterprise the first to sell your current product/service in the market?						depends on the customer segment						Questionnaire Clarity
GEN008	How much money that the entrepreneur/owner can spend at the end of the month?						this question might be too private?						Questionnaire Difficulty

Table C10 - Summary of Item-Specific Feedback

Face Validation Item-Specific Feedback

Feedback Category	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	TOTAL
Questionnaire Clarity	6	10	7	6	16	9	**55**
Overlapping Questions	1	7	1	15	2	0	**26**
Questionnaire Difficulty	0	3	1	0	1	14	**18**
Use of Scale	0	8	0	0	0	7	**15**
Typo/Grammar	1	1	6	1	1	0	**10**
Suggestion	0	0	3	1	0	0	**4**
Measure the wrong concept	1	0	0	0	1	1	**3**
Lack of Introductions	0	0	2	0	0	0	**2**
Lack of Definitions	0	0	1	0	0	0	**1**
TOTAL	**9**	**29**	**21**	**23**	**21**	**31**	

Table C11 - Fleiss's Kappa formula to calculate interjudge reliability

$\bar{P} = \frac{1}{N} \sum_{i=1}^{N} P_i$	*N* represent the total number of subjects; *n* is the number of ratings or raters per subject; *k* is the number of categories into which assignments are made; n_{ij} is the number of raters who assigned the *i*th subject to the *jth category;* P_j is the proportion of all assignments which were to the *j*th category; P_i is the proportion of agreement among *n* raters for the *i*th subject ; $\bar{P}$ is the overall extent of agreement ; $\bar{P}_e$ is the mean proportion of agreement ; *K* is the normalized measure of overall agreement, corrected for the amount expected by chance
$P_i = \frac{1}{n(n-1)} \sum_{j=1}^{k} (n_{ij}^2 - n)$	
$\bar{P}_e = \frac{1}{N} \sum_{j=1}^{k} P_j$	
$\bar{P}_e = \sum_{j=1}^{k} P_j^2$	
$\kappa = \frac{\bar{P} - \bar{P}_e}{1 - \bar{P}_e}$	

Table C12 - General Feedback on the Measurement Instrument in first stage of Face Validation

NO.	JUDGES	Category
	Judge 1	
1	Inconsistencies in the use of capital letters	Inconsistencies
2	Missing definitions in some scale	Lack of Definitions
	Judge 2	
1	Put Introduction in each part	Lack of Introductions
2	Remove references	Too Detail
3	Last year or 12 months back?	Questionnaire Clarity
4	In the instructions: "put x if you cannot answer the question"	Suggestion
5	Definition in some items	Lack of Definitions
6	Do not use dichotomous scale, use likert for all items	Use of Scale
7	Inconsistencies in sentences, dots, capitals, introduction	Inconsistencies
	Judge 3	
1	The clarity of some items must be improved	Questionnaire Clarity
2	There are overlapping questions	Overlapping Questions
	Judge 4	
1	Some overlapping/unclear questions,	Overlapping Questions
2	check on language errors	Typo/Grammar
	Judge 5	
1	While it is academically a very good questionnaire, it is quite long with lots and lots of text (and references). I think SME owners or employees will need quite some time to complete it, at least 1-2 hours.	Questionnaire Length
2	I think that it not needed to have a 6-10 line introduction to these questions	Too Detail
3	I strongly recommend to only provide explanations to the terms used in your questionnaire. Leave everything else behind, also because of the bias you will create with all these text and explanations.	
4	you do not always have to inform the respondents that certain questions fit with a certain concept	
5	If you reduce the categories in your questionnaire you also reduce the explanations needed	

6	The only one that needs to know that some questions belong to a certain category is you this will shorten the questionnaire very quickly, only explain concepts when it is absolutely necessary.	

	Judge 6	
1	Some of the questions are too hard, especially for SMEs	Questionnaire Difficulty

	Other Comments	
	Mikko Pohjola - email from Harry (9 June 2015)	
1	A shorter questionnaire may increase the response rate and quality	Questionnaire Length
2	Is there a specific reason for using the same likert scale for all items	Use of Scale
3	You use a component based way of defining the business model, which is based on the literature. How did you operationalize these main concepts and did you already do some scale testing/validation?	Concept Operationalization
4	based on my reading of the literature, I could see that new products are not always fixed to new value propositions or vice versa.	Concept Operationalization
5	in the protocol you write that product and process innovation can drive BMI (H1), while in question 1 on you ask about product innovation as a part of BMI (value propositions). Have I not understood this correctly, or is the difference vague between the drivers and the BMI?	Concept Operationalization
6	the word "resources" is rather vague	Questionnaire Difficulty
7	Both question 3 and 6 refer to processes (production vs. business). Is the distinction clear enough?	Questionnaire Clarity
8	You use the wording “business model innovation” in the survey. Is this a concept the respondents are familiar with? What about just referring to developing or changing the business model?	Questionnaire Difficulty
	Angele Giuliano - Across Limits (10 June 2015)	
1	The questionnaire is way too long	Questionnaire Length
2	many of the questions are shades of the same aspect	Overlapping Questions
3	are some small typos	Typo/Grammar
4	it will be nigh to impossible to get SMEs to answer this unless it is shortened seriously	Questionnaire Length
5	I saw no questions asking for SMEs to tick the actual type of business model they adopt.	Lack in Questionnaire Content

6	The questions on women and families do not do anything except count if they are involved. How about asking if innovation or the model is different due to this, or somehow explore how this makes the area stronger	Lack in Questionnaire Content
7	How about asking for the sector of the enterprise? Services, manufacturing, technology etc.?	Lack in Questionnaire Content

Bled Minutes of Meeting (15 June 2015)

1	Needs to be shortened and simplified in next iteration	Questionnaire Length
2	Current version the answer categories are unrelated to question	Use of Scale
3	Current empirical research of other parties is disappointing, mainly based on CIS (Common Innovation Survey) as implemented by Eurostat	Lack in Questionnaire Content
4	Definition BMI	Lack of Definitions
5	Relation Core concepts and variables (indicators) have to be elaborated and motivated	Concept Operationalization

Table C13 - First Face Validation General Feedback Categorization

Category of Feedback	Total mentioned
Questionnaire Length	6
Questionnaire Difficulty	4
Lack in Questionnaire Content	4
Concept Operationalization	4
Use of Scale	3
Lack of Definitions	3
Typo/Grammar	2
Too Detail	2
Questionnaire Clarity	3
Inconsistencies	2
Overlapping Questions	3
Lack of Introductions	2
Suggestion	1

Table C14 - List of modified or deleted items based on face validation (1st stage)

Changes	Item Code					
Modified Items	PRE001	BMI017	BMI030	BMI064	BMI084	INN032
	PRE002	BMI018	BMI031	BMI065	BMI085	INN033
	PRE003	BMI019	BMI032	BMI066	BMI087	INN036
	BMI001	BMI020	BMI033	BMI067	BMI088	INN037
	BMI002	BMI022	BMI034	BMI068	BMI091	INN038
	BMI006	BMI023	BMI042	BMI069	BMI092	ENV006
	BMI007	BMI025	BMI048	BMI074	INN002	PER001
	BMI008	BMI026	BMI049	BMI075	INN027	PER003
	BMI009	BMI027	BMI055	BMI076	INN028	PER007
	BMI015	BMI028	BMI056	BMI080	INN029	GEN002
	BMI016	BMI029	BMI057	BMI081	INN030	GEN014
Deleted Items	BMI003	BMI024	INN035			
	BMI010	BMI041				
	BMI011	BMI070				
	BMI012	BMI071				
	BMI014	INN018				
	BMI021	INN034				

Table C15- Items Marked "Not Clear" in second stage of Face Validation

Code	Item	CLARITY
		Judge 7
BMI001	New Products A good or product is usually a tangible object such as smartphone, furniture, packaged software, etc.	x
BMI006	From a different demographic segment. Different demography means that the customer can be different in age,sex, income, educational level, race, nationality	x
BMI007	From a different geographic area	x
BMI008	Based on their different life-styles	x
BMI015	Provided new complementary goods/services to business partners	x
BMI016	Was supplied with new complementary goods/service from business partners	x
BMI017	Introduced new ways of connecting suppliers to customers.	x
BMI018	Partnership with business partners regarding product/service delivery	x
BMI029	New ways revenue streams to generate revenue as source of income. This revenue streams can be in a form of selling, licensing, advertising, transaction cut	x
BMI035	We plan to experiment with our business model	x
BMI036	We have a specific team to handle business model experimentations	x
BMI037	We allocate specific budgets for business model experimentation	x
BMI044	derived from enterprise's strategy (BM Design)	x
BMI055	Business models can be described using Canvas model and other similar models.. Have you ever used such model?	x
BMI058	computer based tools	x
BMI074	Organization The way we orrange the responsibilities and development of our employees	x
BMI080	connect business processes	x
BMI085	in the core components of the business model. Core components of business model are different for each enterprise, depending on characteristics and necessity of the enterprise.	x
BMI087	Enabled our enterprise to target our competitor's unserved customers	x
BMI088	Can threaten the sustainability of the industry leader's business model.	x
BMI089	Cannot be found in the dominant business model in the industry	x
INN008	Employee learning is seen as an investment	x
INN010	Vision is being agreed upon across levels, functions, and divisions	x
INN014	Our corporate culture is not focused on constant innovation	x
INN024	Challenging existing business models is central to our strategy	x
INN027	In hindsight, how many major changes your enterprise experienced in the last 12 months? Changes can be in terms of product/service, process, organization, marketing, etc,	x
INN030	The enterprise regularly adopted several innovations that are available in the industry each year	x
PER001	We are satisfied with the sales growth of the company	x
PER002	“How, approximately, did your company’s sales develop the past 12 months from the previous year?	x
PER005	What is you net profit margin (%)?	x
PER009	Unit Sales *	x
GEN002	How many employees in total did the enterprise have in the last 12 months	x
GEN004	Is your Enterprise the first to sell your current product/service in the market?	x

Table C16 - Items Marked "Not Relevant" in second stage of Face Validation

Code	Item	RELEVANCE
		Judge 7
BMI040	used to gain competitive advantages	x
BMI046	Decreasing profit	x
PER007	Time to market	x
PER014	Net Profit Margins*	x
GEN008	How much money that the entrepreneur/owner can spend at the end of the month?	x

Table C17 - Item-Specific Feedback Category (second stage of Face Validation)

Face Validation Item-Specific Feedback

Face Validation Second Stage

Feedback Category	Judge 7
Questionnaire Clarity	25
Questionnaire Difficulty	11
Overlapping Questions	6
Lack of Introductions	2
Lack of definitions	1
TOTAL	**45**

Table C18 - Feedback on the Measurement Instrument's Items in second stage of Face Validation

Code	Item	Comments	Category
		Judge 7	Judge 7
BMI001	New Products A good or product is usually a tangible object such as smartphone, furniture, packaged software, etc.	Use "new" instead of "novel"	Questionnaire Clarity
BMI006	From a different demographic segment. Different demography means that the customer can be different in age,sex, income, educational level, race, nationality	Specify B2C	Questionnaire Clarity
BMI007	From a different geographic area	Specify B2C	Questionnaire Clarity
BMI008	Based on their different life-styles	Specify B2C	Questionnaire Clarity
BMI015	Provided new complementary goods/services to business partners	"existing business partners"	Questionnaire Clarity
BMI016	Was supplied with new complementary goods/service from business partners	"existing business partners"	Questionnaire Clarity
BMI017	Introduced new ways of connecting suppliers to customers.	too difficult	Questionnaire Difficulty
BMI018	Partnership with business partners regarding product/service delivery	Need to be rephrased; overlap with previous scale?	Overlapping Questions
BMI020	Internal system to support product/service delivery. The internal system can consists of physical system (controls flow of parts or product) and information system (controls flow of information) The internal system can consists of physical system (controls flow of parts or product) and information system (controls flow of information)	Delete "internal"	Questionnaire Clarity
BMI026	Physical capital resources. It can be plant, equipment, geographic location, building, etc.	delete "capital"	Questionnaire Clarity
BMI027	Human capital resources. It can be experience, intelligence, knowledge from employee	delete "capital"	Questionnaire Clarity
BMI028	Organizational capital resources. It can be reporting structure, planning system, controlling system, informal relation within the firm, relation with other enterprises, relation with customers	delete "capital"	Questionnaire Clarity
BMI029	New ways revenue streams to generate revenue as source of income. This revenue streams can be in a form of selling, licensing, advertising, transaction cut	change "source of income" to "ways of generating revenue"	Questionnaire Clarity
BMI035	We plan to experiment with our business model	"experiment" word is too difficult; SME rarely experiments	Questionnaire Difficulty

Code	Item	Comments	Category
		Judge 7	Judge 7
BMI036	We have a specific team to handle business model experimentations	"experiment" word is too difficult; SME rarely experiments	Questionnaire Difficulty
BMI037	We allocate specific budgets for business model experimentation	"experiment" word is too difficult; SME rarely experiments	Questionnaire Difficulty
BMI040	used to gain competitive advantages	Unnecessary	Overlapping Questions
BMI044	derived from enterprise's strategy (BM Design)	need to be rephrased "as a result of the change of strategy"	Questionnaire Clarity
BMI045	Poor Performance of our enterprise	specify "internal" at the introduction	Lack of Introductions
BMI046	Decreasing profit	Delete, integrate with previous item	Overlapping Questions
BMI049	new market opportunity	specify "external" at the introduction	Lack of Introductions
BMI055	Business models can be described using Canvas model and other similar models.. Have you ever used such model?	change "business model" into "your business"	Questionnaire Difficulty
BMI058	computer based tools	at the introduction, put the word "frequency" to make it clear	Questionnaire Clarity
BMI074	Organization The way we orrange the responsibilities and development of our employees	vague	Questionnaire Clarity
BMI078	specify internal controls to monitor processes	internal controls	Questionnaire Clarity
BMI080	connect business processes	can use "integrate" instead of "connect"	Questionnaire Clarity
BMI085	in the core components of the business model. Core components of business model are different for each enterprise, depending on characteristics and necessity of the enterprise.	too difficult	Questionnaire Difficulty
BMI087	Enabled our enterprise to target our competitor's unserved customers	too difficult	Questionnaire Difficulty
BMI088	Can threaten the sustainability of the industry leader's business model.	too difficult	Questionnaire Difficulty
BMI089	Cannot be found in the dominant business model in the industry	too difficult	Questionnaire Difficulty
INN008	Employee learning is seen as an investment	add "instead of cost"	Questionnaire Clarity

Code	Item	Comments	Category
		Judge 7	Judge 7
INN010	Vision is being agreed upon across levels, functions, and divisions	change "vision" to "company direction"	Questionnaire Clarity
INN014	Our corporate culture is not focused on constant innovation	change "corporate" to "company"	Questionnaire Clarity
INN024	Challenging existing business models is central to our strategy	the word "business model" is too difficult	Questionnaire Difficulty
INN027	In hindsight, how many major changes your enterprise experienced in the last 12 months? Changes can be in terms of product/service, process, organization, marketing, etc,	it might be difficult to specify the number	Questionnaire Difficulty
INN030	The enterprise regularly adopted several innovations that are available in the industry each year	similar to previous item	Overlapping Questions
PER001	We are satisfied with the sales growth of the company	change "sales" to "Revenue"	Questionnaire Clarity
PER002	"How, approximately, did your company's sales develop the past 12 months from the previous year?	change "sales" to "Revenue"	Questionnaire Clarity
PER005	What is you net profit margin (%)?	explanation about "net profit margin"	Lack of definitions
PER007	Time to market	similar to previous item	Overlapping Questions
PER009	Unit Sales *	change "sales" to "Revenue"	Questionnaire Clarity
PER014	Net Profit Margins*	similar to previous item	Overlapping Questions
GEN002	How many employees in total did the enterprise have in the last 12 months	change "the last 12 months" to "current"	Questionnaire Clarity
GEN004	Is your Enterprise the first to sell your current product/service in the market?	need to be rephrased.. "unique" ?	Questionnaire Clarity
GEN008	How much money that the entrepreneur/owner can spend at the end of the month?	unsure if this is useful.. Related to legal structure of the company	Questionnaire Clarity

Table C19 - General Feedback on the Measurement Instrument in second stage of Face Validation

NO.	JUDGES	Category
	Judge 7	
1	Questionnaire is too long	Questionnaire Length
2	Need to find simpler words for some items, especially the word "business model"	Questionnaire Difficulty
3	Put introduction of each scale closer to the items	Lack of introductions

Table C20 - List of modified or deleted items based on face validation (2nd stage)

Changes	Item Code						
Modified Items	BMI006	BMI020	BMI034	BMI080	INN008	INN029	GEN004
	BMI007	BMI026	BMI040	BMI084	INN010	INN030	GEN008
	BMI008	BMI027	BMI044	BMI085	INN012	PER005	
	BMI015	BMI028	BMI054	BMI088	INN014	PER009	
	BMI016	BMI029	BMI055	BMI089	INN024	GEN001	
	BMI018	BMI033	BMI074	BMI092	INN028	GEN002	
Deleted Items	BMI017	BMI038					
	BMI035	BMI046					
	BMI036	INN027					
	BMI037	PER006					

Table C21 - The result of the first and second stage face validation comparison

Item Code	Action Taken based on 1st face validation	"Not Clear" Item Checking Category	"Not Relevant" Item Checking Category	Item with Comments Checking Category
PRE001	modified	IMPROVED	NO ISSUE	IMPROVED
PRE002	modified	IMPROVED	NO ISSUE	IMPROVED
PRE003	modified	IMPROVED	NO ISSUE	IMPROVED
BMI001	modified	NEW ISSUE	NO ISSUE	NEW ISSUE
BMI002	modified	NO ISSUE	NO ISSUE	NO ISSUE
BMI003	deleted	IMPROVED	NO ISSUE	IMPROVED
BMI004	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI005	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI006	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI007	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI008	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI009	modified	IMPROVED	NO ISSUE	IMPROVED
BMI010	deleted	IMPROVED	NO ISSUE	IMPROVED
BMI011	deleted	NO ISSUE	NO ISSUE	NO ISSUE
BMI012	deleted	IMPROVED	NO ISSUE	IMPROVED
BMI013	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI014	deleted	IMPROVED	IMPROVED	IMPROVED
BMI015	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI016	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI017	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI018	modified	NEW ISSUE	NO ISSUE	NEW ISSUE
BMI019	modified	IMPROVED	NO ISSUE	IMPROVED
BMI020	modified	NO ISSUE	NO ISSUE	NEW ISSUE
BMI021	deleted	NO ISSUE	NO ISSUE	NO ISSUE
BMI022	modified	IMPROVED	NO ISSUE	IMPROVED
BMI023	modified	IMPROVED	NO ISSUE	IMPROVED
BMI024	deleted	IMPROVED	NO ISSUE	IMPROVED
BMI025	modified	IMPROVED	NO ISSUE	IMPROVED
BMI026	modified	IMPROVED	NO ISSUE	NEED FURTHER CHECKING
BMI027	modified	IMPROVED	IMPROVED	NEED FURTHER CHECKING
BMI028	modified	IMPROVED	NO ISSUE	NEED FURTHER CHECKING
BMI029	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI030	modified	IMPROVED	NO ISSUE	IMPROVED
BMI031	modified	IMPROVED	IMPROVED	IMPROVED
BMI032	modified	IMPROVED	NO ISSUE	IMPROVED
BMI033	modified	IMPROVED	NO ISSUE	IMPROVED
BMI034	modified	NO ISSUE	NO ISSUE	NO ISSUE
BMI035	no action	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING

Item Code	Action Taken based on 1st face validation	"Not Clear" Item Checking Category	"Not Relevant" Item Checking Category	Item with Comments Checking Category
BMI036	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
BMI037	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
BMI038	no action	IMPROVED	NO ISSUE	IMPROVED
BMI039	no action	NO ISSUE	NO ISSUE	IMPROVED
BMI040	no action	NO ISSUE	NEW ISSUE	NEED FURTHER CHECKING
BMI041	deleted	NO ISSUE	NO ISSUE	IMPROVED
BMI042	modified	IMPROVED	NO ISSUE	IMPROVED
BMI043	no action	IMPROVED	NO ISSUE	IMPROVED
BMI044	no action	NEW ISSUE	NO ISSUE	NEED FURTHER CHECKING
BMI045	no action	NO ISSUE	NO ISSUE	NEW ISSUE
BMI046	no action	NO ISSUE	NEW ISSUE	NEW ISSUE
BMI047	no action	IMPROVED	NO ISSUE	NO ISSUE
BMI048	modified	IMPROVED	NO ISSUE	IMPROVED
BMI049	modified	IMPROVED	NO ISSUE	NEED FURTHER CHECKING
BMI050	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI051	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI052	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI053	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI054	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI055	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI056	modified	NO ISSUE	NO ISSUE	NO ISSUE
BMI057	modified	IMPROVED	NO ISSUE	IMPROVED
BMI058	no action	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI059	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI060	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI061	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI062	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI063	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI064	modified	NO ISSUE	NO ISSUE	IMPROVED
BMI065	modified	NO ISSUE	NO ISSUE	IMPROVED
BMI066	modified	NO ISSUE	NO ISSUE	IMPROVED
BMI067	modified	NO ISSUE	NO ISSUE	IMPROVED
BMI068	modified	NO ISSUE	NO ISSUE	IMPROVED
BMI069	modified	NO ISSUE	NO ISSUE	IMPROVED
BMI070	deleted	NO ISSUE	NO ISSUE	NO ISSUE
BMI071	deleted	IMPROVED	NO ISSUE	IMPROVED
BMI072	no action	IMPROVED	NO ISSUE	IMPROVED
BMI073	no action	IMPROVED	NO ISSUE	IMPROVED
BMI074	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI075	modified	IMPROVED	NO ISSUE	IMPROVED
BMI076	modified	IMPROVED	NO ISSUE	IMPROVED

Item Code	Action Taken based on 1st face validation	"Not Clear" Item Checking Category	"Not Relevant" Item Checking Category	Item with Comments Checking Category
BMI077	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI078	no action	NO ISSUE	NO ISSUE	NEW ISSUE
BMI079	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI080	modified	NEW ISSUE	NO ISSUE	NEW ISSUE
BMI081	modified	IMPROVED	NO ISSUE	IMPROVED
BMI082	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI083	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI084	modified	IMPROVED	NO ISSUE	IMPROVED
BMI085	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
BMI086	no action	NO ISSUE	NO ISSUE	NO ISSUE
BMI087	modified	NEW ISSUE	NO ISSUE	NEED FURTHER CHECKING
BMI088	modified	NEW ISSUE	IMPROVED	NEED FURTHER CHECKING
BMI089	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
BMI090	no action	IMPROVED	NO ISSUE	IMPROVED
BMI091	modified	IMPROVED	NO ISSUE	IMPROVED
BMI092	modified	NO ISSUE	NO ISSUE	NO ISSUE
INN001	no action	IMPROVED	NO ISSUE	IMPROVED
INN002	modified	IMPROVED	NO ISSUE	IMPROVED
INN003	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN004	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN005	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN006	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN007	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN008	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
INN009	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN010	no action	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
INN011	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN012	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN013	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN014	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
INN015	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN016	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN017	no action	IMPROVED	NO ISSUE	IMPROVED
INN018	deleted	IMPROVED	NO ISSUE	IMPROVED
INN019	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN020	no action	IMPROVED	NO ISSUE	IMPROVED
INN021	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN022	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN023	no action	IMPROVED	NO ISSUE	IMPROVED
INN024	no action	NEW ISSUE	NO ISSUE	NEW ISSUE

Item Code	Action Taken based on 1st face validation	"Not Clear" Item Checking Category	"Not Relevant" Item Checking Category	Item with Comments Checking Category
INN025	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN026	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN027	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
INN028	modified	IMPROVED	NO ISSUE	IMPROVED
INN029	modified	NO ISSUE	NO ISSUE	NO ISSUE
INN030	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
INN031	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN032	modified	NO ISSUE	NO ISSUE	NO ISSUE
INN033	modified	IMPROVED	NO ISSUE	IMPROVED
INN034	deleted	IMPROVED	NO ISSUE	NO ISSUE
INN035	deleted	IMPROVED	NO ISSUE	IMPROVED
INN036	modified	NO ISSUE	IMPROVED	IMPROVED
INN037	modified	IMPROVED	IMPROVED	IMPROVED
INN038	modified	NO ISSUE	IMPROVED	IMPROVED
INN039	no action	IMPROVED	NO ISSUE	IMPROVED
INN040	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN041	no action	NO ISSUE	NO ISSUE	NO ISSUE
INN042	newly created	IMPROVED	IMPROVED	IMPROVED
ENV001	no action	NO ISSUE	NO ISSUE	NO ISSUE
ENV002	no action	NO ISSUE	NO ISSUE	NO ISSUE
ENV003	no action	IMPROVED	NO ISSUE	IMPROVED
ENV004	no action	NO ISSUE	NO ISSUE	NO ISSUE
ENV005	no action	NO ISSUE	NO ISSUE	NO ISSUE
ENV006	modified	IMPROVED	NO ISSUE	NO ISSUE
ENV007	no action	NO ISSUE	NO ISSUE	NO ISSUE
ENV008	no action	NO ISSUE	NO ISSUE	NO ISSUE
ENV009	no action	NO ISSUE	NO ISSUE	NO ISSUE
PER001	modified	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
PER002	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
PER003	modified	IMPROVED	NO ISSUE	IMPROVED
PER004	no action	NO ISSUE	NO ISSUE	NO ISSUE
PER005	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
PER006	no action	IMPROVED	NO ISSUE	IMPROVED
PER007	modified	NO ISSUE	NEW ISSUE	NEED FURTHER CHECKING
PER008	no action	IMPROVED	NO ISSUE	IMPROVED
PER009	no action	NEW ISSUE	NO ISSUE	NEW ISSUE
PER010	no action	NO ISSUE	NO ISSUE	NO ISSUE
PER011	no action	NO ISSUE	NO ISSUE	NO ISSUE
PER012	no action	NO ISSUE	NO ISSUE	NO ISSUE
PER013	no action	NO ISSUE	NO ISSUE	NO ISSUE

Item Code	Action Taken based on 1st face validation	"Not Clear" Item Checking Category	"Not Relevant" Item Checking Category	Item with Comments Checking Category
PER014	no action	NO ISSUE	NEW ISSUE	NEW ISSUE
PER015	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN001	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN002	modified	NEW ISSUE	NO ISSUE	NEW ISSUE
GEN003	no action	IMPROVED	NO ISSUE	IMPROVED
GEN004	no action	NEED FURTHER CHECKING	NO ISSUE	NEED FURTHER CHECKING
GEN005	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN006	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN007	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN008	no action	IMPROVED	NEW ISSUE	NEED FURTHER CHECKING
GEN009	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN010	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN011	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN012	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN013	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN014	modified	NO ISSUE	NO ISSUE	NO ISSUE
GEN015	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN016	no action	NO ISSUE	NO ISSUE	NO ISSUE
GEN017	newly created	IMPROVED	IMPROVED	IMPROVED

Table C22 - Final Item Pool and Item Status

Code	Item	Status		
		After 1st FV	After 2nd FV	New/Existing Item
KNOWLEDGE ABOUT THE FIRM				
PRE001	I know the product/service offerings of my enterprise	modified	no action	NEW ITEM
PRE002	I know my enterprise's source of income	modified	no action	NEW ITEM
PRE003	I have been or am involved in developing new product/services	modified	no action	NEW ITEM
BUSINESS MODEL INNOVATION				
BMI001	New Products A good or product is usually a tangible object such as smartphone, furniture, packaged software, etc.	modified	no action	NEW ITEM
BMI002	New services A service is usually intangible such as retailing, insurance, educational courses, air travel, consulting, etc	modified	no action	NEW ITEM
BMI003	*DELETED*	deleted	no action	deleted
BMI004	New to your enterprise? Your enterprise introduced a new good or service that was already available from your competitors in your market	no action	no action	CIS 2008-2010
BMI005	New to your market? Your enterprise introduced a new good or service onto your market before your competitors	no action	no action	CIS 2008-2010
BMI006	From a different demographic segment in business-to-consumer market. Different demography means that the customer can be different in age,sex, income, educational level, race, nationality	modified	modified	NEW ITEM
BMI007	From a different geographical area in business-to-consumer market.	modified	modified	NEW ITEM
BMI008	Based on their consumer's different life-styles in business-to-consumer market	modified	modified	NEW ITEM
BMI009	From other enterprises in business-to-business market	modified	no action	NEW ITEM
BMI010	*DELETED*	deleted	no action	deleted
BMI011	*DELETED*	deleted	no action	deleted
BMI012	*DELETED*	deleted	no action	deleted
BMI013	started to collaborate with new business partners	no action	no action	NEW ITEM
BMI014	*DELETED*	deleted	no action	deleted
BMI015	Provided new complementary goods/services to existing business partners	modified	modified	NEW ITEM
BMI016	Was supplied with new complementary goods/service from existing business partners	modified	modified	NEW ITEM
BMI017	*DELETED in 2nd Stage*	modified	deleted	deleted
BMI018	Shared responsibilities with business partners regarding product/service delivery	modified	modified	NEW ITEM
BMI019	Distribution channels to deliver product/services	modified	no action	NEW ITEM

		Status		
Code	**Item**	**After 1st FV**	**After 2nd FV**	**New/Existing Item**
BMI020	System to support product/service delivery. The system can consists of physical system (controls flow of parts or product) and information system (controls flow of information) The internal system can consists of physical system (controls flow of parts or product) and information system (controls flow of information)	modified	modified	NEW ITEM
BMI021	*DELETED*	deleted	no action	deleted
BMI022	New primary business processes in the enterprise. Primary processes can be related to product/service creation, marketing, and product/service delivery	modified	no action	NEW ITEM
BMI023	New supporting activities for our business processes. Supporting activities can be maintenance systems or operations for purchasing, accounting or computing	modified	no action	NEW ITEM
BMI024	*DELETED*	deleted	no action	deleted
BMI025	New company rules that provide standards for activities	modified	no action	NEW ITEM
BMI026	Physical resources. It can be plant, equipment, geographic location, building, etc.	modified	modified	NEW ITEM
BMI027	Human resources. It can be experience, intelligence, knowledge from employee	modified	modified	NEW ITEM
BMI028	Organizational resources. It can be reporting structure, planning system, controlling system, informal relation within the firm, relation with other enterprises, relation with customers	modified	modified	NEW ITEM
BMI029	New revenue streams to generate revenue as new ways of generating revenue This revenue streams can be in a form of selling, licensing, advertising, transaction cut	modified	modified	NEW ITEM
BMI030	New product/service promotion techniques to increase sales. Promotion techniques can be the use of advertising media, brand image, loyalty cards, etc	modified	no action	NEW ITEM
BMI031	New methods of setting price pricing mechanism for products/service. The example of pricing mechanisms are pay-per-use, subscription, freemium, bargaining, etc	modified	no action	NEW ITEM
BMI032	The ways of reducing costs	modified	no action	NEW ITEM
BMI033	Fixed costs of the enterprise. Fixed costs are costs that remain the same despite the volume of goods or services produced. Examples include salaries, rents, and physical manufacturing facilities goods or services produced. Examples	modified	modified	NEW ITEM

Code	Item	Status		
		After 1st FV	After 2nd FV	New/Existing Item
	include salaries, rents, and physical manufacturing facilities			
BMI034	Variable costs of the enterprise. Variable costs are costs that vary proportionally with the volume of goods or services produced.	modified	modified	NEW ITEM
BMI035	*DELETED in 2nd Stage*	no action	deleted	deleted
BMI036	*DELETED in 2nd Stage*	no action	deleted	deleted
BMI037	*DELETED in 2nd Stage*	no action	deleted	deleted
BMI038	*DELETED in 2nd Stage*	no action	deleted	deleted
BMI039	a common discussion topic among the management	no action	no action	NEW ITEM
BMI040	Done with trial and error process	no action	modified	NEW ITEM
BMI041	*DELETED*	deleted	no action	deleted
BMI042	Done in teams, either internally or by collaborating with external partners.	modified	no action	NEW ITEM
BMI043	done with help of consultants	no action	no action	NEW ITEM
BMI044	As a result of the changes in strategy	no action	modified	NEW ITEM
BMI045	Poor Performance of our enterprise	no action	no action	NEW ITEM
BMI046	*DELETED in 2nd Stage*	no action	deleted	deleted
BMI047	New use of existing assets	no action	no action	NEW ITEM
BMI048	New internal product/services	modified	no action	NEW ITEM
BMI049	new market opportunity	modified	no action	NEW ITEM
BMI050	changes in customer's preferences	no action	no action	NEW ITEM
BMI051	competitor behaviour	no action	no action	NEW ITEM
BMI052	technological change	no action	no action	NEW ITEM
BMI053	new regulation	no action	no action	NEW ITEM
BMI054	changes in partner's way of doing business	no action	modified	NEW ITEM
BMI055	Your business can be described using Canvas model and other similar models.. Have you ever used such model?	modified	modified	NEW ITEM
BMI056	If yes, please indicate which ontology….	modified	no action	NEW ITEM
BMI057	Are you familiar with BM tools such as sticky notes, Excel, etc?	modified	no action	NEW ITEM
BMI058	computer based tools	no action	no action	NEW ITEM
BMI059	paper based tools	no action	no action	NEW ITEM
BMI060	spread sheets	no action	no action	NEW ITEM
BMI061	board game	no action	no action	NEW ITEM
BMI062	sticky notes	no action	no action	NEW ITEM
BMI063	others, namely	no action	no action	NEW ITEM
BMI064	computer based tools	modified	no action	NEW ITEM
BMI065	paper based tools	modified	no action	NEW ITEM
BMI066	spread sheets	modified	no action	NEW ITEM
BMI067	board game	modified	no action	NEW ITEM
BMI068	sticky notes	modified	no action	NEW ITEM

		Status		
Code	**Item**	**After 1st FV**	**After 2nd FV**	**New/Existing Item**
BMI069	others, namely	modified	no action	NEW ITEM
BMI070	*DELETED*	deleted	no action	deleted
BMI071	*DELETED*	deleted	no action	deleted
BMI072	Value Chain The way we divide the responsibilities between our internal enterprise and external partners	no action	no action	NEW ITEM
BMI073	Cost Model The way we manage cost to be able to deliver product/service profitably	no action	no action	NEW ITEM
BMI074	Organization The way we utilize and develop our employees	modified	modified	NEW ITEM
BMI075	Our enterprise is familiar with (the use of) EA	modified	no action	NEW ITEM
BMI076	specify key business processes	modified	no action	NEW ITEM
BMI077	design information system	no action	no action	NEW ITEM
BMI078	specify internal controls to monitor processes	no action	no action	NEW ITEM
BMI079	standardize business processes	no action	no action	NEW ITEM
BMI080	integrate business processes	modified	modified	NEW ITEM
BMI081	deliver IT software based on business objectives	modified	no action	NEW ITEM
BMI082	deliver IT infrastructure based on business objectives	no action	no action	NEW ITEM
BMI083	define business/organization structure	no action	no action	NEW ITEM
BMI084	in the majority of our business components. Some of the business components are product/service offering, target customer, partner network,distribution channel, revenue model, cost structure	modified	modified	NEW ITEM
BMI085	in the core components of the business. Core components of business model are different for each enterprise, depending on characteristics and necessity of the enterprise. It can be one of the components described above or a combination of them,	modified	modified	NEW ITEM
BMI086	in the components of business model cannot be undone	no action	no action	NEW ITEM
BMI087	Enabled our enterprise to target our competitor's unserved customers	modified	no action	NEW ITEM
BMI088	Can threaten the industry leader's business.	modified	modified	NEW ITEM
BMI089	Cannot be found in the dominant way of doing business in the industry	no action	modified	NEW ITEM
BMI090	is the result of internal formulation	no action	no action	NEW ITEM
BMI091	Was replicated by other enterprises in the industry	modified	no action	NEW ITEM
BMI092	Was not adapted from other existing business in the industry.	modified	modified	NEW ITEM
INNOVATIVENESS				
INN001	understand customer needs	no action	no action	Hult, Hurley & Knight, 2004
INN002	Has a clear formulation of customer satisfaction objectives.	modified	no action	Hult, Hurley & Knight, 2004
INN003	measures customer satisfaction	no action	no action	Hult, Hurley & Knight, 2004

Code	Item	Status		
		After 1st FV	After 2nd FV	New/Existing Item
INN004	Our salespeople share competitor information	no action	no action	Hult, Hurley & Knight, 2004
INN005	The enterprise responds rapidly to competitors' actions	no action	no action	Hult, Hurley & Knight, 2004
INN006	Our managers discuss competitors' strategies	no action	no action	Hult, Hurley & Knight, 2004
INN007	Our ability to learn is our key competitive advantage	no action	no action	NEW ITEM
INN008	Employee learning is seen as an investment instead of cost	no action	modified	NEW ITEM
INN009	Employee learning is a top priority	no action	no action	NEW ITEM
INN010	Company direction is being agreed upon across levels, functions, and divisions	no action	modified	NEW ITEM
INN011	Employees are considered partners of business unit	no action	no action	NEW ITEM
INN012	Sharing company direction is considered important for management	no action	modified	NEW ITEM
INN013	Managers encourage employees to "think outside of the box."	no action	no action	Hult, Hurley & Knight, 2004
INN014	Our company culture is not focused on constant innovation	no action	modified	NEW ITEM
INN015	Original ideas are highly valued	no action	no action	Hult, Hurley & Knight, 2004
INN016	Accept risks	no action	no action	NEW ITEM
INN017	undertakes strategic planning activities	no action	no action	NEW ITEM
INN018	*DELETED*	deleted	no action	deleted
INN019	Is able to identify new opportunities	no action	no action	NEW ITEM
INN020	Suppliers	no action	no action	Su,Tsang, & Peng, 2009
INN021	Customers	no action	no action	Su,Tsang, & Peng, 2009
INN022	Competitors	no action	no action	Su,Tsang, & Peng, 2009
INN023	Universities and Research Institutes (URI)	no action	no action	Su,Tsang, & Peng, 2009
INN024	Challenging the existing way of doing business is central to our strategy	no action	modified	NEW ITEM
INN025	Providing new products/services for customers is central to our strategy	no action	no action	NEW ITEM
INN026	Creating changes in the industry is central to our strategy	no action	no action	NEW ITEM
INN027	*DELETED in 2nd Stage*	modified	deleted	deleted
INN028	Product/Service Innovation. Product innovations are goods or services which have significantly improved functional or user characteristics compared to existing products	modified	modified	NEW ITEM
INN029	Process Innovation. Process innovations involve production and delivery methods and other ancillary support activities aimed at decreasing unit costs or increasing product quality	modified	modified	NEW ITEM
INN030	Marketing Innovation. Marketing innovation is the adoption of a new marketing concept that involves a significant change in the design of an existing product, sales channels, and brand reputation	modified	modified	NEW ITEM
INN031	Our enterprise is one of the first adopters of innovations	no action	no action	NEW ITEM
INN032	Untested new innovations are often	modified	no action	NEW ITEM

Code	Item	Status		
		After 1st FV	After 2nd FV	New/Existing Item
	adopted early by our enterprise			
INN033	Other enterprises often seek our advice before adopting innovations	modified	no action	NEW ITEM
INN034	*DELETED*	deleted	no action	deleted
INN035	*DELETED*	deleted	no action	deleted
INN036	Introduced innovations each year	modified	no action	NEW ITEM
INN037	Been the first to adopt innovations in the industry	modified	no action	NEW ITEM
INN038	Allocated budget to regularly adopt innovations each year.	modified	no action	NEW ITEM
INN039	Are very novel for industry	no action	no action	Clausen & Rasmussen, 2012
INN040	Challenging to existing ideas in industry	no action	no action	Clausen & Rasmussen, 2012
INN041	Are capable for generating ideas for other products	no action	no action	Clausen & Rasmussen, 2012
INN042	External Partners	newly created	no action	Moore, 1993; Peppard & Rylander, 2006
INN043	Organizational Innovation. Organisational innovations deal primarily with people and the organisation of work.	did not exist	newly created	NEW ITEM
ENVIRONMENTAL TURBULENCE				
ENV001	Price competition is very high	no action	no action	NEW ITEM
ENV002	Product offerings are similar between enterprises	no action	no action	NEW ITEM
ENV003	Competitor's reactions to our initiatives are very frequent	no action	no action	NEW ITEM
ENV004	Customer preferences change very frequently	no action	no action	NEW ITEM
ENV005	Our clients look for new products all the time	no action	no action	NEW ITEM
ENV006	Our customer's needs are very different to common customers	modified	no action	NEW ITEM
ENV007	Technology in this sector is changing rapidly *	no action	no action	NEW ITEM
ENV008	A high number of advanced technological products have been developed lately *	no action	no action	NEW ITEM
ENV009	Technological development in this sector has increased rapidly	no action	no action	NEW ITEM
BUSINESS PERFORMANCE				
PER001	We are satisfied with the sales growth of the company	modified	no action	Su,Tsang, & Peng, 2009
PER002	"How, approximately, did your company's sales develop the past 12 months from the previous year?	no action	no action	NEW ITEM
PER003	We are satisfied with the profit growth of the company	modified	no action	NEW ITEM
PER004	"How, approximately, did your company's profit develop the past 12 months from the previous year?	no action	no action	NEW ITEM
PER005	What is you net profit margin (%)? Net profit margin is the ratio of net profit to total revenue. One operational indicator of profit is Earning Before Interest & Tax (EBIT).	no action	modified	NEW ITEM
PER006	*DELETED in 2nd Stage*	no action	deleted	deleted

		Status		
Code	**Item**	**After 1st FV**	**After 2nd FV**	**New/Existing Item**
PER007	Time to market	modified	no action	NEW ITEM
PER008	Market Share	no action	no action	NEW ITEM
PER009	Sales Quantity	no action	modified	NEW ITEM
PER010	Penetration Rate*	no action	no action	NEW ITEM
PER011	Customer Loyalty*	no action	no action	NEW ITEM
PER012	Market Value*	no action	no action	NEW ITEM
PER013	Net Income*	no action	no action	NEW ITEM
PER014	Net Profit Margins*	no action	no action	NEW ITEM
PER015	Return on Investment (ROI)*	no action	no action	NEW ITEM
GENERAL INFO ON THE ENTERPRISE				
GEN001	How many years has it been since the enterprise was founded?	no action	modified	Su,Tsang, & Peng, 2009
GEN002	How many employees in total did the enterprise have currently?	modified	modified	Su,Tsang, & Peng, 2009
GEN003	In which phase is your enterprise currently in? (startup, growth, mature, decline/transition)?	no action	no action	NEW ITEM
GEN004	Is your Enterprise the pioneer in the market?	no action	modified	NEW ITEM
GEN005	monthly salary	no action	no action	NEW ITEM
GEN006	dividend	no action	no action	NEW ITEM
GEN007	other type of return	no action	no action	NEW ITEM
GEN008	What is your enterprise's business structure?	no action	modified	NEW ITEM
GEN009	Is the enterprise being managed by family members?	no action	no action	NEW ITEM
GEN010	Are entrepreneurs involved in the team as owners-managers?	no action	no action	NEW ITEM
GEN011	Is your enterprise part of an enterprise group?	no action	no action	CIS 2008-2010
GEN012	If the answer to previous question is 'yes', then in which country is the head office of your group located?	no action	no action	CIS 2008-2010
GEN013	Are females part of the owners/entrepreneurs?	no action	no action	NEW ITEM
GEN014	Female involvement in the enterprise is helping the enterprise in achieving its goals.	modified	no action	NEW ITEM
GEN015	In which geographic markets did your enterprise sell goods and/or services?	no action	no action	CIS 2008-2010
GEN016	Does the enterprise collaborate with other enterprises from different industries?	no action	no action	NEW ITEM
GEN017	What is your enterprise's primary business sector?	newly created	no action	NEW ITEM

Table C23 - Final Measurement Instrument

Knowledge about your enterprise

What is your level of agreement with the following statements?

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
I know the product/service offerings of my enterprise.	☐	☐	☐	☐	☐	☐	☐
I know my enterprise's source of income.	☐	☐	☐	☐	☐	☐	☐
I have been or am involved in developing new product/services.	☐	☐	☐	☐	☐	☐	☐

PART 1 - Business Model Innovation

1. New Product/Service Offering

In the past 12 months, our enterprise introduced

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
New products. *A good or product is usually a tangible object such as smartphone, furniture, packaged software, etc.*	☐	☐	☐	☐	☐	☐	☐
New services. *A service is usually intangible such as retailing, insurance, educational courses, air travel, consulting, etc*	☐	☐	☐	☐	☐	☐	☐

Were any of your product/service innovations during the past 12 months….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
New to your enterprise? *Your enterprise introduced a new or significantly improved good or service that was already available from your competitors in your market*	☐	☐	☐	☐	☐	☐	☐
New to your market? *Your enterprise introduced a new or significantly improved good or service onto your market before your competitors (it may have*	☐	☐	☐	☐	☐	☐	☐

already been available in other markets)

2. New Target Customer

In the past 12 months, our enterprise served new customers…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
From a different **demographic segment** in business-to-consumer market. *Different demography means that the customer can be different in age,sex, income, educational level, race, nationality.*	☐	☐	☐	☐	☐	☐	☐
From a different **geographical area** in business-to-consumer market.	☐	☐	☐	☐	☐	☐	☐
Based on consumer's **different life-styles** in business-to-consumer market.	☐	☐	☐	☐	☐	☐	☐
From other enterprises in business-to-business market	☐	☐	☐	☐	☐	☐	☐

3. New Value Network

In the past 12 months, our enterprise…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Started to collaborate with new business partners.	☐	☐	☐	☐	☐	☐	☐
Provided new complementary goods/services to existing business partners.	☐	☐	☐	☐	☐	☐	☐
Was supplied with new complementary goods/service from existing business partners	☐	☐	☐	☐	☐	☐	☐

4. New Value Delivery

In the past 12 months, our enterprise introduced new….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Shared responsibilities with business partners regarding product/service delivery.	☐	☐	☐	☐	☐	☐	☐

Distribution channels to deliver product/services. System to support product/service delivery.	☐	☐	☐	☐	☐	☐	☐
The system can consists of physical system (controls flow of parts or product) and information system (controls flow of information)	☐	☐	☐	☐	☐	☐	☐

5. New Key Processes

In the past 12 months, our enterprise introduced:

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
New **primary business processes** in the enterprise. *Primary processes can be related to product/service creation, marketing, and product/service delivery*	☐	☐	☐	☐	☐	☐	☐
New **supporting activities** for our business processes. *Supporting activities can be maintenance systems or operations for purchasing, accounting or computing*	☐	☐	☐	☐	☐	☐	☐
New company rules that provide standards for activities.	☐	☐	☐	☐	☐	☐	☐

6. New Key Resources

During the past 12 months our enterprise introduced new

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Physical resources. *It can be plant, equipment, geographic location, building, etc.*	☐	☐	☐	☐	☐	☐	☐
Human resources. *It can be experience, intelligence, knowledge from employee.*	☐	☐	☐	☐	☐	☐	☐
Organizational resources. *It can be reporting structure, planning system, controlling system, informal relation within the firm, relation with other enterprises, relation with customers.*	☐	☐	☐	☐	☐	☐	☐

7. New Profit Formula / Revenue Model

In the past 12 months, our enterprise introduced:

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
New **revenue streams** as ways of generating revenue. *This revenue streams can be in a form of selling, licensing, advertising, transaction cut*	☐	☐	☐	☐	☐	☐	☐
New product/service **promotion techniques** to increase sales. *Promotion techniques can be the use of advertising media, brand image, loyalty cards,social media,etc*	☐	☐	☐	☐	☐	☐	☐
New **pricing mechanism** for products/service. *The example of pricing mechanisms are pay-per-use, subscription, freemium, bargaining, etc*	☐	☐	☐	☐	☐	☐	☐

8. New Cost Structure / Cost Model

In the past 12 months,there were changes in…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
The ways of reducing costs.	☐	☐	☐	☐	☐	☐	☐
Fixed costs of the enterprise. *Fixed costs are costs that remain the same despite the volume of goods or services produced. Examples include salaries, rents, and physical manufacturing facilities*	☐	☐	☐	☐	☐	☐	☐
Variable costs of the enterprise. *Variable costs are costs that vary proportionally with the volume of goods or services produced.*	☐	☐	☐	☐	☐	☐	☐

9. BMI Processes / Practices

The innovation in the way we do our business is…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
A common topic in the management team.	☐	☐	☐	☐	☐	☐	☐
Done with trial-and-error process	☐	☐	☐	☐	☐	☐	☐
Done in teams, either internally or by collaborating with external partners.	☐	☐	☐	☐	☐	☐	☐
Done with help of	☐	☐	☐	☐	☐	☐	☐

consultants. As a result of the changes in strategy	☐	☐	☐	☐	☐	☐	☐

10. Internal Business Model Innovation Drivers

In the past year, innovation in our business model has been driven by….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Poor performance of our enterprise.	☐	☐	☐	☐	☐	☐	☐
New use of existing assets.	☐	☐	☐	☐	☐	☐	☐
New internally developed product/services.	☐	☐	☐	☐	☐	☐	☐

11. External Business Model Innovation Drivers

In the past year, innovation in our business model has been driven by….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
New market opportunity.	☐	☐	☐	☐	☐	☐	☐
Changes in customer's preferences.	☐	☐	☐	☐	☐	☐	☐
Competitor behavior.	☐	☐	☐	☐	☐	☐	☐
Technological change.	☐	☐	☐	☐	☐	☐	☐
New regulation.	☐	☐	☐	☐	☐	☐	☐
Changes in partner's way of doing business	☐	☐	☐	☐	☐	☐	☐

12. The use of Business Model Ontologies

Your business can be described using Canvas model and other similar models. Have you ever used such models?

☐ Yes

☐ No

If yes, please indicate which model: _____

13. The use of Business Model Tooling

	Very unfamiliar	Unfamiliar	Slightly Unfamiliar	Neither Unfamiliar nor Familiar	Slightly Familiar	Familiar	Very Familiar
Are you familiar with Business Model tools. *To make decisions on a new business model, several tools can be used. For instance, brainstorming tools like sticky notes or computer tools like Excel.*	☐	☐	☐	☐	☐	☐	☐

To what extent do you frequently use the following tools to support business model innovation:

	Never			Sometimes			Use it intensively
Computer-based tools.	☐	☐	☐	☐	☐	☐	☐
Paper-based tools.	☐	☐	☐	☐	☐	☐	☐
Spreadsheets (Excel).	☐	☐	☐	☐	☐	☐	☐
Board Game.	☐	☐	☐	☐	☐	☐	☐
Sticky Notes.	☐	☐	☐	☐	☐	☐	☐
Other,	☐	☐	☐	☐	☐	☐	☐

Namely:_____

If you have used or would like to use business model tooling, to what extent do you prefer them?

	Strongly do not prefer	Do not Prefer	Slightly do not Prefer	Neutral	Slightly Prefer	Prefer	Strongly Prefer
Computer-based tools.	☐	☐	☐	☐	☐	☐	☐
Paper-based tools.	☐	☐	☐	☐	☐	☐	☐
Spreadsheets (Excel).	☐	☐	☐	☐	☐	☐	☐
Board Game.	☐	☐	☐	☐	☐	☐	☐
Sticky Notes.	☐	☐	☐	☐	☐	☐	☐
Other,	☐	☐	☐	☐	☐	☐	☐

Namely:_____

14. Operating Model

To what extent do you agree or disagree the following operating model elements supported your business as a whole?

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Value Chain. *The way we divide the responsibilities between our internal enterprise and external partners*	☐	☐	☐	☐	☐	☐	☐
Cost Model. *The way we manage cost to be able to deliver product/service profitably*	☐	☐	☐	☐	☐	☐	☐
Organization. *The way we utilize and develop our employees*	☐	☐	☐	☐	☐	☐	☐

15. Enterprise Architecture (EA)

	Very unfamiliar	Unfamiliar	Slightly Unfamiliar	Neither Unfamiliar nor Familiar	Slightly Familiar	Familiar	Very Familiar
Our enterprise is familiar with (the use) of Enterprise Architecture (EA).	☐	☐	☐	☐	☐	☐	☐

In our enterprise, we use Enterprise Architecture (EA) to….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Specify business processes.	☐	☐	☐	☐	☐	☐	☐
Design information system.	☐	☐	☐	☐	☐	☐	☐
Specify internal controls to monitor processes.	☐	☐	☐	☐	☐	☐	☐
Standardize business processes.	☐	☐	☐	☐	☐	☐	☐
Integrate business processes.	☐	☐	☐	☐	☐	☐	☐
Deliver IT software based on business objectives.	☐	☐	☐	☐	☐	☐	☐
Deliver IT infrastructure based on business objectives.	☐	☐	☐	☐	☐	☐	☐
Define business/organization structure.	☐	☐	☐	☐	☐	☐	☐

16. Business Model Innovation Radicalness

The questions so far addressed the changes in the elements of business model and the practice (from design to implementation) of this changes (business model innovation). Next questions will address the outcome of these changes.

In the past 12 months, in our enterprise there were changes…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
In the **majority** of our business components. *Some of the business components are product/service offering, target customer, partner network, distribution channel, revenue model, cost structure*	☐	☐	☐	☐	☐	☐	☐
In the **core components** of the business. *Core components of business are different for each enterprise, depending on characteristics and necessity of the enterprise.It can be one of the components described above or a combination of them,*	☐	☐	☐	☐	☐	☐	☐
In the components of business model that cannot be undone.	☐	☐	☐	☐	☐	☐	☐

17. Business Model Innovation Disruptiveness

In the past 12 months, the changes in the way we do business..

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Enabled our enterprise to target our competitor's unserved customers.	☐	☐	☐	☐	☐	☐	☐
Can threaten the of the industry leader's business.	☐	☐	☐	☐	☐	☐	☐
Cannot be found in the dominant way of doing business in the industry.	☐	☐	☐	☐	☐	☐	☐

18. Business Model Innovation Originality

Our current way of doing business….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Is the result of internal formulation.	☐	☐	☐	☐	☐	☐	☐
Was replicated by other enterprises in the industry	☐	☐	☐	☐	☐	☐	☐
Was not adapted from other existing business in the industry.	☐	☐	☐	☐	☐	☐	☐

PART 2 - Innovativeness

19. Customer Orientation

Our enterprise…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Understands customer needs.	☐	☐	☐	☐	☐	☐	☐
Has a clear formulation of customer satisfaction objectives.	☐	☐	☐	☐	☐	☐	☐
Measures customer satisfaction.	☐	☐	☐	☐	☐	☐	☐

20. Competitor Orientation

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Our salespeople share competitor information.	☐	☐	☐	☐	☐	☐	☐
The enterprise responds rapidly to competitors' actions.	☐	☐	☐	☐	☐	☐	☐
Our managers discuss competitors' strategies.	☐	☐	☐	☐	☐	☐	☐

21. Commitment to Learning

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Our ability to learn is our key competitive advantage.	☐	☐	☐	☐	☐	☐	☐
Employee learning is seen as an investment instead of cost.	☐	☐	☐	☐	☐	☐	☐
Employee learning is a top priority.	☐	☐	☐	☐	☐	☐	☐

22. Shared Vision

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Company direction is being agreed upon across levels, functions, and divisions.	☐	☐	☐	☐	☐	☐	☐
Employees are considered partners of business unit.	☐	☐	☐	☐	☐	☐	☐
Sharing company direction is considered important for management.	☐	☐	☐	☐	☐	☐	☐

23. Open-Mindedness

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Managers encourage employees to "think outside of the box".	☐	☐	☐	☐	☐	☐	☐
Our company culture is not focused on constant innovation.	☐	☐	☐	☐	☐	☐	☐
Original ideas are highly valued.	☐	☐	☐	☐	☐	☐	☐

24. Entrepreneurial Orientation

Our enterprise…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Accept risks.	☐	☐	☐	☐	☐	☐	☐
Undertakes strategic planning activities.	☐	☐	☐	☐	☐	☐	☐
Is able to identify new opportunities.	☐	☐	☐	☐	☐	☐	☐

25. Collaboration Effort

For developing new products/services, our enterprise frequently interacts with

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Suppliers.	☐	☐	☐	☐	☐	☐	☐
Customers.	☐	☐	☐	☐	☐	☐	☐
Competitors.	☐	☐	☐	☐	☐	☐	☐
Universities & Research Institutes (URI).	☐	☐	☐	☐	☐	☐	☐
External Partners.	☐	☐	☐	☐	☐	☐	☐

26. Enterprise's Strategic Emphasis on Innovation

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Challenging the existing way of doing business is central to our strategy.	☐	☐	☐	☐	☐	☐	☐
Providing new products/services for customers is central to our strategy.	☐	☐	☐	☐	☐	☐	☐
Creating changes in the	☐	☐	☐	☐	☐	☐	☐

industry is central to our strategy.

27. Average Number of Innovation Adoption

*The enterprise regularly introduced **more than one innovation** in each of the following area:*

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Product/Service Innovation. *Product innovations are goods or services which have significantly improved functional or user characteristics compared to existing products* (OECD, 2005)	☐	☐	☐	☐	☐	☐	☐
Process Innovation. *Process innovations involve production and delivery methods and other ancillary support activities aimed at decreasing unit costs or increasing product quality*	☐	☐	☐	☐	☐	☐	☐
Marketing Innovation. *Marketing innovation is the adoption of a new marketing concept that involves a significant change in the design of an existing product, sales channels, and brand reputation*	☐	☐	☐	☐	☐	☐	☐
Organizational Innovation. *Organisational innovations deal primarily with people and the organisation of work.*	☐	☐	☐	☐	☐	☐	☐

28. Time of Innovation Adoption

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Our enterprise is one of the first adopters of innovations.	☐	☐	☐	☐	☐	☐	☐
Untested new innovations are often adopted early by our enterprise.	☐	☐	☐	☐	☐	☐	☐
Other enterprises often seek our advice before they adopt the same innovations.	☐	☐	☐	☐	☐	☐	☐

29. Variability/Consistency of Time of Innovation Adoption

Our enterprise has **consistently**….

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Introduced innovations each year	☐	☐	☐	☐	☐	☐	☐
Been the first to adopt innovations in the industry.	☐	☐	☐	☐	☐	☐	☐
Allocated budget to regularly adopt innovations each year.	☐	☐	☐	☐	☐	☐	☐

30. Degree of product/service newness

To what extent do you agree or disagree that your enterprise's products/services…

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Are very novel for industry.	☐	☐	☐	☐	☐	☐	☐
Are challenging to existing ideas in industry.	☐	☐	☐	☐	☐	☐	☐
Are capable for generating ideas for other products.	☐	☐	☐	☐	☐	☐	☐

PART 3 - Environmental Turbulence

31. Competitive Intensity

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Price competition is very high.	☐	☐	☐	☐	☐	☐	☐
Product offerings are similar between enterprises.	☐	☐	☐	☐	☐	☐	☐
Competitor's reactions to our initiatives are very frequent.	☐	☐	☐	☐	☐	☐	☐

32. Market Turbulence

To what extent do you agree or disagree with the following statements.

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	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Customer preferences change very frequently.	☐	☐	☐	☐	☐	☐	☐
Our clients look for new products all the time.	☐	☐	☐	☐	☐	☐	☐
Our customer's needs are very different to common customers.	☐	☐	☐	☐	☐	☐	☐

33. Technology Turbulence

To what extent do you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Technology in this sector is changing rapidly.	☐	☐	☐	☐	☐	☐	☐
A high number of advanced technological products have been developed lately.	☐	☐	☐	☐	☐	☐	☐
Technological development in this sector has increased rapidly.	☐	☐	☐	☐	☐	☐	☐

PART 4 - Business Performance

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
We are satisfied with the sales growth of the company.	☐	☐	☐	☐	☐	☐	☐

	Decreased more than 50%	Decreased 50%-31%	Decreased 30% - 0%	Did not change	Increased 0% - 30%	Increased 31%-50%	Increased more than 50%
How, approximately, did your company's sales develop last year from the previous year?	☐	☐	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
We are satisfied with the profit growth of the company.	☐	☐	☐	☐	☐	☐	☐

	Decreased more than 50%	Decreased 50%-31%	Decreased 30% - 0%	Did not change	Increased 0% - 30%	Increased 31%-50%	Increased more than 50%
How, approximately, did your company's profit develop last year from the previous year?	☐	☐	☐	☐	☐	☐	☐

What is your net profit margin (%) ?
Net profit margin is the ratio of net profit to total revenue. One operational indicator of profit is Earning Before Interest & Tax (EBIT).

_____%

34. *To what extent do you agree or disagree that the following items are important as the indicator of your enterprise's business performance?*

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
Time to Market	☐	☐	☐	☐	☐	☐	☐
Market Share.	☐	☐	☐	☐	☐	☐	☐
Sales Quantity.	☐	☐	☐	☐	☐	☐	☐
Penetration Rate.	☐	☐	☐	☐	☐	☐	☐
Customer Loyalty.	☐	☐	☐	☐	☐	☐	☐
Market Value.	☐	☐	☐	☐	☐	☐	☐
Net Income.	☐	☐	☐	☐	☐	☐	☐
Net Profit Margins.	☐	☐	☐	☐	☐	☐	☐
Return on Investment (ROI).	☐	☐	☐	☐	☐	☐	☐

PART 5 - General Information about the enterprise

35. How many years has it been since the enterprise was founded? _____years

36. How many employees in total did the enterprise have currently? _____employees

37. In which phase is your enterprise currently in?

☐ **Startup**
the period in which developing and implementing a business plan, obtaining initial financing, and entering the marketplace are dominant concerns.

☐ **Growth**
By this stage, the firm has achieved a degree of success; the previously dominant concern for survival has largely been overcome, and the firm is actively seeking and engaged in expansion opportunities.

☐ **Mature**
Managers often regard the company and themselves as successful, respected leaders and role models.

☐ **Decline/Transition**
demand for an organization's traditional products and/or services will be reduced, prompting management to consider such strategies as mergers, downsizing, and layoffs to ensure organizational survival.

	YES	NO
38. Is your enterprise the pioneer in the market?	☐	☐

39. *The entrepreneur/owner receives …..*

	YES	NO
monthly salary	☐	☐
dividend	☐	☐
other type of return	☐	☐
Namely: _____		

40. What is your enterprise's business structure?

☐ **Sole Trader.**
As a sole trader, you run your own business as an individual. You can keep all your business's profits after you've paid tax on them.

☐ **Limited Company.**
A limited company is an responsible in its own right for everything it does and its finances are separate to your personal finances. Any profit it makes is owned by the company, after it pays Corporation Tax. The company can then share its profits. Every limited company has 'members' - the people or organisations who own shares in the company.

☐ **Business Partnership.**
In a business partnership, you and your business partner (or partners) personally share responsibility for your business. You can share all your business's profits between the partners. Each partner pays tax on their share of the profits.

	YES	NO
41. Is the enterprise being managed by family members?	☐	☐
42. Are entrepreneurs involved in the team as owners-managers?	☐	☐
43. Is your enterprise part of an enterprise group?	☐	☐

44. If the answer to previous question is 'yes', then in which country is the head office of your group located? _____

	YES	NO
45. Are females part of the owners/entrepreneurs?	☐	☐

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
46. Female involvement in the enterprise is helping the enterprise in achieving its goals.	☐	☐	☐	☐	☐	☐	☐

47. In which geographic markets did your enterprise sell goods and/or services during last year?
The enterprise might serve national market and also at the same time serve other market in other EU countries, as well in all other countries besides the EU.

	YES	NO
Local/Regional	☐	☐
National	☐	☐
Other European Union (EU) countries, EFTA or EU candidate countries*	☐	☐
All other countries	☐	☐

* Include the following European Union (EU) countries, EFTA or EU candidate countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Switzerland, Turkey, Spain and Sweden.

48. What is your enterprise's primary business sector?

☐	**Agriculture & Mining**	☐	**Finance**
☐	**Utilities & Waste**	☐	**Real Estate**
☐	**Manufacturing**	☐	**Professional & Scientific**
☐	**Construction**	☐	**Administrative Services**
☐	**Retail & Wholesale**	☐	**Education**
☐	**Transport & Storage**	☐	**Health**
☐	**Food & Accomodation**	☐	**Arts & Recreation**
☐	**Information & Communication**	☐	**Other Services**

	YES	NO
49. Does the enterprise collaborate with other enterprises from different industries?	☐	☐

APPENDIX D - Discussion Supporting Tables

Table D1 - Items that were modified but still judged "Not Clear" in second stage of Face Validation

Item code	Modified item in second stage of face validation
BMI006	From a different demographic segment. Different demography means that the customer can be different in age,sex, income, educational level, race, nationality
BMI007	From a different geographic area
BMI008	Based on their different life-styles
BMI015	Provided new complementary goods/services to business partners
BMI016	Was supplied with new complementary goods/service from business partners
BMI017	Introduced new ways of connecting suppliers to customers.
BMI029	New ways revenue streams to generate revenue as source of income. This revenue streams can be in a form of selling, licensing, advertising, transaction cut
BMI055	Business models can be described using Canvas model and other similar models.. Have you ever used such model?
BMI074	Organization The way we arrange the responsibilities and development of our employees
BMI085	in the core components of the business model. Core components of business model are different for each enterprise, depending on characteristics and necessity of the enterprise.
INN027	In hindsight, how many major changes your enterprise experienced in the last 12 months? Changes can be in terms of product/service, process, organization, marketing, etc,
INN030	The enterprise regularly adopted several innovations that are available in the industry each year
PER001	We are satisfied with the sales growth of the company

Table D2 - Business Performance Variables in Selected Studies

Selected Studies				
No.	**Author**	**Year**	**Scope**	**Variables**
1	Subramanian & Nilakanta	1996	Large Firms	Share of Deposits, Return on Assets
2	Hult, G. T. M., Hurley, R. F., & Knight, G. a.	2004	Large Firms	Profitability, Sales Growth, Market Share, General Performance
3	Zott, C., & Amit, R	2007	SMEs	Market Stock Valuation
4	Zott, C., & Amit, R	2008	Large Firms and SMEs	Market Stock Valuation
5	Su, Yu Shan; Tsang, Eric W K; Peng, Mike W.	2009	Large Firms and SMEs	Sales Growth, Net Profit Margin, Market Share
6	Aspara, Jaakko; Hietanen, Joel; Tikkanen, Henrikki	2010	Large Firms and SMEs	Profitable Growth , Operating Income Growth
7	Abd Aziz, Sumaiyah; Mahmood, Rosli	2011	Startups	Gross Profit, Return on Asset, Return on Investment
8	Huang, Hao-Chen; Lai, Mei-Chi; Kao, Meng-Chun; Chen, Yi-Chun	2012	Large Firms and SMEs	Return on investment, Return on asset, Return on sales, Overall profitability
9	Hartmann, M., Oriani, R., & Bateman, H.	2013	Large Firms	Net Operational Performance
10	Cucculelli, Marco; Bettinelli, Cristina	2015	SMEs	Sales Growth, Return on Sales, Total Factor Productivity
11	Kim, Stephen K; Min, Sungwook	2015	Large Firms	Sales Revenue
12	Velu, Chander	2015	SMEs	Survival of firms

Table D3 - Innovativeness Variables in Selected Studies

Selected Studies				
No.	Author	Year	Scope	Variables
1	Subramanian & Nilakanta	1996	Large Firms	Average number of innovation adopted, Average timing of innovation adoption, Consistency of the timing of innovation adoption
2	Hult, G. T. M., Hurley, R. F., & Knight, G. a.	2004	Large Firms	Tendency to innovate
3	Su, Yu Shan Tsang, Eric W K Peng, Mike W.	2009	Large Firms and SMEs	Product Innovativeness, Service Innovativeness
4	Clausen, T. H., & Rasmussen, E.	2012	Startups	Established innovation
5	Cheng, Colin C J Shiu, Eric C C Dawson, John A	2014	Not defined, but most likely large firms	Operating/Delivery Process Newness, Service Modification, Service Newness to the market, Service Newness to the company

Table D4 - Environmental Turbulence Variables in Other Studies

Selected Studies				
No.	Author	Year	Scope	Variables
1	Miller, Droge, and Toulouse	1988	Large firms & SMEs	Market uncertainty, Technology uncertainty
2	Covin & Slevin	1989	SMEs	Environmental Hostility
3	Jaworski & Kohli	1993	Large firms	Market Turbulence, Competitive Intensity, Technology Turbulence
4	Moorman & Miner	1997	Not mentioned	Technology Turbulence, Market Turbulence
5	Zahra & Bogner	2000	Not mentioned	Heterogeneity, Dynamism, Non-price Hostility, Price-related Hostility
6	Calantone, Schmidt, Di Benedetto	2006	Large firms	Technology Turbulence, Market Turbulence

Table D5 - Business Model Innovation Variables in Selected Studies

Selected Studies				
No.	**Author**	**Year**	**Scope**	**Variables**
1	Zott, C., & Amit, R	2007	SMEs	Novelty-centered Business Model Designs
2	Zott, C., & Amit, R	2008	Large Firms and SMEs	Novelty-centered Business Model Designs
3	Su, Yu Shan; Tsang, Eric W K; Peng, Mike W.	2009	Large Firms and SMEs	R&D Capability, Marketing Capability, Manufacturing Capability, Supplier Partnership, Customer Partnership, Competitor Partnership, URI Partnership
4	Aspara, Jaakko; Hietanen, Joel; Tikkanen, Henrikki	2010	Large Firms and SMEs	Strategic Emphasis on BMI
5	Abd Aziz, Sumaiyah; Mahmood, Rosli	2011	Startups	Stakeholders, Competencies, Value Creation, Value Capture
6	Clausen, T. H., & Rasmussen, E.	2012	Startups	Parallel Business Models
7	Huang, Hao-Chen; Lai, Mei-Chi; Kao, Meng-Chun; Chen, Yi-Chun	2012	Large Firms and SMEs	Business Model Innovation
8	Hartmann, M., Oriani, R., & Bateman, H.	2013	Large Firms	Business Model Innovation using NK model
9	Cheng, Colin C J; Shiu, Eric C C; Dawson, John A	2014	Not mentioned	Novelty-centered BM Design (Service)
10	Cucculelli, Marco; Bettinelli, Cristina	2015	SMEs	BM Change
11	Kim, Stephen K; Min, Sungwook	2015	Large Firms	Online Addition, Reputable Time, Number of Stores, Autonomous Business Unit (ABU)
12	Velu, Chander	2015	SMEs	Degree of BMI