Understanding Business Model Innovation Pattern of Small and Medium Enterprises

Analyzing the Changes in Business Model and Operational Area in Response to Firm's External and Internal Factors: A Case Survey Research

ANDRE CAESARSYAH MADIAN | Master Thesis | Management of Technology

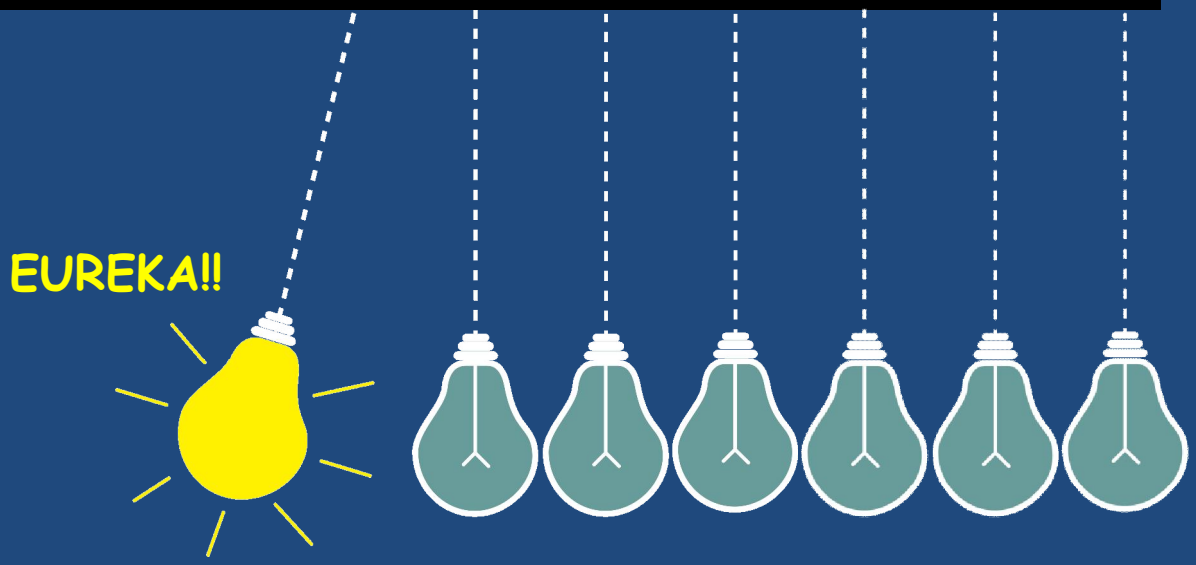


image source: http://www.nesta.org.uk/

TU Delft Delft University of Technology

Delft University of Technology
Faculty of Technology, Policy and Management
Section of Information and Communication Technology
Management of Technology

Author:

Name	Andre Caesarsyah Madian
Student number	4325869
E-mail	andremadian@gmail.com
Date	August 2015

Graduation Committee:

Chairman of committee	Dr. Robert M. Verburg Section of Economics of Technology and Innovation
1st Supervisor	Dr. Ir. G. A. (Mark) de Reuver Section of Information and Communication Technology
2nd Supervisor	Dr. Z. (Zenlin) Roosenboom-Kwee Section of Economics of Technology and Innovation
External Supervisor	Dr. W. A. G. A. (Harry) Bouwman ENVISION project
Additional Supervisor	Alexia Athanasopoulou - PhD candidate Section of Information and Communication Technology

Preface

This master thesis report represent the final project for the course "MOT2910 Master Thesis Project" and signify the end of my study in Management of Technology of Delft University of Technology. The last 6 months of conducting this research project was a great experience to me. I am truly grateful to have given the opportunity to be involved in a project with such interesting topic, which have broaden my perspective professionally as well as personally. Furthermore, this research project would not be possible without the help of several parties. Therefore, I would like to say my gratitude to every parties that are involved directly or indirectly in supporting me during this research project.

First, I want to say my thanks to the members of the graduation committee. I want to express my deep gratitude to my first supervisor in this research, Dr. Ir. Mark de Reuver. Your feedbacks always stimulate me to think more critically whenever I stumbled upon some obstacles, in which I really appreciate and value greatly. I believe your advices and critics are really sharp and straight to the point, which help shape my research greatly.

I also want to say thank you to Prof. Harry Bouwman for all the mentorship and guidance given to me. I believe your advices are really helpful in giving the strategic direction for my thesis. Really appreciate the honesty in all of your advices and comments which motivate and challenge me to always do better and deliver excellent results.

Many thanks to Dr. Robert Verburg for the critical comments during all the meetings that we had. You pointed to some important elements that are missing in my research and ways to improve it, and for that I am very grateful. Thank you also to Dr. Zenlin Roosenboom-Kwee for your time and flexibility to be my second supervisor in the graduation committee. I also want to say thanks to Alexia Athanasopoulou for the valuable inputs given to improve my thesis.

Second, I want to say my thanks to the members of ENVISION project. Thank you for providing me with all of the essential data needed for this cases. It was also really nice to meet all of you and get many insights regarding this topic during the kick-off meeting. Many thanks to Dr. Marikka Heikkilä for answering a lot of questions and provide clarifications for me regarding the cases used in this research.

Lastly, I want to say many thanks to all of my family and friends. Special thanks to my mother and father that supported me all the way during my study in Delft. Thank you for all the love and patience given to me. To all of my friends in Delft, thank you for all the laughs and silly moments that made my life in Delft to be such a memorable experience.

Andre Caesarsyah Madian

Delft, August 2015

Executive summary

The EU Innovation Union identified that innovations are needed to boost economic growth performance, where SMEs are considered vital for these goals. To achieve this, business model innovation (BMI) is identified as the new area to innovate and also source of future competitive advantage. This is relevant for SMEs since innovative SMEs are more likely to contribute to economic growth (such as generate more jobs) than SMEs with low innovation. Furthermore, business model changes as a form of innovation can be seen as a response to the changes of external environment or internal factors of the firm.

However, it is not easy for firms to perform BMI. One of the barriers in changing business model would be the conflict between existing BM and its underlying operation with the new BM. Moreover, by taking account the external and internal factors of the firms, there can be various arrangements in the BM and operational elements that can be modified by the firm, making it a complex and cumbersome process.

To overcome these barriers, ontologies or frameworks could be utilized to guide the BMI practice. However, firms are presented with various options of ontologies with different possible changes in both BM and operational elements. Furthermore, while trial-and-error approach could be utilized to find the best ontologies or the appropriate changes in BM and operational level, firms don't have much time to experiment due to market pressure. Hence, this research found a need to provide SMEs with insights regarding pattern of past BMI practices to help simplify and reduce the time to perform BMI. To achieve this, this research took several steps.

First, to have an aggregated learning regarding BMI patterns with a limited time and resources, the author selected the case survey method as the research approach. Case survey method are used because it can (1) provide inexpensive way of tapping the rich insights from various cases in a relatively shorter time than performing individual case studies and (2) ensure cross-case compatibility and the generalizability of the research, since the case survey will include cases from various type of industries and geographic area (heterogeneous case).

Second, the case survey coding scheme was designed by exploring vast amount of literature. This is to identify possible variables that is relevant and can be used to assess BMI patterns in the cases collected. Due to the exploratory nature of this research, the case survey coding scheme are made to have open-ended questions to gather all possible answers in order to have rich insights. In the end, the coding scheme designed in this research have 43 open-ended questions (variables).

Third step would be the data collection. To collect the BMI cases, the author contacted several researchers in Europe and members of ENVISION project that have done case studies in business model innovation to have a more relevant focus and time-saving (*purposive sampling*). Furthermore, to filter the data collected, this research applied a strict selection and exclusion criteria according to case survey procedure. Due to these stringent selection & exclusion criteria, we removed around 14 cases and resulted in 27 final sample cases.

Fourth, the case survey coding scheme was applied to the BMI cases. To help the coder in assessing the BMI cases, this research included a coding manual that consists of definitions and rules regarding each variables of the coding scheme. The application of the coding scheme results in a database containing qualitative answers (coding) for each cases. On top of it, the coding scheme also produced VIP frameworks that provide additional insights regarding firm's relationship (in terms of value, information and process) with other actors in the value network / ecosystem.

Fifth, this research converted the qualitative data into quantitative data by using qualitative content analysis. The conversion was done firstly by grouping the qualitative answers based on its commonalities to create answer categories. The categorization process resulted in 158 answer categories (variables). The quantitative coding was done by counting the frequencies of each answers categories across all cases. The quantitative data was used as an input to do statistical analysis in a software (SPSS) to provide further analysis.

Sixth, due to the interpretive nature of the coding, this research used alternative means to measure reliability and validity of the qualitative coding. Reliability of the coding are being measured through *dependability (e.g. transparent coding process / coding manual)* and *confirmability (e.g. member checking)*. Internal validity are substituted by establishing *credibility* via validation with case owners (member checking) , while external validity is substituted by establishing *transferability* using thick description of variables in the coding scheme by utilizing coding manual and the usage of purposive sampling.

Lastly, the usage of SPSS produced a descriptive analysis that helps describing the patterns of BMI practice found in the quantitative data. After the descriptive analysis was done, this research tried to test association between the variables with correlation analysis and regression analysis in SPSS. However, the majority of the results are found to be not statistically significant. The non-significant results may have been contributed by the small sample size of this research and the existence of missing values in the data.

There are several findings regarding the BMI practice done by SMEs. First, the major drivers for SMEs to do BMI would be due to market dynamics, high innovativeness and low business performances. Second, the most BM ontologies used to guide the BMI would be Canvas and STOF, while ArchiMate is found to be the most popular EA framework used. Third, we found that in overall, changes in the BM are mostly related to changes in services, organizational network and target market. And lastly, the changes in BM will create changes in the operational area especially in the process domain, value dependencies and information domain. These findings would represent the main pattern of BMI practice that were found within the SMEs in our cases.

This research contain many limitations, and the BMI patterns in this research are mainly descriptive insights, which can be improved in several ways. The first one is to classify the combinatorial patterns of these BMI practices by using cluster analysis (or latent class analysis in the case of categorical data). The second one is to use configurational analysis to find the best 'path' or combinations when making changes / configuration of the BM and operational elements according to the contextual conditions (external -internal factors) of each firm.

Table of Contents

List of Figures

List of Tables

1. Introduction

"Innovation is the central issue in economic prosperity" - Michael Porter

1.1 Background

Innovations have been seen as an important agenda nowadays. Innovations are identified by countries globally as key policy and strategic issue to face globalisation challenges and sustain competitive advantage (Baregheh, Rowley, & Sambrook, 2009). Other scholars view innovations (alongside entrepreneurship) as the main pillars of economic policies in developed countries (de Jong, 2013) and also the main engine of growth (Aghion, Van Reenen, & Zingales, 2013). The importance of innovations can also be seen from the launching of Innovation Union initiative in 2010 as part of Europe 2020 strategy to realise smart, sustainable and inclusive economic growth.

SMEs play important role to European countries, since it support the innovations and economic growth (Acs & Audretsch, 1988). SMEs in the European Union contributed to 99% of the industry in the area and more than 70% of employment (Nieto & Santamaría, 2010). Since smaller firms are associated with a more radical or disruptive innovations (Abernathy & Utterback, 1978), they are often identified as the source of development of technological capabilities for larger or more established firms (Granstrand & Sjolander, 1990). Furthermore, it is found that innovative SMEs are more likely to generate more jobs than SMEs with low innovation (Spencer & Kirchhoff, 2006). Therefore it is important to promote innovations of SMEs.

Firms (such as SMEs) can innovate in several popular and known areas such as products, operational processes, services or organizational forms (including people) (Baregheh et al., 2009; John E Ettlie & Reza, 1992). Aside from these well known area of innovations, innovation in business model area is currently growing (Lindgren, 2011).

Business model have been identified as the new area to innovate and also source of future competitive advantage (Amit & Zott, 2012). Amit & Zott (2012) also argued that business model innovations have better advantage compared to the traditional product and process innovation because innovation in these areas are often time consuming and expensive, while the results are relatively uncertain. Furthermore, business model innovation (BMI) is identified as a means to bridge the gap between research into their commercial application (Barjak, Bill, & Perrett, 2014). Invention of new products that is kept in a laboratory setting have no direct economic value, thus it need to be diffused into other parties in the marketplace aside from the inventor itself (Garcia & Calantone, 2002).

Companies are starting to shift focus to BMI as an alternative area of innovation to gain long-term advantage over competitors (Lindgren, 2011). IBM's 2006 and 2008 "Global CEO Study," show that top management in a broad range of industries are actively seeking guidance on how to innovate their business models (Casadesus-Masanell & Ricart, 2010). Firms are starting to realize that product innovation alone is not enough nowadays to differentiate themselves from competitors (Teece, 2010), since it can be easily copied compared to the innovation in the business model.

Business model changes as a form of innovation is a response to the changes of external environment or internal factors of the firm (Demil & Lecocq, 2010; Hult, Hurley, & Knight, 2004). New business model design should be adapted to the environmental circumstances (George & Bock, 2011; Morris, Shirokova, & Shatalov, 2013). To keep up with environmental dynamics such as changing technology landscape, market place and regulatory conditions, organizations have to reinvent their business models regularly in order to remain competitive (Morris, Schindehutte, & Allen, 2005). If companies don't react quickly to the changes in their environment, they will not be able to compete in the long term (Giesen, Riddleberger, Christner, & Bell, 2010). The choice is either the company transform their business model or their business model become obsolete. **Figure 1** can illustrate the importance of business model innovation adaptation to environment changes and firm's survival.

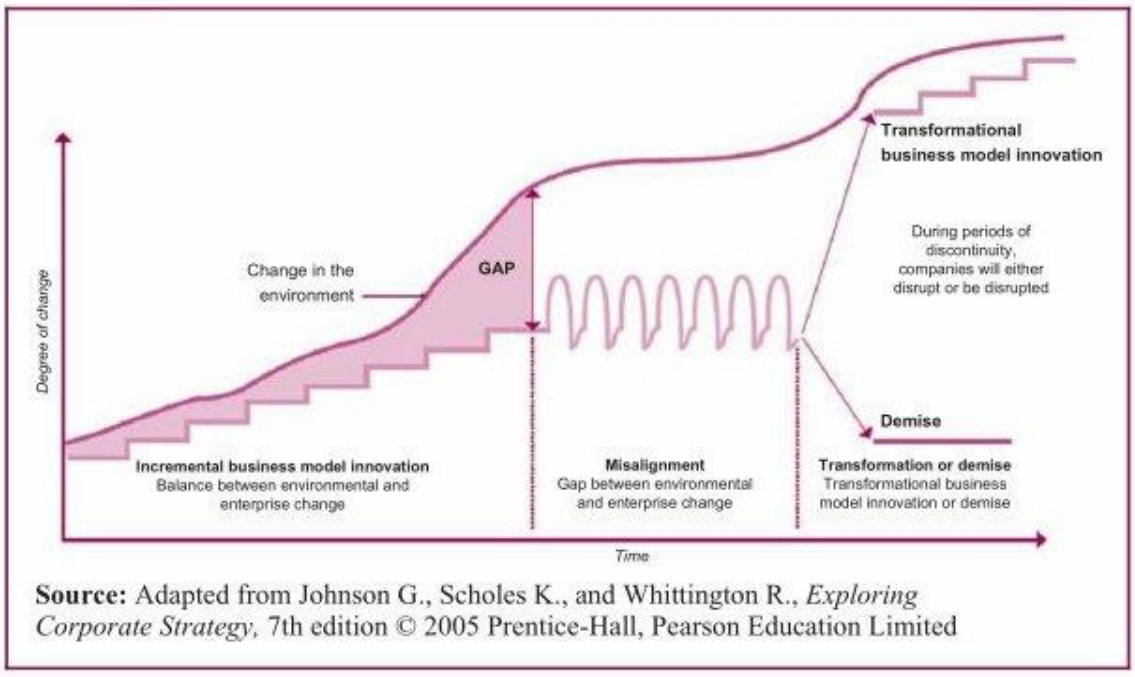


Figure 1 Business model innovation adapted to change in environment (Giesen et al, 2010)

Aside from environmental dynamics, firms will also need to consider its internal factors when innovating their business model. Innovativeness or firm's orientation to innovation is especially important factor when market turbulence or other environmental dynamics exists (Hult et al., 2004). Companies that emphasize on innovation, particularly when resources are available, will tend to develop new innovations (Hurley & Hult, 1998), such as business model innovation. This is relevant for SMEs, since they generally have the necessary conditions that promote innovativeness such as flexibility, entrepreneurship and rapid response (Lewin & Massini, 2003). Therefore SMEs is more likely to have BMIs compared to larger firms.

When talking about SMEs, it is interesting to look at them on the startup stage. New startups with innovative business models are starting to emerge by capitalizing the development in ICT and the ubiquity of internet. The rapid development in ICT technologies and internet allowed for various business configuration choices, that leads to variety of business models possibilities (Applegate, 2000; Osterwalder, 2004; Timmers, 1998). One of the rising new business model is the sharing economy model, that focus on "collaborative consumption". By collaborative consumption, it means that these startups are facilitating the usage of underutilized resources among people in a new and creative ways (B. Cohen & Kietzmann, 2014). Several startups use this new business model to disrupt several industries such as Airbnb in tourism industry and Uber in transportation industry.

Another type of new business model developed by startups is enabled by the rise of cloud computing technology. Cloud computing can make significant impact on the firm's operations, customer relationship management and also the industry value chains (Berman, Kesterson-Townes, Marshall, & Srivathsa, 2012). The example is Netflix, a startup company that focus on delivering on-demand movies via internet, which use cloud computing ability to manage large surges of demand during peak times, make it a very scalable business (Berman et al., 2012). The disruptive business model by Netflix forced Blockbuster, the incumbent player of movie rental industry, to closed down because it is unable to cope with the competition and industry transformation (Giesen et al., 2010). The example of changes brought by Airbnb, Uber and Netflix in their respective industries shown that companies should rethink their business models especially during periods of major industry change (Giesen et al., 2010).

Although BMI is important for SMEs in startups stage such as Airbnb, Uber and Netflix, BMI is also important for SMEs that are already established (beyond startup phase). While startups are trying to grow their size and attain significant profitability through BMI, established SMEs usually do BMI to adapt to the changes in their environments or capturing opportunities outside their core operating space (Günzel & Holm, 2013). Creating innovative business model is relatively easier for new startups, since they don't have legacy systems or customers, but it pose more challenges to a more established businesses.

One of the barrier in changing business model for established business is the conflict between existing BM and its underlying operational aspect with the new business model design (Chesbrough, 2010). The conflict exist because after new business model have been designed, there is a need to transform this new BM into operational level (Morris et al., 2005). The new business model will require organizational re-alignment and adjust the organization structures to enable the change (Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). Aside from organization structures, the changes in business models can also mean transformation in the information and IT infrastructure, and firms will need to respond and adapt quickly to these changes (Versteeg & Bouwman, 2006).

The ability to transform BM to IT infrastructure may be a weakness for SMEs. Some scholars mentioned the reason are because the management of SMEs lack of expertise, time and resources to adapt to changes and implement the IT infrastructures (Bernaert, Poels, Snoeck, & De Backer, 2014). Enterprise Architecture (EA) can help SMEs with the transformation of new BM to its operational aspects.

EA is found to be a good solution to help SMEs management during the transformation that involve complex process with high impact (Jacobs & Kotzé, 2011), such as the changes in the business model. EA can be seen as the organizing logic of IT infrastructures and operational processes that provide the requirements for standardization and integration of the firm's operating model (Ross, Weill, & Robertson, 2007). It is a method to design and realize enterprise's organizational structure, business processes, information system and infrastructure (ArchiMate, 2014). The dashboard of EA can provide both indicators (measurements) and controls to management to adjust the transformation of the enterprise accordingly (Cloo, Op't Land, Proper, & Waage, 2009). Hence, EA can be used to accommodate the changes in operational structure of SMEs caused by BMI activities in a more structured and measurable manner.

However, even with the help of EA, the organizational inertia and lock-in effects from the existing BM of established SMEs will hinder the introduction of new BM (Sosna et al., 2010). Established firms that already enjoyed steady cash flows and profits from the existing BM and processes will be reluctant to change their business dramatically, because it will pose a significant risk to their own survival.

To overcome the conflict with existing BM, Chesbrough (2010) argued that the way to successfully innovate BM is through experimentation. This view is also shared by Sosna et al (2010) where they argued that the uncertainty and fast changing market will make the 'trial and error' approach to be appropriate as a learning approach to the conceptualization and implementation of new business model.

Experimentation activities during BMI will need guidance to keep it on track. Chesbrough (2010) proposed to create maps of the alternative business model to guide the experimentation. The mapping or conceptualization of new BM and EA can be explicitly described by an ontology. An ontology can provide explicit specification of a concept (Gruber, 1995), in this case the set of elements that define BM and EA and the relationships among them. From above, there would be two ontologies needed to guide BMI activities: (1) BM ontologies and (2) EA ontologies

By having explicit conceptualization, BM ontology aim to improve the communication and shared understanding of business model among stakeholders within and outside the company (Jaap Gordijn, Osterwalder, & Pigneur, 2005). As the same case with BM ontologies, EA frameworks can be used to help management communicate with different views of stakeholders on operational level, and it can be used to map all of the information needed in the EA (Cloo et al., 2009). Therefore, BM and EA ontologies can be used to guide the BMI and the alignment processes with firm's operational aspects.

1.2 Research problem

Even though firms can experiment with BM and EA ontologies during BMI process, time is a constraint for them. In the highly competitive market nowadays, quick adaptation to changes is essential (Versteeg & Bouwman, 2006). In the meantime, managers and firms are presented with vast options of BM ontologies (Bouwman, Reuver, & Solaimani, 2012; Fritscher & Pigneur, 2014) and EA frameworks (Fritscher & Pigneur, 2011; Iacob et al., 2012; Lankhorst, 2004) each with different elements and specialties to choose from. The process also become more complex by the need to adjust the BMI according to the external factors (e.g. environment changes) and the firm's internal factors (e.g. innovativeness level) which can vary for each firms.

By taking account these external and internal factors, there can be various arrangements in the BM and operational elements that can be modified by the firm, making it a complex and cumbersome process. Therefore, firms can spend a lot of time doing 'trial and error' in their attempt to align and fit their specific situations with these BMI processes since there are too many variables to think of. This problem point to a need for an approach to reduce the complexity in BMI process and shorten the experimentation period.

This research believe that one of the solution is to have insights on the patterns of BMI practice from SMEs that already conducted BMI before. Derived from definitions of 'patterns' from Oxford Dictionaries (2015b), BMI pattern itself can be seen as *a regular and repeated design of BMI practice that could serve as an example to be used by others*.

These BMI patterns will give much learning on how these SMEs change their business model element or what are the BM ontologies selected in order to respond to their external and internal factor. The author believe these insights on BMI pattern can be used as a best practice that can be applied to other SMEs that want to innovate their business model in a swift and structured manner.

The author will explore the existing literatures of business model innovation in the following section to see whether the needs above have been tackled or not.

1.3 Review of past literatures

In this section, the author wants to look at the existing literatures and see whether the problem stated in the previous section have been addressed or not. The author used several scientific database such as Scopus, Elsevier, Springer, Web of Science and Emerald Insight. If the author didn't found the articles needed from these databases, the author opt to use Google Scholar since the author felt that it has a wider range of literatures. The author used several keywords related to theme of this research such as 'innovation', 'business model', 'business model innovation'. Some keywords related to BM translation to operational aspect such as 'business process', 'alignment business model and business process' and also 'enterprise architecture' were also used.

We found that many researches of business model are on conceptual level. Business model is a broad concept, with many scholars tried to formulate their own definitions (Chesbrough & Rosenbloom, 2002; Osterwalder, Pigneur, & Tucci, 2005; Shafer, Smith, & Linder, 2005; Zott, Amit, & Massa, 2011). With many researches tried to define the concept, one of the simplest definition of business model would be "how firms create and capture value" (Chesbrough & Rosenbloom, 2002). However, there are still no consensus on these definitions of business model up until now, and the usage of each definitions vary depend largely on the context of the research. On top of it, some of these researches also tried to describe the components of the BM in order to explain their definition (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Linder & Cantrell, 2000; Osterwalder, 2004), with common components such as 'target market' and 'value proposition' described within these literatures. The BM components will be used and discussed in a more extensive manner within chapter 2 of this study.

Another researches on conceptual level of business model focused on its classification and typology, which we found quite extensive (Al-Debei & Avison, 2010; Baden-Fuller & Morgan, 2010; Pateli & Giaglis, 2004). These type of researches on business model tried to organize different perspectives of business model and consolidate it into hierarchical taxonomies while also explaining their roles.

Some other conceptual stream of business model researches are focusing on ontologies and methodologies development (Bouwman, De Vos, & Haaker, 2008; El Sawy & Pereira, 2013; J. Gordijn & Akkermans, 2001; Heikkilä, Heikkilä, & Tinnilä, 2008; Osterwalder et al., 2005). These ontologies are going to be one of the element that are going to be one of the focus in this research, with further detail explained in chapter 2.

However, some researchers already realized the importance of business model application and shifting its focus from the conceptual level into practical area. Due to the rise of internet, one of the emerging topic for business model research is related to e-business or "doing business electronically" (Zott et al., 2011), with several literatures available around this theme (Afuah & Tucci, 2003; Ghaziani & Ventresca, 2005; Magretta, 2002; Yip, 2004). Among the literatures on e-business models, some gave overview on how to monetize the internet application using BM, moving on from 'free' into 'fee'-based activities for digital contents (Pauwels & Weiss, 2008). Other scholars made classification on internet business models (Timmers, 1998) and the transition of media channels into digital platform that gave rise to the media business model or mobile e-services (Eriksson, Kalling, Åkesson, & Fredberg, 2008; Huizingh, 2002; McPhillips & Merlo, 2008).

The researches of business model also start to involved multi-actor setting and networked enterprise, since a business (especially small one) will rely on its complex value network with multiple stakeholders and processes involved (Applegate, 2000; Bouwman et al., 2008; Chung, Yam, & Chan, 2004; El Sawy & Pereira, 2013). Furthermore, the digital economy enabled firms to experiment with new value creation methods which involves various partners (networked) to serve multiple users (Zott et al., 2011).

Some scholars also tried to explain the connection between business model with firm performance. Several literatures argue that firms can gain competitive advantage through their business model, because the new approach on the models can give better value creation and replace the old ways (Casadesus-Masanell & Ricart, 2010; Magretta, 2002; Morris et al., 2005). Empirical study can be found in the research on implication of business model for entrepreneurial firms (Zott & Amit, 2007), the effect of business model on product market strategy and performance (Zott & Amit, 2008) and the moderating effect of business model on firm performance and the management composition (Patzelt, Zu Knyphausen-Aufseß, & Nikol, 2008).

Business model innovation (BMI) is a growing topic in the research area regarding business model. BMI is a new type of innovation that complements the traditional innovation such as product, process, marketing and organizational innovation (Zott et al., 2011) with several scholars highlighting the importance of doing BMI for firms (Casadesus-Masanell & Ricart, 2010; Lindgren, 2011; Teece, 2010). The term BMI itself is relatively new, therefore some literatures tried to define business model innovation (Amit & Zott, 2012; Cavalcante, Kesting, & Ulhøi, 2011; Hartmann, Oriani, & Bateman, 2013). Several scholars explored this area with different focuses such as changing BM as an open business model for licensing technologies (Chesbrough, 2010), BMI as means to do corporate transformation (Demil & Lecocq, 2010; Sosna et al., 2010) and also the effect of BMI with firm's performance (Giesen, Berman, Bell, & Blitz, 2007; Hartmann et al., 2013; Linder & Cantrell, 2000).

Several literatures regarding business model change mentioned the role of external and internal factors. Scholars have mentioned the importance of adapting new business model design to the dynamics in the environment (de Reuver, Bouwman, & MacInnes, 2009; George & Bock, 2011; Giesen et al., 2010; Morris et al., 2005, 2013). While adaptation of BMI to the changes in environment is crucial, some scholars also reminded that BMI may be a response to the changes in internal factors and will also be dependent to the firm's internal competencies and resources to execute the innovation (Demil & Lecocq, 2010; Hult et al., 2004; Morris et al., 2013).

From the literature research, we also found that changing business model is not an easy task. The barriers to the innovation of business model have been identified by several scholars (Chesbrough, 2010; M. W. Johnson, Christensen, & Kagermann, 2008) with some factors influenced the success of BMI such as the configurations of process and assets of the existing firm. Hence, several researchers put focus on the transition from old BM to new BM through the BMI road-mapping (Bouwman et al., 2012; De Reuver, Bouwman, & Haaker, 2013; M. W. Johnson et al., 2008) or business model experimentation (Hayashi, 2009; McGrath, 2010; Sosna et al., 2010). Several scholars recommended to guide the experimentation by using BM ontologies (Chesbrough, 2010) such as Canvas (Osterwalder & Pigneur, 2010) or STOF (Bouwman et al., 2008). However, even though there are multiple literature describing each BM ontologies, there are no literature that explain how to choose these ontologies when doing business model innovation.

We also found several literatures regarding BM translation to operational aspects. Before translating the business model into operational areas, several literatures emphasized the need to understand the 'how' part of the business model, which is the operating model (Heikkilä, Tyrväinen, & Heikkilä, 2010; Lindgardt, Reeves, Stalk, & Deimler, 2009; Morris et al., 2013; Ross et al., 2007; Slack, Chambers, Johnston, & Betts, 2012).Some scholars tried to propose an unified framework of a business which connect business model with operational level in a form of business process or architecture (Al-Debei & Avison, 2010; Morris et al., 2005; Osterwalder & Pigneur, 2002; Teece, 2010). Furthermore, some scholar also argued that the translation (or the 'how' part) of business model into implementation can be explained through business process (BP) as the representation of operational arrangement (Solaimani & Bouwman, 2012). Hence, this research recognized business process as an important aspect of organization to represent operational activities.

Researches on BP areas are very broad, with certain theme such as e-commerce or service-oriented architecture (SOA) emerges due to the trend of internet and advancement in ICT technologies (Sidorova & Isik, 2010). However we are focusing on the literature of BP that have relation with business model changes. We found several literatures on BP areas connected to BMI such as business process re-engineering (BPR) (Hammer & Champy, 1993), the importance of business process management (BPM) to manage the BPR (R. G. Lee & Dale, 1998) and also the usage of enterprise architecture (EA) as a form of BPM in enterprise level (Harmon, 2010).

From the literature, we found that enterprise architecture (EA) would be suitable to align business model into its operational aspects, since it emphasize on process alignment and identification of elements needed to support the business process changes (Harmon, 2010). Several literatures mentioned some EA frameworks can be used by the firms according to their preferences and conditions such as ArchiMate or TOGAF (Fritscher & Pigneur, 2011; Iacob et al., 2012; Lankhorst, 2004). However, despite the vast options of EA frameworks available, we didn't find literatures that explained clearly on how to select these frameworks.

Although the researches on individual topic of BM and its operational level (EA) can be found easily, it is hard to find researches that make linkage or alignment between them. One scholar made a linkage between the 'how' part of the BM (the operating model) with EA, by stating that the key to effective EA is to take operating model from a mere vision into a reality by identifying the related elements such as processes, data, technologies, etc (Ross et al., 2007). Other existing researches that we found that connect the BM with EA is limited only to a specific BM ontology such as Canvas model or e3 value model that are translated into specific framework of enterprise architecture (such as ArchiMate) (Fritscher & Pigneur, 2011; Iacob et al., 2012; Janssen, van Buuren, & Gordijn, 2005; Meertens, Iacob, Nieuwenhuis, Sinderen, & Bizzdesign, 2012).

There is little knowledge on how BMI is carried out in SMEs (Lindgren, 2012), especially in Europe region. The article by Mitchell and Coles (2004) tried to look at BMI best practices by interviewing several business model innovators and came up with several type of business model breakthroughs. Other article by Bucherer, Eisert and Gassmann (2012) used multiple case studies on 11 companies, using product innovation management as the framework to understand best practices of BMI. The recent one explored BMI practice trends among SMEs in Europe (Barjak, Bill, et al., 2014). However, these literatures did not focus on European SMEs, but also on large firms from other countries. Furthermore, these literatures lack the insights on BMI pattern of SMEs such as changes in BM elements, their alignment with operational elements or the frameworks used to guide the changes.

In conclusion, the author did not find any existing literatures that addressed the research problem mentioned in the previous section among the vast collection of BMI literatures. Thus, we identify the knowledge gap to be:

> "There are lack of understanding regarding business model innovation pattern in SMEs since there are no insights available on the possible changes made on business model and operational elements in response to firm's external and internal factors"

1.4 Research objective

To fulfil the knowledge gap above, we define the research objective of this study as:

> ***"To gain better understanding on business model innovation pattern in SMEs by providing insights regarding the possible changes made on business model and operational elements in response to firm's external and internal factors"***

1.5 Research framework

To structure the research and proceed to the next steps, we are going to use a research framework. There are several elements in a research framework (Verschuren & Doorewaard, 2010), and the first one is **research objective.** We can use the contribution mentioned in our research objective, which would be to gain better understanding on business model innovation pattern in SMEs.

The second element would be **research object.** In this research, we want to improve understanding regarding the business model innovation pattern within the time constraint of the research (5-6 months). Hence, we are going to delve into secondary data instead of primary data (which would be more time consuming). The secondary data that are going to be used as the research object would be the collection of cases regarding BMI, since these cases will provide in-depth and idiographic richness about BMI in practices (Larsson, 1993). Hence, the research object would be the "BMI cases" instead of organizations or people.

The third element is **research perspective.** Since research perspective is a set of lens assess the research object, we are going to need certain criteria to assess the BMI cases (research object). These criteria will be derived from the theoretical domain related to the subject of this research. The detail of the variables used as assessment criteria would be explained in the later sections.

The last element would be the **theories to specify research perspective.** To specify the variables of the assessment criteria, we are going to use several theories related to Innovation, Business Model (BM), Business Model Innovation (BMI) and Enterprise Architecture (EA). The usage of these theories would be explained in later sections in this research. The full research framework of this project can be seen from Figure below.

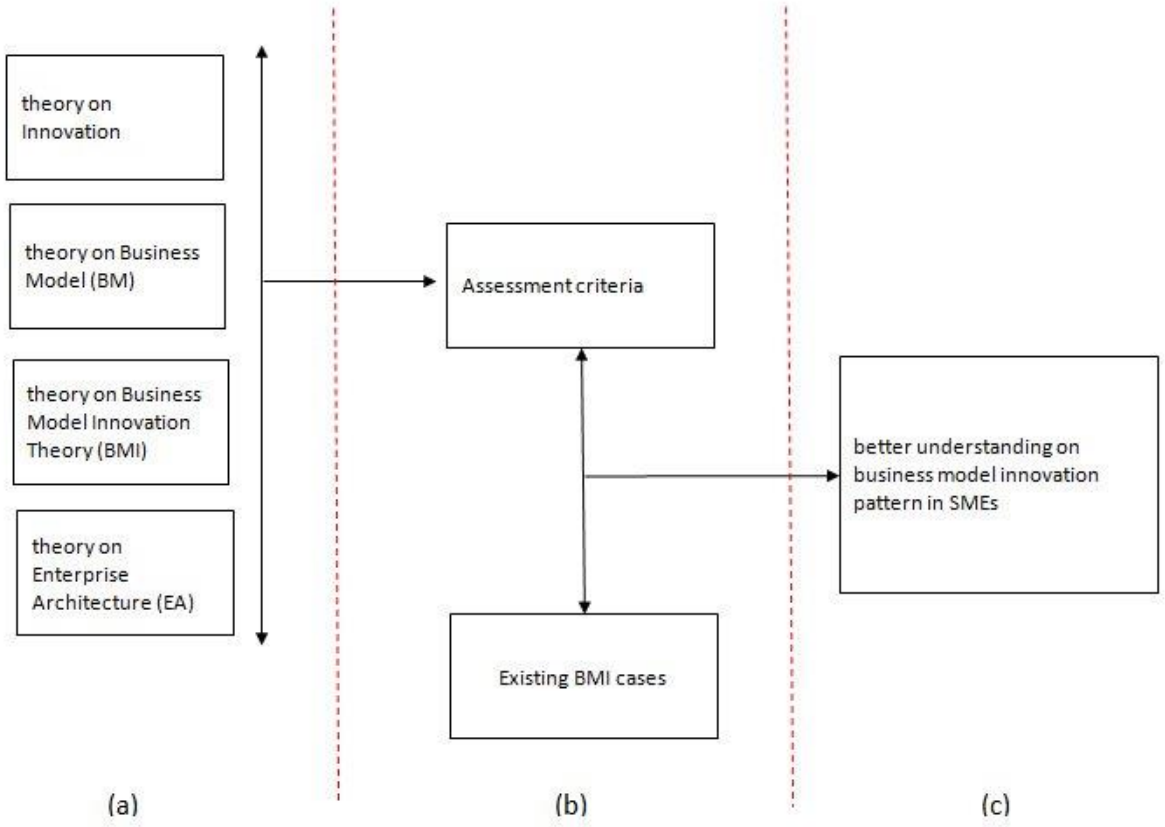


Figure 2 Research framework

From the research framework on **figure 2**, we can see that there are three consecutive components / steps needs to be taken: (a) Extensive study and literature review regarding theories related to innovation, business model (BM), business model innovation (BMI) and enterprise architecture (EA) will yield some variables to be used on the (b) assessment criteria to evaluate the BMI cases, where it is expected to result in (c) better understanding and provide insights on business model innovation pattern.

1.6 Research questions

To achieve the research objective of this study, we are going to focus on the following main research question:

> ***"What are the insights on the possible changes of business model and operational elements during BMI process in response to firm's external and internal factors, in order to have better understanding on business model innovation pattern in SMEs?"***

To guide this study further and answer the main question, there are several research questions that need to be addressed. These research questions are derived from the research framework (Verschuren & Doorewaard, 2010):

(1)" What are the relevant aspects of business model innovation that should be included as assessment criteria?"

First, we would need to explore the theoretical domain. BMI is still a relatively new term in the line of innovation and sometime businesses and researchers used other concepts to explain it. The study will explore several concepts related to business model innovation such as innovation, business model and enterprise architecture. The answer to this question will clarify the relevant variables needed to identify BMI practice within a firm and assess their changes on the BM and operational elements.

(2) "What are the patterns of business model innovation done by SMEs in response to their external and internal factors?"

In order to answer this research question, we will need several sub-questions as follows:

> ***(a) "What are the external and internal factors of SMEs that are driving them to do business model innovation?"***
>
> In the background section, this research already identified the needs of BMI to response to the external and internal factors. The answer to this question will also enable us to analyze whether there are specific patterns behind the changes on BM and EA in response to their specific external and internal factors. We can also see these factors as the drivers of BMI for the firm.
>
> ***(b) "What are the BM ontologies and EA frameworks used to guide the business model innovation process in SMEs?"***
>
> The previous step already inform us about the drivers that prompt the firm to engage in BMI activity. This answer to this question is meant to identify the ontologies / frameworks used by the firms to map and experiment with the alternatives of business model and enterprise architecture in response to the external and internal factors identified in question (2a). We can also see whether there are patterns in the selection of BM and EA frameworks during their alignment process.

(c) "What are the changes in the SME's business model and operational elements caused by BMI?"

Innovation in business model will meant changes on how the business and its components work. The theoretical concepts and variables explored from the previous question will help on identifying the changes in BM and operational level of the firm. The answer to this question will enable us to see whether specific changes on the elements of BM corresponds to the changes in operational elements during their alignment process.

1.7 Research approach

After looking for several alternatives, we are going to use **case survey** as the research method. There are several reasons to select case survey method for this research. First, we have a time constraint to do the research (5-6 months), hence we are going to opt with secondary data instead of primary data to save time. Second, to ensure cross-case compatibility and the generalizability of our research, we need to include cases from various industries (heterogeneous case). Third, the unit analysis of these cases would be an organization. Fourth, we are interested in finding the characteristics of the cases (what BM ontology being used, etc), not the insights or conclusions of each cases itself. Finally, broad range of impact factors would also be involved (such as innovation, BM, BMI, and EA). Hence, the research situations explained above fits the condition of case survey method described by Larsson (1993).

One thing should be noted in selecting the case survey method. The case survey method require multiple coders to be involved in order to ensure reliability and avoid coder's bias (Larsson, 1993; Lucas, 1974). This requirement can't be fulfilled by this research since it will only use one coder (the author itself) due to resource and time limitation. This is obviously weaken the argument to use case survey method, however the author did not found any other research approach that can fit the objective and limitation faced in this research. Thus, the author will proceed to use the case survey method with other mechanism to ensure reliability and will put this possible bias into limitation.

Several authors defined case survey method as a meta-analysis of case studies (Lucas, 1974; Yin & Heald, 1975). By meta-analysis, it means that the researcher's main task then is to make aggregation of the case studies characteristics instead of the findings or conclusions of the cases being studied (Yin & Heald, 1975). The methodology for case survey that the author found stems from the paper of Yin & Heald (1975) and Lucas (1974), but Larsson (1993) made a refinement of it by breaking down the four basic procedure of case survey into 12 steps. This research will adapt the case survey procedures from Larsson (1993) and modify it according to the context of this research as follows

(1) Developing concept specification & initial research questions

The procedure should begin with one or more theories which can explain the phenomenon being studied, to identify the importance of a concept and which variables to be included in the case survey (Lucas, 1974). Subsequently, specific research questions are also needed to select relevant cases and to designed an effective coding scheme (Larsson, 1993). The research question have been formulated in the previous section while the concept specification will be done in chapter 2.

(2) Case selection criteria and sample collection

The cases being studied should be seen as sample of observations and the search / selection process is a sampling procedure where precise definitions regarding the boundaries of universe being studied and the unit of analysis are needed (Lucas, 1974). Once it is determined, Bullock and Tubbs (1987) suggested that selection criteria should be made explicit and based on the theoretical domain the research questions defined (as cited in Larsson, 2003).

Exclusion criteria should also be stated explicitly to distinguish which cases belong to a theoretical domain and have at least the minimum amount of reported information about the domain to be meaningful for the case survey (Larsson, 1993). The steps of search and excluding cases should be presented clearly to ensure confidence that omission of studies are not resulting in bias (Lucas, 1974). Nature of the case such as type of research design, publication status, and time period studied should will used as variables instead of initial selection criteria to avoid 'methodological bias' (Larsson, 1993; Lucas, 1974). The case selection-exclusion criteria and data collection will be provided in chapter 3.

(3) Designing the coding scheme

The coding scheme is the core of case survey. It act as the guideline for the researchers and coders to convert qualitative data from the case studies into quantitative variables that can help define the research question operationally (Larsson, 1993). The coding scheme come in a form of set of questions and answers (a checklist) to collect the rich information in the cases (Lucas, 1974; Yin & Heald, 1975). The coding scheme design will be described in chapter 3.

(4) Coding the cases with the coding scheme

Due to the exploratory nature of this research, there would be two phases in coding. The first phase is to use coding scheme with open-ended questions in order to gather wide range of qualitative answers. The second phase is to convert the qualitative coding scheme into quantitative data, which can serve as an input to statistical analysis. The conversion from qualitative data into quantitative data will be using categorization method from content analysis. This part will be described further in chapter 3.

(5) measuring reliability and resolving coding discrepancies;

To measure the coding reliability, Larsson (1993) recommended to measure inter-coder reliability. However, since this research will only use one coder to code the BMI cases, another type of reliability measure should be used. The author will be check the reliability of the coding through case validation with the case owners and see if there are any discrepancies with the case owner's description about the case. If there are any discrepancies in the coding, then the case owners will notify the author to make the correction in the coding. This coding validation with case owners will also serve to provide credibility (internal validity) to the qualitative coding that mainly relies on the coder's interpretation (White & Marsh, 2006). This part will be described further in chapter 3

(6) Analyze the quantitative coding validity,

The quantitative coding can be measured by construct validity as being suggested by Larsson & Finkelstein (1999). Moreover, the construct validity is used to see whether the operationalization did measures the concept it is supposed to measure (Bagozzi, Yi, & Phillips, 1991). The construct validity will be assessed through convergent validity and discriminant validity (Sekaran, 2006).

However, due to resource and time limitation, this research will not use statistical tools to check the coding validity. The coding validity will be done by validation with each of the case owners. Further explanation about validity will be explained in chapter 3.

(7) statistically analyze the impact of specific case study characteristics,

To see the extent of the effect of case study characteristics to the result of coding, we should include case quality variables such as type of research design, publication status and time period of the study (Larsson, 1993; Lucas, 1974) as being mentioned in step (4). This analysis will be provided in chapter 4.

(8) Statistically analyze the created case data set

The data analysis will be done by using relevant statistical method according to the type of scales being used in the coding scheme (Larsson, 1993) and also the objective of the research. Firstly, the scales used are mixtures of category scale (categorical variable) and binary scale (yes or no answer). Second, the objective of this research is to find the patterns or classifications. This analysis will be provided in chapter 4.

(9) Evaluation of results and conclusions

The last step is to evaluate and report the statistical results. This last step should help explain the answers to the main research question. This evaluation will be further discussed in chapter 5. Furthermore, conclusions of this research would be presented in chapter 6. The overall research steps can be seen from the illustration on **figure 3** below.

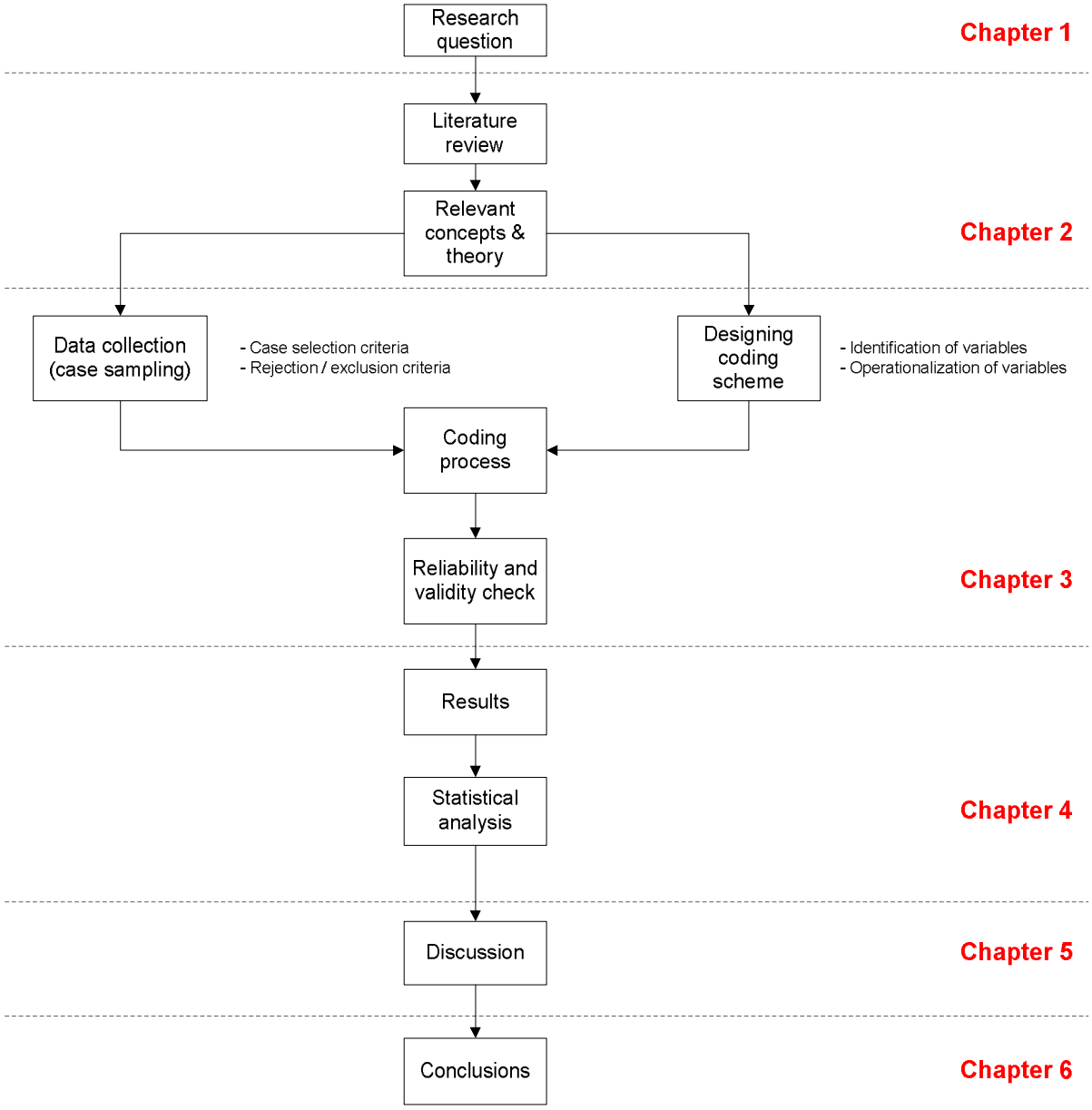


Figure 3 Research steps, adapted from Larsson (1993)

1.8 Relation to ENVISION Project

Aside from academic environment, this master thesis is also related to external project called the ENVISION project. ENVISION is one of the initiative by the (European) Innovation Union to reach the ambitious goals of increasing investments in R&D and job employment rate while reducing the poverty numbers by the year 2020.

ENVISION itself stands for EmpoweriNG (European) SME business model InnovatiON. The target of this project will be SMEs all across Europe, since these type of firms are regarded as vital by the European Innovation Union to achieve the above goals. The project aims to empower SMEs in Europe through innovation of their business models. Therefore it would be related to this master thesis since it is also discussing the BMI topic.

The ENVISION project is divided into several work packages to achieve the objective. This master thesis will be closely related to the Work Package (WP) 5 of the ENVISION project. The objective of WP 5 is to provide more understanding to the BMI practice on the SMEs across Europe. The nature of WP 5 would be a qualitative one that will serve as an insights to the other WPs such as the metrics needed to evaluate BMI or to the BM tooling platform design.

This master thesis will be contributing to WP 5 in a form of insights on BMI best practices and patterns. As mentioned in the research objective and research questions, the BMI best practices that are going to be discussed in this thesis would be regarding the changes in BM and operational elements as well as the selection of ontologies to guide these changes. Another contribution would be the relation between these BMI practices to the external and internal factors of the firms itself, which could enrich the insights. To achieve this, the author will work closely with members of the ENVISION project. The nature of the working relation will be more on data collection and validation of the insights made by this master thesis.

1.9 Research outline

The overall research outline of this research can be seen from **figure 3** above. The *first chapter* of this research is mainly describing the background of the study alongside a literature review, research objective, research framework, research questions, the research method and also the relation to external project (ENVISION project).

The *second chapter* will explain the all the related concepts that are going to be used in this research. The related concepts include the business model, innovation, business model innovation, enterprise architecture. This chapter will also making alignment between these concepts and creating a general framework to assess the BMI cases.

The *third chapter* will explain about the detail of the case survey. This will include data collection steps including searching and sampling criteria, the design of coding scheme and also coding validation method to ensure reliability. Qualitative content analysis procedure will also be included in this chapter to convert qualitative data from case survey into a quantitative data as an input for statistical analysis.

The *fourth chapter* will be focusing on results and data analysis. The data analysis will include quantitative analysis using the appropriate statistical tools, while also providing qualitative insights.

The *fifth chapter* will discuss the results of statistical analysis. This chapter will discuss the patterns found on the BMI cases. The author will also discuss the BMI patterns found compared to the findings of other scholars or actual practices.

The *last chapter* will present the conclusion of this study by answering the research questions. Limitation of this research and future research regarding this area will also be discussed.

2. Theoretical background

" Innovation distinguishes between a leader and a follower" - Steve Jobs

2.1 Introduction

This chapter will discuss several concepts mentioned in our research objective in more detail in order to answer our first research question: what are the relevant aspects of business model innovation that should be included as assessment criteria? To answer this research question, there are several concepts that we are going to explore in this chapter, namely small-medium enterprises (SMEs), business model, innovation, business model innovation (BMI), and enterprise architecture (EA). Furthermore, this chapter will also made alignment between the relevant concepts found in the literatures and proposed a relationship between them.

2.2 Small and medium enterprises (SMEs)

2.2.1 Definition of SME

Before proceeding, we need to understand the exact definition of SMEs. Since this research is located and focusing on Europe area, we will be using the definitions of SMEs by the European Union (2003), which ranged from micro firms to medium firms. The European Union (2003) defined the SME type based on the employee headcounts and the annual turnover as follows:

Micro firms are defined as firms with employee less than 10 persons and annual turnover that does not exceed EUR 2 million.

Small firms are defined as firms with employee less than 50 persons and annual turnover that does not exceed EUR 10 million.

Medium firms are defined as firms with employee less than 250 persons and annual turnover that does not exceed EUR 50 million and/or the annual balance sheet does not exceed EUR 43 million.

Therefore, this research will proceed with these definitions of SMEs from here on.

2.2.2 The characteristics of SMEs

Small and medium enterprises (SMEs) important role as an engine of growth for most of the global economies have been evident (Bruque & Moyano, 2007; Zeng, Xie, & Tam, 2010). Example can be seen in the EU where SMEs contribute to 99 percent of the industry and 70 percents of employment (Nieto & Santamaría, 2010). The innovative capability of SMEs have been regarded highly to be the main drivers of competitive advantage with their continuous developments of product and process as the means to survive in the highly competitive environments (Verhees, Meulenberg, & Pennings, 2010; Wolff & Pett, 2006). The importance of SMEs also attract attention from policy makers, where initiatives have been taken to support the SMEs (Bougrain & Haudeville, 2002; Hoffman, Parejo, Bessant, & Perren, 1998).

Even though small in size, SMEs have advantages compared to larger firms. The main advantages of SMEs compared to larger firms lies in its internal behaviours and conditions that supports innovation activities such as entrepreneurship, high responsiveness and also flexibility (Lewin & Massini, 2003).

However, larger firms have advantage in resource aspects compared to SMEs (Nieto & Santamaría, 2010).

SMEs have difficulties in gaining critical resources and competencies to do innovation (Hewitt-Dundas, 2006). *Resources* itself can be defined as all assets including organizational processes, capabilities, firm attributes, information, knowledge that are controlled by a firm to design and implement strategies that leads to efficiency and effectiveness (Barney, 1991). On the other hand, *competencies* can be defined as the organized collection of firm's resources (Galunic & Rodan, 1998) or the current skills of the firm (Hamel & Prahalad, 1994).

On top of tangible resources (such as financial aspects), SMEs also lack the intangible resources. This is because SMEs have a more limited access to human capital skills and knowledge compared to bigger firms (Rogers, 2004). However, SMEs have alternative solution to fill the resource gap between them and the larger firms (Nieto & Santamaría, 2010).

To be able to fill up the resource gap and solving the problem of lacking internal resources, several literatures highlights the importance of doing cooperative research and development (R&D) (Bougrain & Haudeville, 2002; Hewitt-Dundas, 2006; Rogers, 2004). Collaboration with external stakeholders will contribute to improving access to resources as an important input for the innovation activities of the SMEs (Nieto & Santamaría, 2010). The external infrastructures and resources will benefit more to SMEs compared to the large firms, because larger firms have more resources and capabilities which makes external resources to be not as important (Feldman, 1994; Piergiovanni, Santarelli, & Vivarelli, 1997). Despite having a downside in increasing transaction costs to manage or controlling collaboration activities (Pisano, 1990), this research recognize the importance of collaboration and external network for supporting innovation at SMEs.

2.2.3 Organization life-cycle / phase

SMEs can have several stages in their organization life-cycle. Firms have different opportunities and threats along its life-cycle, therefore firms will likely have different needs and resources to do innovation during this various stages (Jawahar & McLaughlin, 2001). There are several organization life-cycle according to Jawahar and McLaughlin (2001), which are the startup, emerging / rapid growth, maturity and declining stage.

Startup stage would be the period where firms will start developing and implementing their first business model where getting funding and entering market with existing dominant players would be it main obstacles (Jawahar & McLaughlin, 2001). In other words, the main concerns for firms that are in this stage would be the initial funding to start up the company, the cash flows and also the market acceptance, because these factors could threaten the survival of the company (Dodge, Fullerton, & Robbins, 1994; Dodge & Robbins, 1992).

Another aspects that is crucial to avoid start-up failures would be addressing the employees and suppliers as important stakeholders for survival (Jawahar & McLaughlin, 2001). Suppliers would be important in the value network to provide the firms with external resource and competencies that are not considered core business. Meanwhile employees will provide the internal resource and competencies to execute the business model.

Emerging or rapid growth stage is the phase where a firm already experienced some successes in the business, with most of the previous concerns are already addressed and looking out for expansion opportunities (Jawahar & McLaughlin, 2001). The expansion opportunities could be in different forms such as the employee numbers, the relationship with suppliers or even new customers. The expansions are possible because at this stage it is likely that the firm has already received new investments (Jawahar & McLaughlin, 2001)

However, with the high growth there are certain problems faced at this stage. With increased demand, firms need to match this with making sure that their production capability is reliable and stable (Jawahar & McLaughlin, 2001). Expansions will also prompt the need of the firm to maintain the balance of their cash-flow, because while expanding, they will need to also maintain their current operation. Lastly, with the number of employees increasing, the firm will also need to formalize their organization structure, specify certain roles and accountability, which can turned into a more bureaucratic structure (Dodge & Robbins, 1992; Modis, 1994).

Maturity stage is a stable or flat period following the rapid growth stage. In this stage, management of the firms will regard the company as a successful which will leads to have a slower rate of growth (Jawahar & McLaughlin, 2001). The reason is explained by Modis (1994) as an overconfidence of success that reinforced by the uncertainty of another rapid growth opportunities. It is expected that the stock price of the firm will decline at this stage due to the lower rate of growth.

Another characteristics of firms in maturity stage is the financial stability and risk-taking decision. The firm at this stage will maintain a healthy cash-flows from their operation, leaving them less interested in investments from external parties. They will also be more risk-averse in making decisions, since they will have a more gain-oriented when they have to allocate their resources.

Declining or transition stage portrays the situation where the demand for the firm's product or services are in the state of declining. This situation will prompt the firm to make tough decisions such as mergers or employee lay-off in order to survive (Jawahar & McLaughlin, 2001). The cost-cutting measures can leads to decision to outsource their operations to 3rd party suppliers.

To bounce back or revive the firm from this stage, several actions can be taken by the firms. To re-build their market share, firms need to addressed all issues that are related to customers, maybe in a form of better value offering or better customer relationship method. A new product development can help firms to spur new growth (Kazanjian, 1988), which also highlights the importance of regaining technical efficiency (Smith, Mitchell, & Summer, 1985).

2.3 Business Model

While there are currently no consensus on the business model concept, we can explore the differences between these scholars. Pateli & Giaglis (2004) argued that differences on business model concept can be viewed from the perspective of different scientific disciplines such as strategic management (Amit & Zott, 2001; Linder & Cantrell, 2000; Shafer et al., 2005), e-business (Alt & Zimmermann, 2001; J. Gordijn & Akkermans, 2001; Osterwalder & Pigneur, 2002; Timmers, 1998) and information systems (Ballon, 2007; Bouwman et al., 2008; Hedman & Kalling, 2003; Osterwalder & Pigneur, 2010). Bouwman et al (2012) argued that the business model concept on the field of strategic management focus more on the implementation of strategies, while the IS field is focusing more on design and ontologies.

We are going to use the business model concept from both strategic management and IS discipline. In this research we are interested to investigate the firm's selection of BM ontologies and the changes within its elements to innovate the business models as part of their strategy to remain competitive in ever changing technology landscape, market place, and regulatory conditions (Morris et al., 2005). Hence, we are going to use business model concept from the strategic management field to define the business model because it is more suitable to the context of business model innovation as part of firm's strategy. On the other hand, we are going to use business model concept from the IS fields to identify the BM ontologies / tools used by the firms to change the business model.

2.3.1 Business model definitions

There are several definitions regarding business model (BM) within the various literature that we found in several fields of study. Osterwalder and Pigneur (2010) define business model concept as the rationale of "*how an organization creates, delivers, and captures value*" (p.14), while Timmers (1998) formulate business model as "*an architecture for the product, service and information flows, including a description of the various business activities and their roles*" (p.4). Osterwalder et al (2005) tried to make a broad definition of business model that reflects all the business model concept made by these different scholars as:

> *"A conceptual tool containing a set of objects, concepts, and their relationships with the objective to express the business logic of a specific firm. Therefore we must consider which concepts and relationships allow a simplified description and representation of what value is provided to the customers, how this is done and with which financial consequences"*(p.3).

However, as mentioned above, we want to specify the business model definition from strategic management view. From the strategic management field, business model can be defined as the *activities of companies to create and capture value from technological innovation* (Chesbrough & Rosenbloom, 2002), where it also *represents the strategic aspect of the company* (Solaimani & Bouwman, 2012). Additionally, other than value creation and value capture activities defined above, we should also understand that these activities will happen in *a multi-actor setting and networked enterprise*, since a business (especially small one) will rely on its complex value network (Bouwman et al., 2008; Chung et al., 2004; El Sawy & Pereira, 2013; Shafer et al., 2005).

From above, this research will use the definition of business model from Shafer et al (2005):

> ***"Business model is the core logic and strategic choices of a firm in creating and capturing value within a value network"*** (p.204).

From the definition above, there are four key concepts that define the business model which are strategic choices, value creation, value capture and value network. In order to identify these key concepts in the BMI cases, it should be broken down into more specific elements. Among several business model concept defined by scholars, Pateli & Giaglis (2004) found that there are common components that exists in almost research in several domains which are the strategic objectives, target market, value proposition (product or service offering), resources, key activities (intra and inter-organizational processes), cost structure, revenue model and value chain (alliances and partnerships). Hence, we are going to incorporate these components into the definition of business model of this research.

The ***strategic choices*** can include many elements (Shafer et al., 2005) but in this paper we will choose only the important elements which are the value proposition, pricing and selection of customers(target market). Value proposition will determine the selection of means to create value, while also determine the target of such value (Morris et al., 2005). Without a compelling value proposition, customers are unlikely to be attracted to the products or services that are being offered by the firms (Teece, 2010). Even though Shafer et al (2005) put revenue model in the strategic choice element, we felt that it is better to be put in the value capture element, since revenue would be one of the form of values that can be captured by the firms.

Value creation will involve combining work activities in a unique way into business process that differentiate from competitors (Shafer et al., 2005). Moreover, the firms need to deliver the value (Osterwalder et al., 2005), where at the same time needs a business system within the organization in order to do it (Itami & Nishino, 2010). Barjak et al (2014) also put the importance on the business system as it reflecting on how the firms organizes its activities (processes). Hence we can define value creation as how firm manage its process to deliver value.

Value capture involve financial aspects such as the profits and cost (Shafer et al., 2005), hence, we will also include the revenue model of the organization since it is also impacting finance. The notion of value capture is important for firms, since the business would not be sustainable if the firms cannot generate profits for quite some time (Chesbrough, 2007). However, it is also important to remember that network governance and partner selection would be important to achieve sustainable network value capture (Bouwman et al., 2008).

Value network itself can be defined as a set of relatively autonomous unit that is managed independently, but operate together in common principles and service level agreements (SLA) (Peppard & Rylander, 2006). Value network can include partners, suppliers, distribution channels and even the end customer itself (Shafer et al., 2005). Furthermore, on top of product / service exchange, the value network put importance on relationships and knowledge exchange between parties in the network, even with the end customers itself (Shafer et al., 2005). The summary of the business model elements can be seen from **table 1**.

Table 1 Business model elements based on Shafer et al (2005)

No	Business Model Elements	
1	Strategic choices	value proposition (product and services offering), pricing, target market
2	Value creation	Value delivery, work activities combination, business system (how firm organize activities)
3	Value capture	revenue model, cost structure, , network governance, partner selection
4	Value network	suppliers, customer relationships, product / service flows, information flows

2.3.2 Business model position with business strategy and business processes

Some scholars tried to describe business model as an intermediary between business strategy and business process or architecture, giving an unified framework of a business (Al-Debei & Avison, 2010; Morris et al., 2005; Osterwalder & Pigneur, 2002; Teece, 2010). Hence, it means that when the firm's strategy changes the business model elements, it would also need to implement the changes on the business process level. The intersection points of BM with strategy and business process by Al-Debei and Avison (2010) can be seen from the **figure 4**.

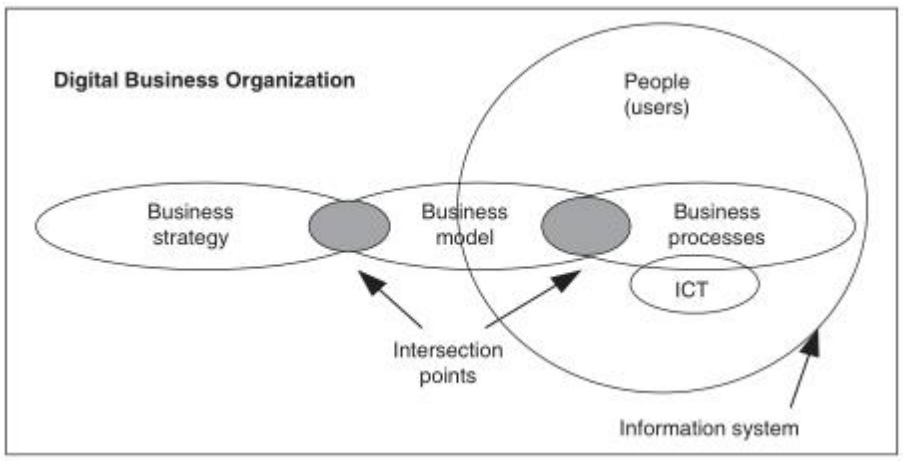


Figure 4 BM intersection points (Al-Debei & Avison, 2010)

The concept of strategy have been explained in various ways, but the common theme perceived it as a set of guidelines that are made deliberately and will determine any decision in the future (Mintzberg, 1978). Furthermore, strategy involve one important thing, which is making choices (Shafer et al., 2005). The essence of strategy is choosing to do activities differently from competitors or doing different activities than competitors (Porter, 1996). In other words, organizations need to be different in order to be more competitive than its rivals.

A competitive strategy involves choosing a different set of activities that can delivers a unique mix of value (Porter, 1996). A firm can have three different competitive strategies, which are the cost leadership, differentiation or focus (Porter, 1997). Cost leadership is the most common strategy to be used to pursue the lowest price possible to be offered to the customer, which enabled by the efficiency in scale. Differentiation will involve creating a distinct functions and features of the product (usually with a high quality level) that will set them apart from their competitors. Focus is an extension of differentiation strategy where it is focused on a specific customer segment in the market. Therefore, this research will adapted Porter's definition of business strategy as cited in Al-Debei and Avison (2010), which is

> *a deliberate choice by an organization to position itself in the industry in order to be competitive by adopting generic strategies such as cost leadership, product differentiation or focus.*

Business model would be the bridge or tool to align the business strategy and business process. The business strategy will be the main driving forces behind BM formation and its response with competitors (Magretta, 2002). Therefore, the business model (BM) will derive its components such as value proposition or financial arrangements based on the strategy to achieve the business objective (Al-Debei & Avison, 2010). On the other hand, the BM itself will become the basis in which operational business process and IT infrastructures should be derived on (Al-Debei & Avison, 2010).

Business process (BP) itself can be defined as *a specific ordering of work activities across time and place, with a beginning, an end and clearly identified inputs and outputs, which constitutes a structure for action and have strong emphasis on how work is being done in an organization* (Davenport, 1993). The BP will also have a logically related tasks performed to achieve certain business outcome (Davenport & Short, 1990).

Technology improvements as well as rising interest in improving business process giving trends to technology-driven BP change and researches of several BP areas such as e-commerce or service-oriented architecture (SOA) (Sidorova & Isik, 2010). Furthermore Sidorova & Isik (2010) identified four cornerstone of BP researches as (1) BP design, mainly focus on making plan for future business processes (2) BP-supporting IT, which deal with technological solutions such as web services (3) BP organizational implementation, which focus on the organizational factors that influence BP change and (4) BP on-going management and control, that deal in continuous improvement method such as Six Sigma.

Since the focus in this study will on changing business model, we are going to put more attention on the BP design or re-design for future BPs. Additionally, even though it would not be in the scope of this research, but the BP organizational implementation is worth the consideration for the implementation of BP changes, since all the changes in the business process will need to take account of organization factors.

2.3.3 Business model ontologies and tools

In order to make changes into the element of business model, BM ontologies can serve as a guide to experiment and map the business model alternatives (Osterwalder, 2004). Among different BM schools, we are going to lean more on the European school since they are mostly focus on design

model / ontologies (Ballon, 2007; Bouwman et al., 2008; Osterwalder et al., 2005), while the American school of BM focus on classification of business model in specific sectors and open innovation (Chesbrough, 2003; Rappa, 2002). Hence, the BM concept made by the European school that stems from IS field of study is more suitable to explain the BM ontologies in this paper.

There are some popular approaches on BM ontologies by the IS field of study. There are several BM ontologies that dominates the IS field of study according to Bouwman et al (2012) such as Osterwalder's Canvas model (Osterwalder et al., 2005) and STOF model (Bouwman et al., 2008). We also consider VISOR model (El Sawy & Pereira, 2013) and CSOFT (Heikkilä et al., 2008) as important BM ontologies to be included in this study because it can represent the digital platforms and service models for B-to-B markets.

Business model Canvas by Osterwalder et al (2010) have four main pillars customer interface, product, infrastructure management, and financial aspects. These pillars consists of nine main blocks which are the customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities and cost structure.

Business model canvas focused on design and innovation (Fielt, 2011). This type of BM ontology support ideation of new business model by allowing management of firms to brainstorm different type of business model. The visualization of the tools also helped firms to identify each elements of the business model that they can experiment with, making it quite a flexible tool. This ontology have weakness in terms of connection with other organizations (value network) (Bouwman et al., 2012). However, from all models mentioned above, the Canvas model is one of the most generic ontology, making it more applicable for industries in general. The illustration of business model Canvas can be seen from **figure 5** below

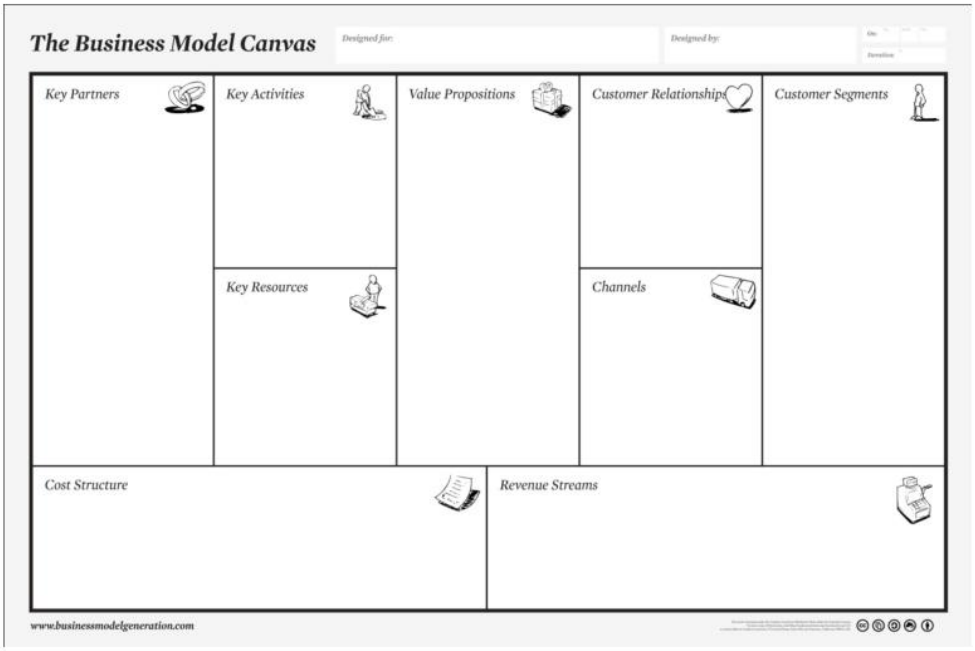


Figure 5 Business Model Canvas (Osterwalder et al., 2010)

The STOF model have specialties in innovation for mobile services (Fielt, 2011). The STOF model contains four main parts (Bouwman et al., 2008) which are the service, technology, organization and finance domain. Furthermore, Bouwman et al (2012) argued that even though the focus of STOF is in mobile services area, the STOF concepts and methods were also adopted in a more broader audience, both in industry and academia. The visualization of the model can be seen from **figure 6** below.

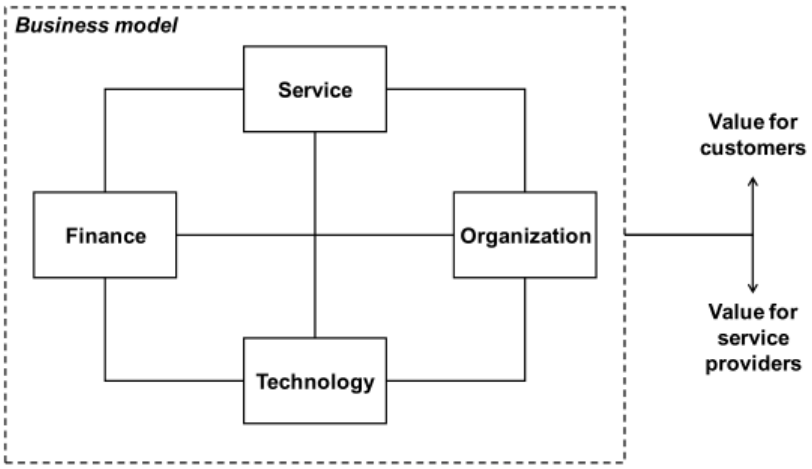


Figure 6 The STOF Model (Bouwman et al., 2008)

Service domain, which focused mainly on deliver certain value propositions to end customers. This domain will connect between perceived value of the customers with the delivered value by the suppliers, which each type of values influenced and determined by things from other domains such as technological functionalities or financial arrangements

Technology domain, will relate to a more technical aspect of the firm such as technological functionality, access networks, technological architecture, backbone infrastructure, etc.

Organization domain relate to inter and intra-organization processes. The intra-organization processes includes the capabilities and resource management such as finance, technology and marketing that needs to be managed in order to create value. The inter-organization process focus mainly on how the business will collaborate with its business networks.

Finance domain is a critical aspect for the business and its value network. There are two main things to be defined in this financial aspect of the model, which are the revenue models and investment decisions. Without a viable and sound financial aspect, it would be hard to convince partner organizations in the value networks to collaborate.

VISOR is a business model ontology by El Sawy and Pereira (2013) that is intended for designing and structuring business model of digital platforms. The VISOR model tried to integrate different approach in business model development while also incorporating several aspects suitable for digital platforms such as the interface and user experiences (El Sawy & Pereira, 2013).

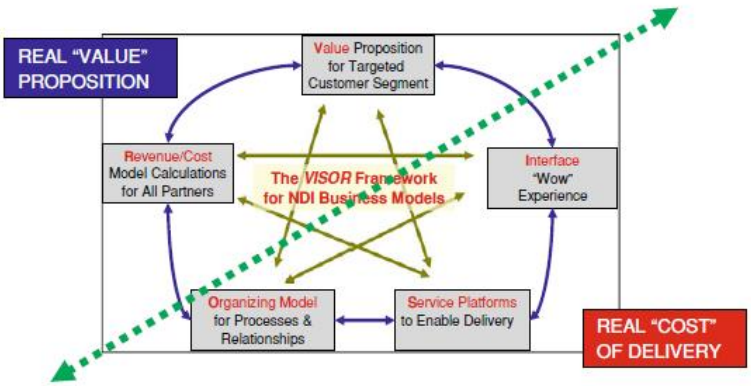


Figure 7 VISOR model (El Sawy & Pereira, 2013)

The components of VISOR model (**figure 7**) are the (1) *Value proposition*, which describe the offering (whether it is a product or services) of the enterprise which makes it valuable to customers, (2) *Interface*, describes the user interface experience of the platform (such as ease of use), which is important to generate the 'wow' effect to the customers (3) *Service platform*, is the main place where all actors converge to create, capture and discover value (4) *Organizing model*, describes how the firm will deliver product or services through its business process and collaboration with partners within value network and (5) *Revenue model*, which describes how the firm will earn more revenues that exceeds the costs while also attractive for partners in the value network.

CSOFT model proposed by Heikkila et al (2008) are emphasizing on the long-term service model for B2B market. The model put importance of business networks to deliver complex products and services based on long term relationship with customers. To achieve this, Heikkila et al (2008) calls for cooperation between firms to form a joint business model. The CSOFT model aim to be a guide to develop the joint business model by focusing on the customer relationship element as the focal point of the ontology.

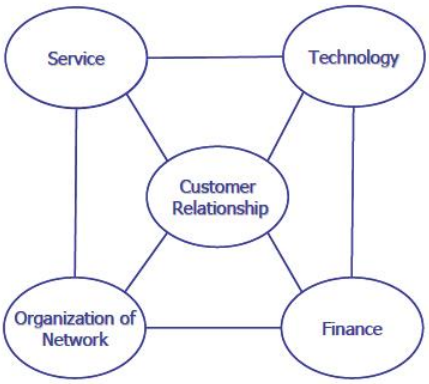


Figure 8 CSOFT Ontology (Heikkila et al, 2008)

The CSOFT ontology consists of five components which are the (1) customer relationship, which is the focal point of CSOFT ontology since the relationship with B2B customers are usually very long. Since its a joint product/services, the relationship should be also owned jointly by firms in the networks (2) the service, is the main value-creating components of the model (3) organization of network, which define the role of each participant of the network (4) finance, which mainly relates to the revenue and cost sharing between firm in the network and (5) technology, that main task is to provide support to the business model. These support especially is ICT-related since there would be risk of conflicting systems between partner's system within the business network. The visualization of the ontology can be seen from the **figure 8** above.

Several applications and tool also exists to help on designing business model. Generic tools such as Microsoft Visio and Microsoft Powerpoint can help visualize the element needed, but they lack mechanism to input modelling constraints (Fritscher & Pigneur, 2014). Another generic tools that exists would be Protégée (Gennari et al., 2003) that can help modelling according to ontology, but not quite user-friendly for users (Fritscher & Pigneur, 2014).

Several other ontologies even have their own BM tools. The SEAM method have a dedicated software tool called the SEAMCAD (Wegmann, 2006) and the e3 value method have its own software (Jaap Gordijn, Akkermans, Koks, & Schildwacht, 2004). Furthermore, research shows that among several business model ontologies mentioned above, Business Model Canvas is one of the best candidate to implement computer-aided design (CAD) tool for people who don't have engineering background (Fritscher & Pigneur, 2010).

2.4 Innovation

2.4.1 Type of innovations

Innovation can be defined as the multi-stage process where organizations transform ideas into new or improved products, service or processes, in order to compete, advance and differentiate themselves successfully in their marketplace (Baregheh et al., 2009). Within the realm of innovations, there are two type of innovation, which are incremental and radical innovations. Incremental innovation mainly deals in minor upgrade in existing process and current product offering, while radical (disruptive) innovations usually involve significant leap in new technologies or ideas that are currently non-existent or require dramatic changes in the existing market (McDermott & O'Connor, 2002). To formalize the type of innovations, this research will adapt the classification of innovation defined by OECD (2005) in their Oslo Manual, which are product innovations, process innovations, marketing innovation and organizational innovation.

Product innovation is defined as "the introduction of goods or services that is new or significantly improved with respect to its characteristics or intended uses".

Process innovation would be defined as "implementation of a new and significantly improved production or delivery method".

Marketing innovation refers to "implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing".

Organizational innovation is defined as "implementation of a new organizational method in the firm's business practices, workplace organization or external relations".

Table 2 Sub-categories of innovation (Barjak et al., 2014; OECD, 2005)

No	Type of innovations	Elements of innovations
1	Product innovation	New goods / products
		New services
2	Process innovation	Logistics
		Production methods
		Support activities
3	Marketing innovation	Designs
		Channels
		Pricing model
		Promotion
4	Organization innovation	Business practices
		Organization of external contacts
		Work organizations

To have a better identification of each type of innovations, Barjak et al (2014) suggest to break it down into a more specific categories which also aligned with Oslo Manual by OECD (2005). The product innovations can be breakdown into both new goods or new services. Process innovations can cover logistics, production methods and support activities. Marketing innovations can range from designs, placement channels, pricing and promotions. In this study we are also going to include revenue model in the marketing innovations as it is closely related to pricing. Lastly, organizational innovations can include business practices, organization of external contacts and work organization. The summary of the breakdown can be seen from **table 2**.

2.4.2 Innovation and business performance

In the competitive environment resulted from globalization, small firms have used innovation to survive in this competitive market as well to improve their business performance (Heunks, 1998; O'Regan, Ghobadian, & Sims, 2006). Their effort to do innovation is reasonable, because several scholars argued that innovation have a positive effect and should results in a better business performance (Aragón-Correa, García-Morales, & Cordón-Pozo, 2007; Kemp, Folkeringa, de Jong, & Wubben, 2003). However, business performance is not a result of innovation alone, because several factors can have influence such as type of innovations (e.g. product or process) and size of the firm (Forsman & Temel, 2011).

Scholars have been connecting successful implementation of innovation with the business performances in terms of profitability, growth, productivity and market share (Heunks, 1998; Hult et al., 2004; Tidd, 2001). Therefore, many consensus measures the growth of an enterprise by the growth of their profits and sales, where growth of employment also become a major concern for government (Forsman & Temel, 2011).

To measure profitability, several scholars perceived profit margins, absolute profit and profits per employee to be important, while productivity as a reflection of company's efficiency has been measured through sales per employee (Freel, 2000; Kannebley, Sekkel, & Araújo, 2010). The notion of efficiency also aligned with some study that suggested that operational improvement can be used to determine firm's performance, innovations in business model area can also affecting the operation aspects of the firms (Hartmann et al., 2013).

The type of innovations can impacted different type of business performances. While some scholars found that growth expectations can help driving the development of product innovation (Verhees et al., 2010), others found that process innovations is mostly driven by expectation in productivity improvements (Huergo & Jaumandreu, 2004). However, the effect of process improvement in small firm's productivity will only last in short term, approximately one year of life-span (Rochina-Barrachina, Mañez, & Sanchis-Llopis, 2010). In the end, both of the improvement in growth and productivity are supposed to help improving profitability of the firms (Forsman & Temel, 2011).

However, the case is different in small firms, where profitability may not be impacted in short term. Heunks (1998) argued that while small firms may achieve efficiency and growth, profits may not be gained at the same time. The case may be different for larger firms that can gained profits from their innovation with immediate effect, which is argued by several scholars is because larger firms is able to have the capability to do multiple innovations at one time and benefit from it (Forsman & Temel, 2011; Freel, 2000). This is also supported by Tether (1998), that argued that the revenue type of benefits from innovation will increase with the size of the firms that do the innovations. Zott and Amit (2007) supported this notion by suggesting that while profitability is an appropriate measure for large firms, it is less appropriate for young firms since it will likely to have negative earnings, in which they suggested to include firm's stock market value to measure young firm's performance.

However, some scholars challenged the notion of growth and lack of focus in profitability for entrepreneurial (small) firms (Brännback, Carsrud, & Kiviluoto, 2012). Brännback et al (2012) argued that growth as a main performance measurement of firms has been a myth, driven by the strong interest in high growth firms by stakeholders (such as venture capitalists) and notion that growth would be equivalent to the success of a firm. Investors such as VCs have an upper hand as they provided important resources to the young firms (who is resource dependent at the early stage), and firms must respond to the investors demand of achieving growth and not profit (Brännback et al., 2012). The study by some scholars also confirm the importance of profit compared to growth, by stating that while most of startup firms tends to start out as growth-oriented firms, their performances are relatively poor compared to the profit oriented firms (Steffens, Davidsson, & Fitzsimmons, 2009).

In their study, Brännback et al (2012) argued that profitability have a fundamental role in supporting the growth capability of small firms and not the other way around. Profitability is also seen as the clear evidence of a working business model, where growth can be easier to achieved afterwards (Brännback et al., 2012). The only important measures of performance is profits, where it also the main driver for all of the other operations of the firm (Drucker, 2001; Schumpeter, 1934) or in other words, profitability would be a prerequisite to the firm's profitable growth (Steffens et al., 2009). Therefore, firms should adopt a business model that put focus on both profit and growth from the beginning, because it would not be an easy task to change the business model when it is already operating (Brännback et al., 2009; Steffens et al., 2009).

While innovation can impacted business performance, the level of business performance can also be the starting point of an innovation. While firms with high level of business performance will satisfied with their situations and just opted to do incremental innovations when necessary, firms that experienced low business performance will be forced to start developing radical innovations (Cainelli, Evangelista, & Savona, 2006). Therefore, the low level of business performance can be a starting point for SMEs to do business model innovation.

2.4.3 Innovation and innovativeness

There is a consensus that innovation will depend on innovativeness (Y. Lee, Shin, & Park, 2012). Innovativeness is especially important when market turbulence or other environmental dynamics exists (Hult et al., 2004). In an environment where consumer's preferences are changing rapidly, it would be important for firms to engage in innovation activities to gain competitive advantage and better performance (Hult et al., 2004).

Innovativeness can be distinguished into two types, product innovativeness and firm innovativeness. *Product innovativeness* can be perceived as the capacity of an innovation to influence the market structure (macro perspective) or affecting the firm's internal resource, competencies or strategy (micro perspective) (Garcia & Calantone, 2002). On the other side, *firm innovativeness* can be perceived as the firm's propensity to innovate or propensity to adopt innovation (Damanpour, 1991; J. E. Ettlie, Bridges, & O'Keefe, 1984). Since the focus of this research will be on the innovation that involves the changes in several areas of the firm (not only product), we are going to focus on the firm innovativeness from here on.

Firm innovativeness can also be seen as the innovation orientation, or the firm's capability to introduce new ideas (Barba-Sánchez, Martínez-Ruiz, & Jiménez-Zarco, 2007). Other scholars defined firm innovativeness as the "openness to new ideas as an aspect of firm's culture" (Hurley & Hult, 1998) and "capacity to engage in innovation or to introduce new product, process or idea in the organization" (Damanpour, 1991; Hult et al., 2004). The capacity to innovate can also be called "absorptive capacity", that is measured by number of innovation that a firm can develop and implement successfully (W. M. Cohen & Levinthal, 1990). Hence, firm innovativeness have two

dimension or stages that are going to be used in this research, which are the openness to new ideas(initiation) and the capacity to introduce these new ideas (implementation).

Organizational characteristics would be an important antecedents to a firm's innovativeness (Damanpour, 1991; Hurley & Hult, 1998). Hurley and Hult (1998) distinguished two types of organizational characteristics, which are the *cultural* and *structural* characteristics.

2.4.3.1 Cultural characteristics of organization

Cultural characteristics can be seen as the value, beliefs and behaviours that are encouraged in an organization. Furthermore, cultural characteristics is an important determinant to the first dimension of innovativeness, *the openness to new ideas*. Various characteristics of firm's culture will determine whether the organization have an orientation towards innovation or not (Hurley & Hult, 1998).

The cultural characteristics that we are going to use in this research would be market orientation, entrepreneurial orientation, creative culture and product leadership orientation. *Market orientation* or *customer-centric orientation* can be defined as the latent aspect of firm's culture, which involves doing something new or different in response to market conditions (Jaworski & Kohli, 1993). A focus on customer experience can prompt an organization to improve their back-office and front-office processes in an innovative ways (Sorescu, Frambach, Singh, Rangaswamy, & Bridges, 2011; Zomerdijk & Voss, 2010). The market orientation will be especially important for SMEs with lack of financial resources to create alternative strategies to achieve competitive advantage (Pelham & Wilson, 1995). In other words, organizations that don't have the luxury or budget to make mistakes (such as SMEs), will have better chance to gain customer acceptance if they have market orientation.

Entrepreneurial orientation can be seen as a tendency to create new products or ventures, that are characterized by boldness and tolerance for risks that open up new markets (Cooper, Woo, & Dunkelberg, 1989; Lumpkin & Dess, 1996). Entrepreneurial orientation is important to market orientation. While superior products can be developed through the market orientation, it is the entrepreneurial orientation that drives these activities (Hult et al., 2004).

Entrepreneurial orientation is also related to firm's resources. The possibility of new products or services that can be created from firm's resource will depend on management's entrepreneurial ability to find innovative combinations. On top of helping finding innovative combinations between resources, entrepreneurial orientation can assist firms to find innovative ways to use the resources or motivate the management to acquire or even develop a new one (Demil & Lecocq, 2010).

Culture as firm's informal structure will also influence innovativeness (Teece, 1996). *Creative culture* will facilitate the creation of innovative value in response to competition, especially when the environment is highly dynamic (Amabile & Khaire, 2008; Goodstein, Boeker, & Stephan, 1996). Creative culture as a form of informal organization within the firm can contribute to the stabilization process when major changes happens within a firm (Gulati & Puranam, 2009). Therefore, creative culture have been regarded as an important prerequisite to firm's capability to innovate (innovativeness) (Nadkarni & Narayanan, 2007).

The author perceived *product leadership orientation* would also be a factor to innovativeness. Product leadership refers to the firms effort to offer customers with a cutting-edge product or services that improve the customer's usage of the products and potentially make competitor's offering to be obsolete (Treacy & Wiersema, 1993). Firms that pursue product leadership will need to focus on improving the performance or features of their products or services (Kaplan & Norton, 2000).

According to Treacy and Wiersema (1993), there are three major challenges for firms pursuing product leadership. The first one, is that they need to be creative. It means the organization have to embrace new ideas from internal or external (open to new ideas), which can also be supported by a creative culture. The second one is that they need to execute this ideas as soon as possible. It means that they need to have the capacity to execute the innovative ideas. The last thing to do is to pursue new innovative ideas after their last ideas have been executed. It means that the firm should not settle and have continuous innovation.

In conclusion, firms that have product leadership orientation will make efforts to produce a consistent stream of state-of-the-art product or services, which can also be said that they tend to innovate their value offering (Treacy & Wiersema, 1993). Therefore, even though the author did not found any literature that prove the relation, this research will include product leadership orientation as antecedents to innovativeness, since innovativeness can be defined as propensity (tendency) to do innovation.

2.4.3.2 Structural characteristics of organization

The second type of organizational characteristic, *structural characteristic*, is the objective aspects of an organization that cannot be reduced or deduced from the member of the organization (Aiken, Bacharach, & French, 1980). Furthermore, structural characteristics would be an important determinant to the second dimension of innovativeness, *the capacity to innovate*. However they need to have openness to new ideas (innovation orientation) in the first place to initiate the innovation process (Hurley & Hult, 1998).

There are several structural properties of a firm that can contribute to the innovation capacity. Hurley and Hult (1998) identified firm's size to be important determinant for firm's capacity to innovate. Firm's size has also claimed to affect the firm's type of innovation (product or process), level of innovation (radical or incremental) and probability to do innovation as a mean to survive and create competitive advantage (Cefis & Marsili, 2005; Hansen, 1992; Huergo & Jaumandreu, 2004). This is aligned with our focus on SMEs, which also determined by firm size (micro, small or medium size).

Firm's size is related to resources (Hurley & Hult, 1998). While larger firms can have advantages on resources aspects, SMEs have a relatively more difficult access to resources that supports innovation (Hewitt-Dundas, 2006; Nieto & Santamaría, 2010). The notion of resources is important because it served as means to facilitate and overcome obstacles to do innovation (Downs & Mohr, 1976; Mohr, 1969). Slack resources or the amount of resources that are in excess to produce an output in organization, can support experimentations within organization that may lead to innovation (Nohria & Gulati, 1996). Therefore resources (which is related to firm size) contributes to the firm's capacity to innovate, as it allow the exploration and exploitation of opportunities (Teece & Pisano, 1994).

Another important characteristic would be the firm's geographic location. Firm's location would be important since it can determine the factors that contribute to innovation capacity such as access to knowledge (Christensen & Drejer, 2005), national innovation policy such as R&D subsidy (Herrera & Nieto, 2008) and clustering of innovative firms (Johansson & Lööf, 2008). The environmental dynamics faced by the firm will vary depends on the firm's choice of industry or geographical location (structural characteristics) since it will determine the state of knowledge and technology in this environment (Kline & Rosenberg, 1986).

Furthermore, since there are rising startups with innovative BM such as Airbnb and Uber, the author will include "organization phase" as one of the variables of structural characteristic. Therefore, we are going to use firm's size, geographic location and organization phase as the main structural characteristic of an organization in this research.

2.5 Business Model Innovation (BMI)

2.5.1 BMI definition

There are several definitions of BMI when we look at several literatures. BMI can be defined as the modification or introduction of a new set of key components (internally or externally) that enable the firm to create and capture value (Hartmann et al., 2013). BMI can also be defined as addition of novel activities (content), linking activities in novel ways (structure) and changing one or more parties that perform any activities (governance) (Amit & Zott, 2012).

Furthermore, business model innovations (BMI) can be categorized as incremental or radical innovations. Incremental BMI can be seen just as a small changes in the business model that involves a change in only one element of the business model (Hartmann et al., 2013). BMI can be seen as radical innovations when it change the way the organization work drastically and affect the entire business internally and relative to the market (Bock, Opsahl, George, & Gann, 2012; Cavalcante et al., 2011; Markides, 2006). Furthermore, Markides (2006) argued that to be qualified as an innovation, the new business model should be able to attract new customer to the market (increase quantity) or by inducing the existing customers to consume more (increase quality).

Hence, following our definition of business model, we define business model innovation (BMI) as

> ***incremental or radical changes (or additions) in one or more elements of business model including the strategic choices in which the firm create and capture value within a value network.***

2.5.2 The factors and drivers to BMI

The author will define the word 'factor' and 'driver' to get more understanding on the differences. Oxford dictionaries (2015a) defined *factor* as " a circumstance, fact, or influence that contributes to a result". On the other hand, Oxford dictionaries (2015a) defined *driver* as "a factor which causes a particular phenomenon to happen or develop". Therefore, we can say that a 'factor' to innovation is contributing or supporting an innovation while 'driver' to innovation is when these factors become the cause of an innovation to happen.

Moreover, Bucherer et al (2012) argued that firms are driven to do BMI because of the existence of both threats and opportunities in both internal or external environments. Other scholars mentioned that innovation is a method to promote changes in organization, whether it is a response for external or internal change in the environment or an initiative to influence the organization's environment (Hult et al., 2004). Therefore in this research we define **BMI drivers** as

> ***The external or internal factors of the firm that create opportunities to be exploited by the firm by voluntary BMI or create threats to the firm which forced firms to do BMI***

2.5.2.1 External factors and drivers to BMI

As mentioned before, the manner of innovation would vary for each industries due to different states of knowledge and technology in each environment (Kline & Rosenberg, 1986). This notion is supported by Hult et al (2004), which suggested that innovation such as new product development can only be successful if a firm understand the characteristics of the environment in which the firm operates. Changes in these environment would be a strong driver to do organizational innovation (Damanpour & Gopalakrishnan, 1998) such as business model innovation.

Morris et al (2005) recognized three types of dynamics factor in the environment which are the changes in market, the development of technology and the changes in regulatory situations. Understanding the changes in these external factors are important to gain better insights on what needs to be changed on the business model (de Reuver et al., 2009).

Changes in the market refers to the rapid changes in customer's preferences, constants entry and exit of competitors from the market or rapid streams of new products offering (Hult et al., 2004). The changing customer values will force organizations to take an "outside-in" perspective and adapting their business model to customer's preference (McGrath, 2010; Sorescu et al., 2011).

Technology change would also be an important aspect in the environment of the firm. Technology drives change and change will need technology (Barba-Sánchez et al., 2007). The definition technology here is more than just the development in computers or internet, but there is a tendency to focus on the rapid development of ICT and internet technology (Barba-Sánchez et al., 2007). Thus, responding to the change in technology such as ICT would be important , since ICT will enable firms to generate more growth, make them more competitive and innovative (Barba-Sánchez et al., 2007).

Technological developments will drive firms to change their ways to create and capture values (Padgett & Mulvey, 2007). The emergence of internet have created a new ways to do economic and information exchanges, that stimulates new market entry for firms with less resources by using customer-centric platforms (Mahajan, Srinivasan, & Wind, 2002; McGrath, 2010). The development of ICT also enables firms to created innovative business models based on self service technologies (Meuter, Bitner, Ostrom, & Brown, 2005).

Regulatory changes can also become important driver for innovation. Government policies and regulation are important, since it will provide an input for investment decision of a firm (Hollanders & Arundel, 2007). The regulatory changes can either hinder the innovation, or it can be used to spur innovation and drive economic growth(Hollanders & Arundel, 2007) The example can be seen from firms in large technical systems such as manufacturing, electrical supply company or network operators have barriers to develop and diffuse radical innovations due to dominant standards and path dependency of the technology regime (Markard & Truffer, 2006). Firms that operates in this type of system will need government intervention and policies to promote radical innovations (Markard & Truffer, 2006). In their article, Markard & Truffer (2006) shown that by having market liberalization in the electrical industry, it promote changes on the firm level, especially in the product offered, business practices and organizational structures.

Furthermore, the adaptation of innovation to the environmental aspects could also determine firm's performance. The environment can influence / moderate the firm performance by accepting or rejecting the outcome of innovation done by firms, either as a response to the change in environment or as pre-emptive action to influence the environment (Damanpour & Gopalakrishnan, 1998). Thus the external factors plays a major role in determining the firm's adaptability, while also moderating the BMI outcome and the performance of the firm.

2.5.2.2 Internal factors and drivers to BMI

There are several potential factors that can drive business model innovation from the internal environment of the firm. The first factor would come from *innovativeness* or the firm's propensity to innovate and its two dimensions (Damanpour, 1991).

The first dimension of innovativeness would be *openness to new idea* or *innovation orientation*. Companies that emphasize on innovation, particularly when resources are available, will tend to develop new innovations (Hurley & Hult, 1998). Firms that have strong market orientation tends to understand their market better, which in turn will led to innovative products, process or administrative approaches (Hult et al., 2004). Furthermore, when firms have high market and learning orientation, it will form strong creative culture (Hurley & Hult, 1998), which enable firms to have better resource configuration and structural change process when undergoing business model innovation (Bock et al., 2012).

The second dimension of innovativeness would be c*apacity to innovate* or *innovation capacity*. The innovation capacity can be seen as the potential to produce innovative outputs and it would be heavily depended on its structural characteristics such as resources and competencies of the firm (Hurley & Hult, 1998; Morris et al., 2005; Neely, Filippini, Forza, Vinelli, & Hii, 2001). For example, to adopt the changes in ICT, firms need internal competencies and resources such as network systems or ICT-related supported services (Leenders & Wierenga, 2002; Roberts, 2000). Thus, the combination of innovation orientation and innovation capacity determine the innovativeness level of the firm.

High level of innovativeness can drive business model innovation. This is the case especially when firms have available resources but underutilized (Bucherer et al., 2012). Underutilized resources can enable firms to do experimentations in order to explore and exploit opportunities (Downs & Mohr, 1976; Nohria & Gulati, 1996). By focusing on finding new ways to improve and experimenting with their internal processes, firms can discover innovative business model (Chen, Hung Tai Tsou, & Huang, 2009; Chesbrough, 2010; McGrath, 2010; Sorescu et al., 2011). Therefore, high level of innovativeness can be an opportunity driver for the firm to do business model innovation.

The second internal factor would be the *business performance* of the firm itself. Firms that have declining performances or under threat of going out of business will need to rethink their core logic of doing businesses (Sosna et al., 2010). This can be seen from the example of Netflix, where they move from pay-per-rental model into subscription model when facing company failure when using the initial pricing model (Teece, 2010). Therefore the *declining performance* of the firm will be one of the internal drivers to conduct BMI because it is threatens the survival of the firm.

Business performance can also present an opportunity to do BMI because it is related to resources. Higher performance level of a firm can contribute to more resources (such as additional financial resources or hiring a more skilful employees) and firms can use these slack resources as diversification initiative to innovate in new value propositions or other BM elements (Demil & Lecocq, 2010). Therefore, we propose that there will be a feedback loop from *higher business performance* to the innovation capacity (innovativeness) of the firm that will indirectly drive business model innovation.

2.5.3 BMI radicalness and disruptiveness

This research will be using the four types of business model change by Cavalcante et al (2011) to determine the radicalness of the BMI. Business model innovation can also perceived as the change of business model, which can include (1) creation, (2) extension,(3) revision and (4) termination of the business model (Cavalcante et al., 2011), which can be seen from the **figure 9** below.

Business model creation (I) will involve realization from ideas to actual business. In this type of business model change, there would be no previous process, structure or system prior to the implementation of the new business model. The main changes in business model creation will relate to the change from vision to the implementation of initial processes to run the business (Cavalcante et al., 2011). Therefore this type of business model change only happen in a totally new venture / startups.

Business model extension (II) involve expanding core activities of the firm or adding a new on to the existing business model. The motivation to do this usually to exploit opportunities identified by the firm in order to expand the existing business. At this stage, usually firm already have a core repeated and standardized processes which may be extended by involving a wider area of offering or product / service lines (Cavalcante et al., 2011).

Business model revision (III) involves the modification of existing element of the business model and replace it with totally new process / activities. By doing BM revision, the firm will embark on another path to do their business, which implying that the existing working practices of the firm are subject to changes (Cavalcante et al., 2011). The business model revision has been associated as 'radical' or 'disruptive' innovation by Cavalcante et al (2011), because the changes will require the firms to change the mental models of the firm and the dominant core logic of doing business that have been established in the previous business model.

Business model termination (IV) means eliminating or removing the existing process from the business model. By removing existing process, it can range from closing a business units / division or closing the whole structure of the firm. If the firm only terminate its business units, then the firm will continue to move forward with the remaining business activities.

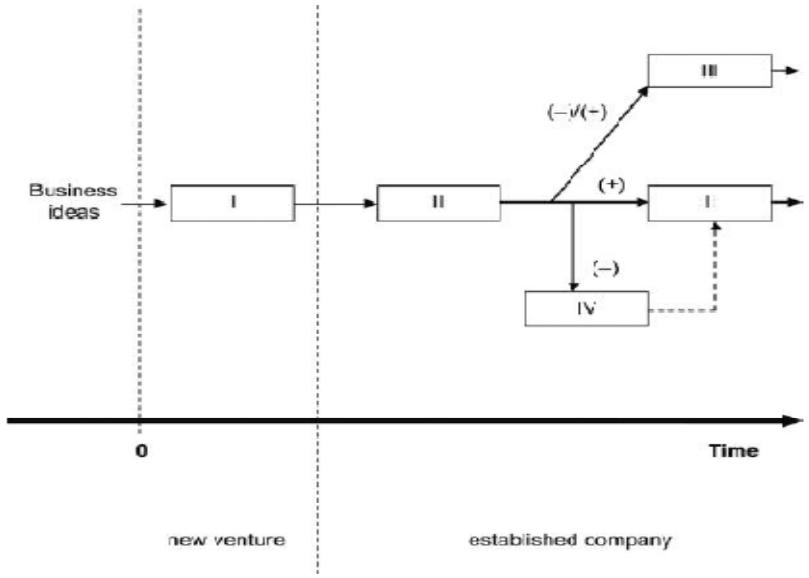


Figure 9 Four types of business model changes (Cavalcante et al, 2011)

In conclusion, we can distinguish the incremental and radical BMI from these 4 types of business model changes. The incremental BMI can be seen from the BM extension (II), since it didn't change the existing process of the firm and it doesn't require the firm to change their core logic. In the incremental BMI, the new process is only added on top of the existing process of the business model. The radical BMI can be seen from the BM creation (I), BM revision (III) and BM termination (IV). These type of business model can be categorized as radical because it involve a large magnitude changes (Hartmann et al., 2013) and change the core logic of the firm (Cavalcante et al., 2011).

However, even though the new business model is radical to the firm, it doesn't mean that it is a novel one among the industry / market. Therefore, to identify the level of novelty of the BMI this research are going to use the classification made by OECD (2005), which are *new to the firm*, *new to the market / industry* and *new to the world*.

We will make distinction between radical BMI and disruptive BMI according to these classification. The lowest rank on the novelty point would be *new to the firm* and the highest would be *new to the world* (Barjak, Bill, et al., 2014).

Table 3 BMI level of innovation

No	BMI level of innovation	Type of BM changes (Cavalcante et al, 2011)	Novelty among competitors in market / industry	Classification by OECD (2005)
1	Incremental innovation	BM extension	No	
2	Radical innovation	BM creation, BM revision, BM termination	No	new to the firm
3	Disruptive innovation	BM creation, BM revision, BM termination	Yes	new to the market / industry or new to the world

new to the firm category would include the changes in business model that are involving BM creation, BM revision or BM termination (Cavalcante et al., 2011), but not necessarily new among the competitors in the market / industry.

The *new to the market / industry* or higher type of novelty aim to see whether the BMI is new among competitors and the firm can be categorized as an innovation leader (Barjak, Bill, et al., 2014). In other words, BMI can only be categorized as *new to the market / industry* or higher only if the BMI is *new to the firm* but also novel amongst the competitors or never seen before in the industry.

Hence, we will define that radical BMI is the BMI that is *new to the firm* category while disruptive BMI involves creating a new business models that are *new to the market / industry* or even *new to the world*. The summary of BMI level of innovation can be seen from the **table 3** above.

2.5.4 BMI in a networked enterprise

Firms are facing an ever changing trends in customer's demand for product customization (Applegate, 2000; Chung et al., 2004). Consumers nowadays wants to be able to tailor their product or service in a unique combinations according to their personal preferences (Applegate, 2000). As an example, firms in the manufacturing industry are under pressure to change from 'made-to-stock' to 'build-to-demand' service model (Chung et al., 2004).

The demand for product customization change the view of traditional value chain. In a traditional value chain, stakeholders in the market are assuming certain roles such as suppliers, producers, distributors or customers. The value (either goods or services) and information flows sequentially within this chain, from suppliers to the customers. Furthermore, firms identified and analyzed the value and costs in each steps using this value chain framework (Applegate, 2000). However the demand for value customization create greater need for information and visibility through the supply chain to provide the customization capability to deliver innovative products (Chung et al., 2004).

Applegate (2000) argued that internet and web technology will be able to facilitate the greater need of information and visibility to deliver customized value. Furthermore, to deliver customization and deliver innovative products, firms will need to focus on their core processes and outsourced the non-core activities or external resources to third party suppliers, which will lead to greater reliance on networked of partners / suppliers (Chung et al., 2004; Denicolai, Ramirez, & Tidd, 2014; Huang, Lai,

Lin, & Chen, 2013). Applegate (2000) and Magretta (1998) identified that new business models emerged to cater the above needs of customization and outsourcing.

There are several characteristic of the emerging networked business model according to Applegate (2000). First, there would be a separation between the firm that produce the value and the firm that sell the technical infrastructure. Second, within this new emerging business model, the orderly sequence of traditional value chain will not applied, because the players in a networked business marketplace will assume more than one roles and have an great interdependencies with one another which can be called *value network*.

A value network or network economy model will provide value through a set of complex economic exchanges between one or more organizations that is not involve only goods or services, but also the intangible value (e.g. reputation) and knowledge (e.g. know-how) (Applegate, 2000; Chung et al., 2004). In contrast, the traditional value chain will coordinate the value exchanges on the market based on bargaining power, while lacking the information sharing dimension, which can also be called market economy model (Chung et al., 2004). The differences between the traditional value chain (market economy model) and the value network (network economy model) can be seen from the example on the **figure 10**.

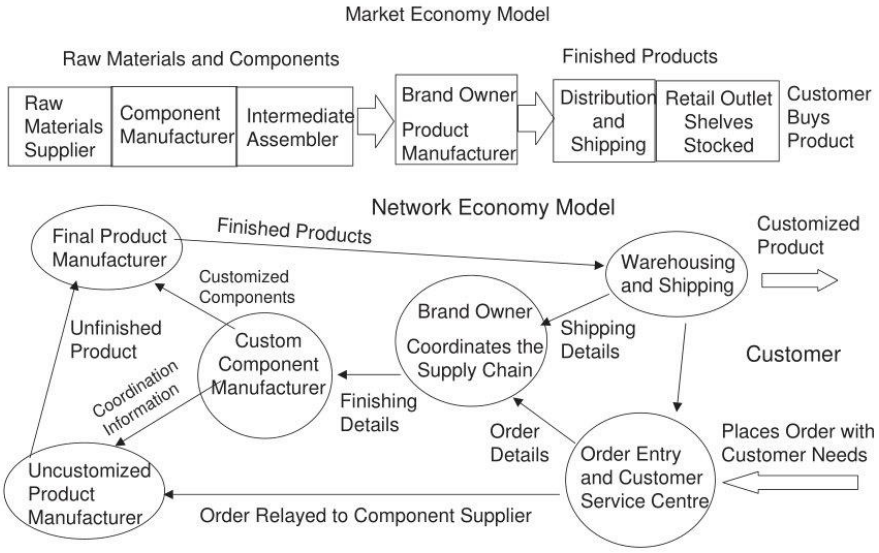


Figure 10 Market and network economy model (Chung et al, 2004)

Relationships with its value network is especially important for SMEs to innovate their business model and provide customized value, since they lack the resources to do it (Hewitt-Dundas, 2006). The partners within the network can provide SMEs with necessary resources such as management expertise and capital as an input to reformulate their business model and ensure growth (Calia, Guerrini, & Moura, 2007). Young firms can focus on their distinctive core process while relying on the relationship with its partners for new knowledge or expertise (Onetti, Zucchella, Jones, & McDougall-Covin, 2010). The importance can be seen from the electronic-based sector in Europe, where SMEs spends twice the budget on partnerships than larger firms (Calia et al., 2007).

However caution must be exercised if firms relied too much on partners. The increased reliance on partners will expose firms to the increased of coordination costs or goal alignment problems (Bock et al., 2012). This problem could appear because firms will need to coordinate with diverse firms in the network, each with its own process and objectives that needs to be aligned to create the value.

2.5.5 Mapping of BMI concept with innovation types

In this study, we want to understand how BMI are being done in practice by firms. Looking back at our definition of BMI:

> *business model innovation is an incremental or radical changes (or additions) in one or more elements of business model including the strategic choices in which the firm create and capture value within a value network.*

From the above definition of BMI, this research needs to identify the changes in the BM elements such as value creation or value capture, however the measurement of BMI is not well conceptualized yet. The approach to measure BMI by IBM Institute for Business Value separate the BMI with other type of innovations, where the validity of such result are being questioned (Barjak, Niedermann, & Perrett, 2014). Another existing public innovation surveys and guidelines to collect innovation data in the Oslo Manual by OECD (2005) do not include the concept of BMI.

From above limitation regarding BMI concept, we need to translate the BMI into the innovation types that are well understood, in order to measure the incidence of BMI in the cases that we are going to study. Barjak, Niedermann et al (2014) proposed to do a mapping between the BMI definitions to the four type of innovations defined by OECD (2005). This kind of mapping is the only possible approach to operationalize and measure the incidences of BMI at the macro levels of countries and industries (Barjak, Niedermann, et al., 2014).

The mapping process will involve matching the BM elements with the innovation elements. For example, the changes in strategic choice element of the BM can be mapped with the product and marketing innovation elements (**figure 11**).

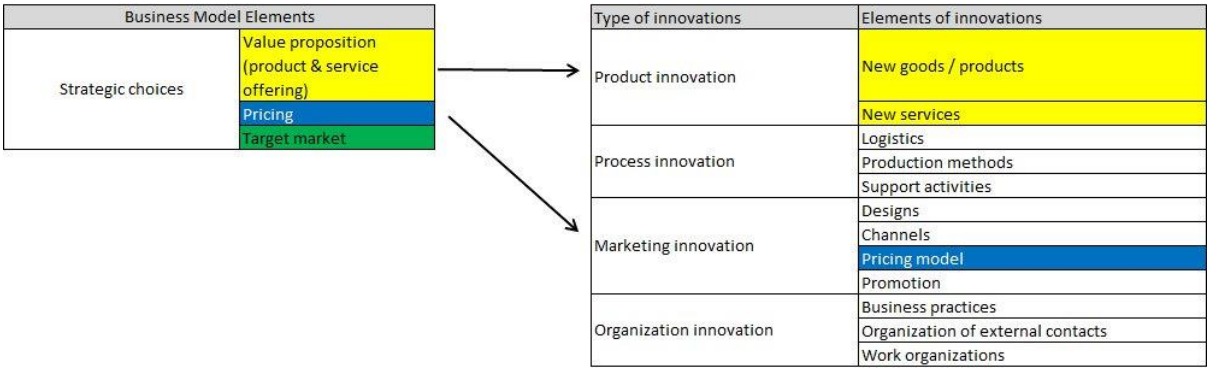


Figure 11 Example of BM elements to innovation elements mapping

Hence, following the suggestion by Barjak, Niedermann et al (2014), we map our BMI definitions to the four type of innovations previously defined into **Table 4** below:

Table 4 Mapping of BMI elements to OECD (2005) innovation types

No	Change in Business Model Elements	Innovation Types	Propositions
1	Strategic choices	product innovation, marketing innovation	The value proposition will be influenced by product innovations (new products or services), while changes in the target market and pricing will be coincide with marketing innovations.
2	Value creation	process innovation, marketing innovation, organizational innovation	Changes in how firms manages their resources, activities and also their organization structure to deliver value. Hence it will coincide process innovations with organizational innovation
3	Value capture	process innovation, organizational innovation	The changes in how firms capture value will determined by the process innovation and also the marketing innovation
4	Value network	marketing innovation, organizational innovation	The changes in position of the firm in a value network will coincide with how firms manage its external relations (organizational innovation)

From **table 4** above, we can see that all type of innovations (product, process, marketing, organizational) can be used to identify the changes in business model elements. Therefore, this research will be using the innovations elements to identify business model changes in order to have a more detail understanding. Furthermore, we believe that during our assessment of the BMI case, it would be easier to assess in a more detailed manner like new product or new services introduction, compared to generic term such as product innovation.

The innovation elements to identify the BM changes can be seen from table below. Other than the innovation elements that are being identified by Barjak et al (2014), this research will also include several elements from the BMI definition and BM ontologies to suit the BMI context.

Table 5 Business model innovation (BMI) elements

No	BMI Elements	Source
1	New goods / products	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
2	New services	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
3	Logistics	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
4	Production methods	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
5	Support activities	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
6	Technology used	e3 value, STOF, CSOFT and VISOR ontology
7	Designs	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
8	Channels	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
9	Pricing model	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;

10	Promotion	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
11	Revenue model	BMI definition, Canvas ontology, Ballon approach, VISOR, STOF, CSOFT
12	Cost structure	BMI definition, Canvas ontology, Ballon approach, VISOR, STOF, CSOFT
13	Target market / customer segment	BMI definition, Canvas ontology, e3 value, VISOR
14	Business practices	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
15	Organization of external contacts	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;
16	Work organizations	Barjak, Bill, & Perrett, 2014; Oslo Manual (OECD), 2005;

2.6 Alignment of business model with operational activities

The challenging task of BMI is the implementation of new business model. Even though business model can describe the business alongside its components, it cannot describe how to implement it into operational area using underlying resources such as IS application or IT infrastructure (Hedman & Kalling, 2003).

2.6.1 Alignment with business process (BP) and Enterprise Architecture (EA)

The translation of business model into implementation can be explained through business process (BP) as the representation of operational arrangement (Solaimani & Bouwman, 2012). The alignment between the BM ontologies of business model (BM) and its operational business processes are important to make it a viable business model and enabling firms realizing the innovation plans alongside their partners (Solaimani & Bouwman, 2012). The next step is how firms translate this operating model into core business processes or IT infrastructures that become the foundation of business model execution.

Since this research will involve changing how the business works, it will involve business process redesign or re-engineering that first described by Hammer & Champy (1993). Business process re-engineering (BPR) refers to a major transformation in the organizations which include most of the organization's critical business process (Sidorova & Isik, 2010). Furthermore, IT is also identified not only as supporting aspect, but it is an integral part driving the BPR (Harmon, 2010). However, BPR is not an easy task since it has a high failure rates, which will need some techniques and tools to help with the transformation (R. G. Lee & Dale, 1998).

Lee & Dale (1998) proposed the usage of approach called the business process management (BPM) to help with the business process re-engineering. BPM can be defined as *a customer-focused approach to the systematic management, measurement, and improvement of all company processes through cross-functional teamwork and employee empowerment* (R. G. Lee & Dale, 1998). Hence, it is an approach that provide not only a method to improve the process, but also the measurements of the improvement.

BPM is also recognized as a general framework to help explain the corporate business change in terms of levels such as enterprise, business process and implementation level (Harmon, 2010). However, we are going to focus on the enterprise level only in this study, since we are aiming to investigate the process change for the whole enterprise and its alignment with business model. The

enterprise level initiatives will be focusing on architecture, process governance and measurements (Harmon, 2010). The BPM on the enterprise level initiatives can be guided using enterprise architecture (EA), since it emphasize on process alignment and identification of related aspects such as the IT elements needed to support the business process changes (Harmon, 2010).

From above, we can conclude that in order to align the business model with its core business process and IT applications supporting them, firms can use the enterprise architecture (EA) (Fritscher & Pigneur, 2011). EA can be seen as the organizing logic of IT infrastructures and operational processes that translates the operating model 's requirements for standardization and integration (Ross et al., 2007) as can be seen in **figure 12**. In short, BM are more focused on the value created by the business, while EA will help explaining how the business will realize this proposed value (Janssen et al., 2005).

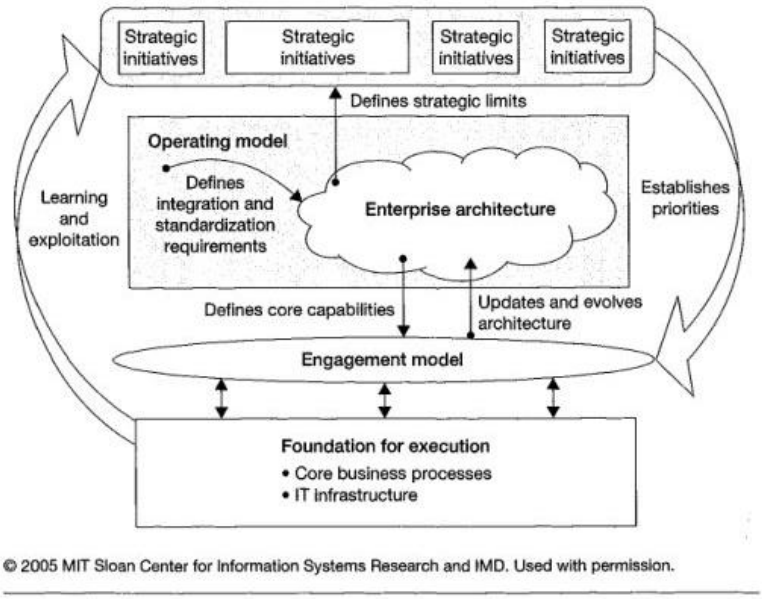


Figure 12 Operating model and enterprise architecture (Ross et al, 2007)

The primary goal of EA is to define future state of a firm's business process and IT systems (target architecture) and roadmap to achieve this target (Tamm, Seddon, Shanks, & Reynolds, 2011). In order to guide the changes and help management communicate with different stakeholders, firms can use EA frameworks (Cloo et al., 2009). The example of EA frameworks are Zachman Framework, The Open Group Architecture Framework (TOGAF), the Design and Engineering Methodology for Organizations (DEMO) and ArchiMate (Fritscher & Pigneur, 2011; Iacob et al., 2012; Lankhorst, 2004). although several authors recommended ArchiMate because of several reasons (Fritscher & Pigneur, 2011; Iacob et al., 2012; Meertens et al., 2012), there are currently no standards or best practice in selecting EA frameworks.

Furthermore, since each EA frameworks have different methods and layer description, we want to use common operational domains that are being used by most of the popular frameworks to provide better generalizability in assessing the BMI cases, because the author believe each cases could use different type of EA frameworks. Hence, in this paper, we are going to identify the changes in operational level through the common domains of EA frameworks as provided by Jonkers et al (2004) in **Table 6** below

Table 6 Changes in operational domains (Jonkers et al., 2004)

No	Domain	Descriptions
1	Product	changes in the products or services that being offered to customers by the firm
2	Organization	changes in the business actors (employees, business unit) and the roles
3	Process	changes in the business processes that consist of business activities
4	Information	changes in the knowledge needed and its structure
5	Data	changes in the information that are suited for automation
6	Application	changes in the software needed to support the business
7	Technical Infrastructure	changes in the infrastructures such as hardware needed to support applications

2.6.2 BM-BP alignment in a networked enterprise

Several scholars attempted to align business model components with operational business process using enterprise architecture frameworks. Some of the scholars attempt to map the business model elements in the Canvas model by Osterwalder et al (2010) into the ArchiMate architecture framework (Fritscher & Pigneur, 2011; Iacob et al., 2012; Meertens et al., 2012). Other scholar tried to map the business model using e3 ontology into the ArchiMate architecture (Janssen et al., 2005). Some other research proposed an unified business model framework (UBMF) that aligned the components of a business model into the enterprise architecture using the Zachman Framework (Goethals, 2009). However, the existing attempt to align business model with business process above have several limitations that make it unsuitable to be applied into innovation that involves multiple actors and industries within a value network.

Solaimani & Bouwman (2012) argued that there are two main limitations on the existing BM-BP alignment attempts using ontologies and frameworks. First, on the BM part, there are various ontologies and frameworks available in literatures, which make it a quite risky thing to do to only use one type of ontology (such as CANVAS) without taking account the strength of other ontology (such as e3 value model) to do the alignment (Solaimani & Bouwman, 2012). On the EA part, various architectural frameworks such as ArchiMate tried to map the BM elements into BP implicitly without analyzing the gap, which have a risk to missed several elements such as value creation, value & information exchange alongside the potential conflicts between networked enterprises. Hence, EA is only used to describe and manage BP, but lacking the analysis needed to properly align the strategy with the operational -level tools and ontologies .

Second, the existing alignment approaches are mainly focus on specific business model or business process instead of focusing on interactions and dependencies between actors on strategic and operational level (Solaimani & Bouwman, 2012). These dependencies on certain ontologies made the existing alignment to be limited in use when there are other ontologies or frameworks (such as an informal one) involved in the alignment.

Solaimani & Bouwman (2012) proposed to use a general framework for aligning BM and BP that are not ontologies-dependent and more suitable to accommodate the interactions and dependencies between actors in the networked enterprises. The proposed framework will consists of three layers which are the value, information and business process layer and thus called the VIP framework (Solaimani & Bouwman, 2012). The visualization of the three layers of VIP framework can be seen from the **figure 13** below

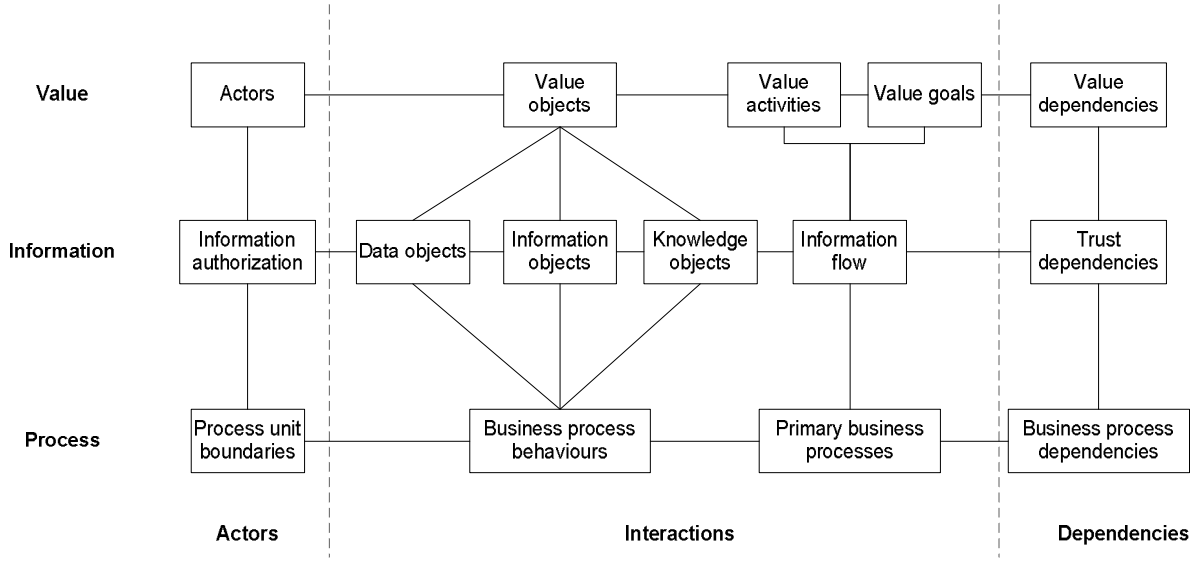


Figure 13 The VIP Framework (Solaimani & Bouwman, 2012)

Value would be the first layer of the framework. This layer will be focusing on value proposition that consists of a set of activities, services or products that are used by providers to create and exchange value to their partners and customers (Bouwman et al., 2008). Furthermore, in the context of collaborations between networked enterprises, the value layer will need to identify the interaction between these actors in terms of goal, relationships and dependencies, which came from several techniques such as e3 value, use-case diagram and stakeholder analysis (Solaimani & Bouwman, 2012). Hence, the main elements of this layer would be actors, value objects (money or goods), value activities, value goals and value dependencies.

Information would be the second layer of the framework. The ability to gain access to information would be critical for BM's viability and feasibility since it would enable firms to understand more about its customers, market, costs and products (Solaimani & Bouwman, 2012). To understand the concept of information, we would need to understand its differences with other concepts such as of data and knowledge (Ackoff, 1989; Zins, 2007). Data, information and knowledge are also being created and exchanged during the collaboration between networked enterprises (Solaimani & Bouwman, 2012), highlighting the dependencies between actors. Another important aspects to be considered is how the information will flows between actors, the access level to these information (authorization) and also the level of relationship between these actors (trust). Hence, the information layer will consists of data objects, information objects, knowledge objects, information flow, information authorization and trust dependency (Solaimani & Bouwman, 2012).

Business process would be the last layer of the framework. To align the high-level perspective of business model and the operational business process, there is a need to identify the primary business process (such as the creation of product or services) of the actors (Solaimani & Bouwman, 2012). Furthermore, since the business process can be viewed from several different perspectives (Curtis, Kellner, & Over, 1992), it is better to use the 'functional' and 'behavioural' perspective, since it is the main focus of business process domain (Solaimani & Bouwman, 2012). Furthermore, to be more focus on the scope of analysis, process boundaries will need to be included in the framework so we can understand whether the process belong to certain unit or section of organizations. Lastly, process dependencies will need to be identified and analyzed at the early stage of BM-BP alignment since it could affect the BM in many ways (Solaimani & Bouwman, 2012). Hence the elements of this layer would be the primary business processes, business process behaviours, the process boundaries and the process dependencies.

The VIP framework can be applied in two ways, which are the descriptive and prescriptive way as seen in the **figure 14** below. In a *descriptive* way, the framework is helpful to translate BMs essential elements on strategic and operational level to redesign the BPs of networked enterprises on both levels (Solaimani & Bouwman, 2012). Hence it would help to design business processes that have higher level of consistency with inter and intra organization BPs despite the ontologies and approaches used, since the business processes would be driven directly from BM.

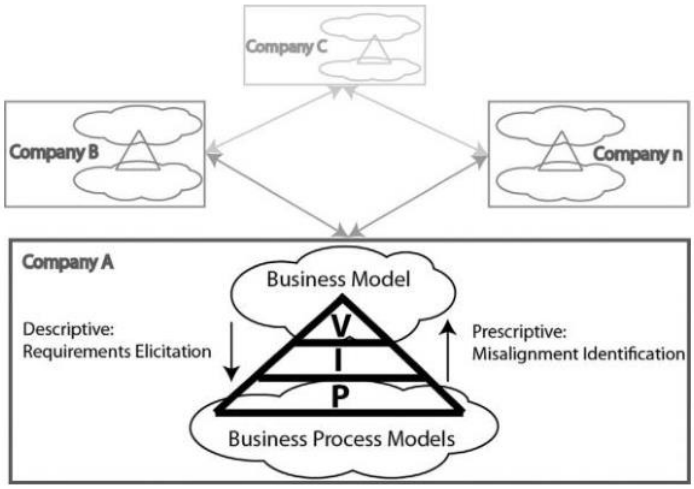


Figure 14 Application of VIP Framework (Solaimani & Bouwman, 2012)

In a *prescriptive* way, the framework will enable analysis on the operational activities of the networked-enterprises based on generic criteria, giving us the means to evaluate the alignment level of the BP with the higher level BM and also with the processes of other actors (Solaimani & Bouwman, 2012). Thus, it will help to identify misalignment or conflicts with the BM or other actors, providing accurate estimation on the BM's viability, sustainability and operational feasibility in order to have better BM redesign.

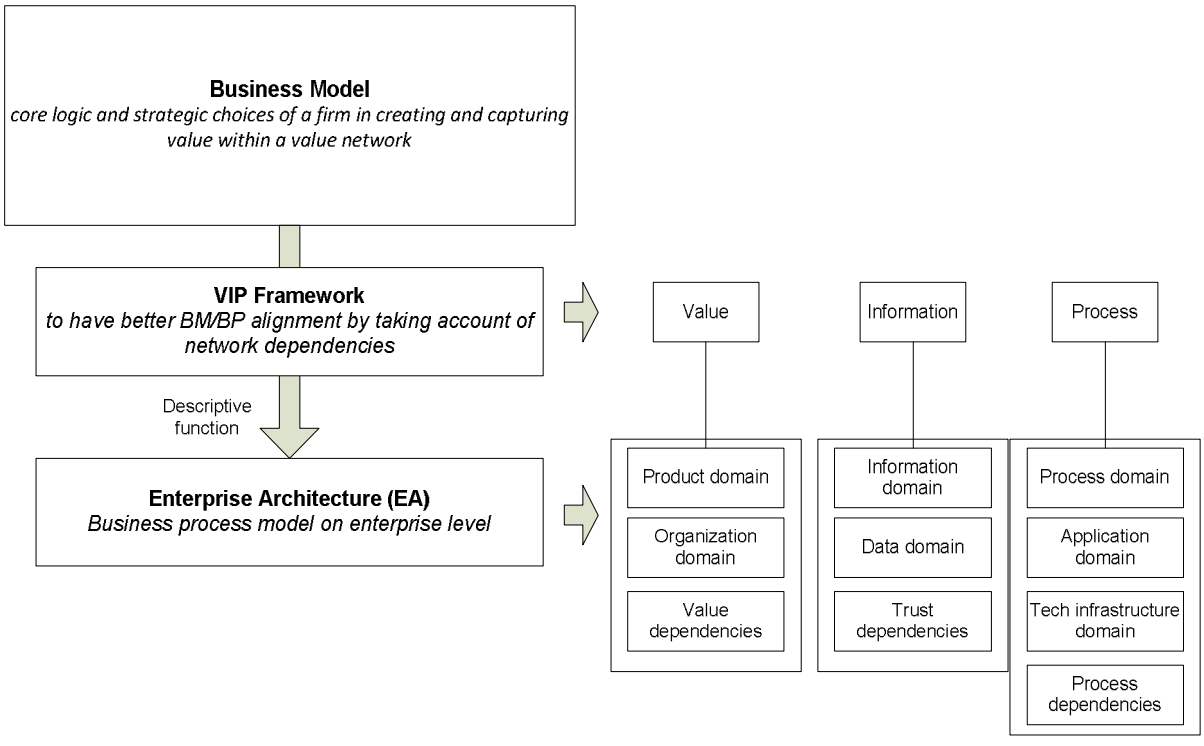


Figure 15 Mapping of VIP framework to EA frameworks domain

In this research, we will focus on the descriptive process of the VIP framework. The VIP framework will be used to help translate the business model into the enterprise architecture (EA) as the representative of the business process model (BPM). Therefore we are going to combine the VIP framework with the common domains of EA frameworks to provide a general framework to assess the changes in the operational aspect of the firm during business model innovation. The mapping of VIP framework into EA frameworks domain can be seen from **figure 15** above.

From the mapping of VIP framework and EA frameworks domain, we have the BM-BP alignment framework to assess the changes in operational aspect of a networked firm in the BMI cases. This framework will keep the three layers of VIP framework, namely value, information and process layer. The value layer will consists of product domain that explains the changes in the value objects (products or services) alongside the activities to create this value. Second one is the organization domain that described the changes in business actor's roles in the network. The last element would be the value dependencies that explains the changes in dependencies of one actor to another actor's value objects.

The information layer will consists of three items, information domain, data domain and trust dependencies. The information domain will take account the changes in both information and knowledge that was needed to be included in the new business model. Data domain will explain the changes in the data needed among stakeholders. Trust dependencies would be included to accommodate the changes in trust needed to share the information or data in the new business model.

Process layer will include all process and infrastructure related domain. First would be the process domain that will explain the changes needed in business process / activities. Second is the application domain, which explains the related application used in the business process. Third is the technical infrastructure, which consists the hardware needed to support the applications. Lastly, this research would also like to see the dependencies between these process using process dependencies domain. The summary of the BM-BP alignment framework can be seen in the **table 7** below.

Table 7 BM-BP alignment framework

Value layer	
Product domain	changes in the value object (products or services) that being offered by stakeholders in the network
Organization domain	changes in the business actors (employees, business unit) and the roles
Value dependencies	describing how the actors need value object of other actors
Information layer	
Information domain	changes in the information and knowledge needed alongside its structure
Data domain	changes in the raw data as a result of a transaction or process
Trust dependencies	describing the level of relationship between actors, determining the probability to share information
Process layer	
Process domain	changes in the business processes that consist of business activities

Application domain	changes in the software needed to support the business
Technical infrastructure domain	changes in the infrastructures such as hardware needed to support applications
Process dependencies	describing the need of execution of one or more processes before another one can be executed

2.7 Conclusions of the theoretical background

This section will aim to align all the concepts and variables presented in the previous sections. These alignment will become the theoretical framework for this research, and will also be used to develop the coding scheme in the next chapter. From the all the concepts that presented above, the author conclude that the constructs will be divided into the main constructs and the supporting constructs.

2.7.1 Main constructs and variables

Aligned with the main focus of this research, the explanation of the constructs will be started from the factors that drive the business model innovation.

Innovativeness would be the first internal factor of the firm that can drive BMI, since there is a consensus that innovation will depend on innovativeness (Y. Lee et al., 2012). Innovativeness consists of two dimensions "openness to new ideas" (innovation orientation) and "capacity to new ideas" (innovation capacity). Openness to new ideas will be essential to initiate the innovation process, while the implementation of innovation will be depending on firm's capacity to innovate (Hurley & Hult, 1998).

Innovativeness above is especially important when **environmental dynamics** exists (Hult et al., 2004). To keep up with environmental dynamics such as changing technology landscape, market place and regulatory conditions, organizations have to reinvent their business models regularly in order to remain competitive (Morris et al., 2005). If companies don't react quickly to the changes in their environment, they will not be able to compete in the long term (Giesen et al., 2010). Therefore, environmental dynamics would act as the external factor that drive business model innovation.

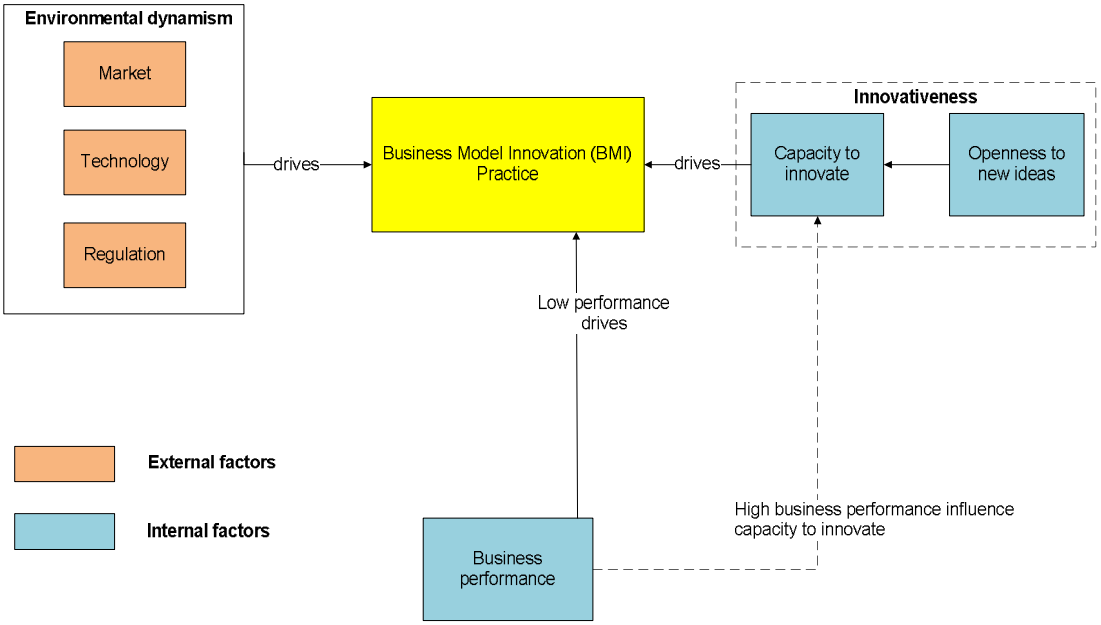


Figure 16 Main constructs and variables

Business performance will also serve as another internal factor that can drive BMI. Firms that have declining performances or under threat of going out of business will need to rethink their core logic of doing businesses (Sosna et al., 2010). Therefore the declining performance of the firm will be one of the internal drivers to conduct BMI because it is threatens the survival of the firm. On the other hand, higher performance level of a firm can contribute to more resources (such as additional financial resources or hiring a more skilful employees) and firms can use these slack resources as diversification initiative to innovate in new value propositions or other BM elements (Demil & Lecocq, 2010). Therefore, we propose that there will be a feedback loop from business performance to the innovation capacity of the firm that will indirectly drive business model innovation.

From above, the external and internal factors of the firm can drive the **business model innovation (BMI) practice.** Since there is a need to transform this new BM into operational level (Morris et al., 2005), the author will divide BMI construct into BMI process and alignment with operational processes.

For the business model innovation process, there would be several variables to be considered.

Type of BMI. Since business model innovation can be done for both new startups or established business, the BMI can be a totally new BM or modified one. This research will categorize this into two type of BMI which are the "new BM to the firm" or "BM modification". "New BM to the firm" will be coded where the new BM is created from scratch, with no previous business model. It is expected that new startups will have this type of BMI. The "BM modification" is a type of BMI where a new BM is created by modifying the existing / previous BM. It is expected that this type of BMI will occurred in an established firm. This research want to observe whether these difference will impacting the changes in the firm's BM.

BM ontology selection. BM ontologies can serve as a guide to experiment and map the business model alternatives (Osterwalder, 2004). With so many business ontologies and tools to choose from (Bouwman et al., 2012; Fritscher & Pigneur, 2014), we would like to see if the selection of BM ontology affecting the BMI practice

Changes in BM element. Since BMI means changing the BM elements, this research would like to see the changes made to the BM. Furthermore, this research would also observe whether the changes in the BM elements corresponds to the selection of BM ontologies. This research will use the BMI elements defined in table 5 to assess the BMI cases.

Alignment of business model with operational processes consists of several variables

Changes in operational area. The changes in business model will impacting operational area (Morris et al., 2005). Different changes in BM elements can yield different changes in operational area, hence various combinations can happen as a result of BM changes. To identify the changes in the operational area, this research will use the BM-BP alignment framework in table 7.

Enterprise architecture (EA) frameworks selection. If the firm decides to guide the changes in operational areas using EA, this research would like to see whether the changes in operational areas impacting their selection of EA frameworks and vice versa.

In conclusion, the combinations between the factors (internal and external) and the BMI practices (which BM ontology to select, BM elements to be changed, etc) will be the combinatorial patterns that are going to be assessed in this research. The relationship between the main constructs can be seen from **figure 16** above.

2.7.2 Supporting constructs and variables

This section would be discussing the constructs that are related to BMI but not the main focus of this research, hence the term supporting constructs. The author include these supporting constructs in order to have a better explanation to the BMI practice and the factors that drive the BMI.

2.7.2.1 Organization characteristics as supporting constructs

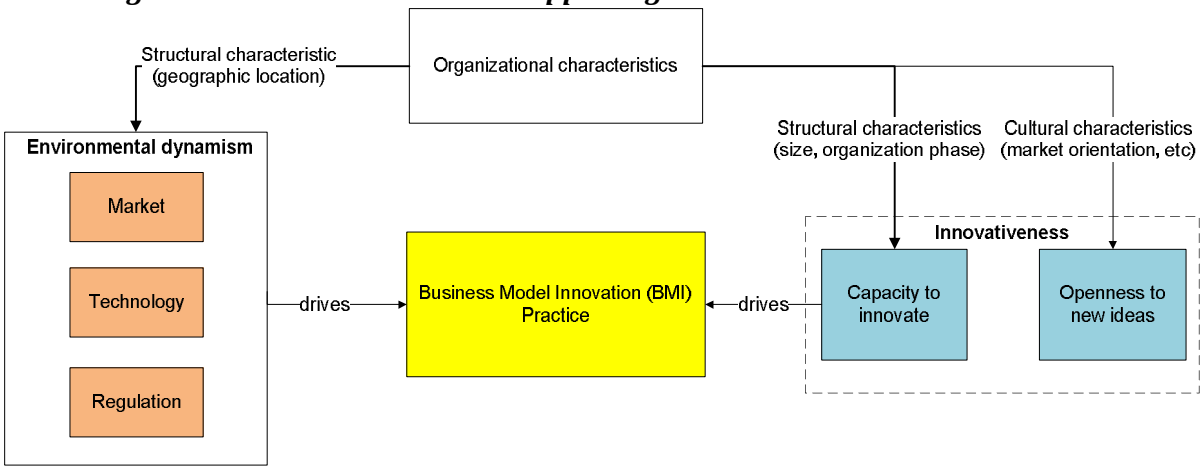


Figure 17 Organizational characteristics as supporting constructs

Organizational characteristics will influence both innovativeness and environmental dynamics (**figure 17**). ***Cultural characteristics*** of the firm would be important part of innovation orientation (Damanpour, 1991; Hurley & Hult, 1998). For example, when facing environmental dynamics, it is the role of the cultural characteristics such as market orientation that will determine how responsive the firm is to these changes. The cultural characteristics variables to be used in this research would be market orientation, entrepreneurial orientation, creative culture and product leadership orientation.

On top of innovation orientation, the ***structural characteristics*** of the organization will be the antecedents of firm's capacity to innovate. Innovation orientation when combined with resources or other structural characteristics of the firm will lead to greater innovation capacity (Hurley & Hult, 1998). The structural characteristics that are going to be used as variables are the firm's size and organization phase.

Structural characteristics will also impacting environmental dynamics. The environmental dynamics faced by the firm will vary depends on the firm's choice of industry or geographical location (structural characteristics) since it will determine the state of knowledge and technology in this environment (Kline & Rosenberg, 1986).

2.7.2.2 BMI outcomes as supporting constructs

Furthermore, the relationship between innovation and its business performance would be mediated by the innovation outcome (Neely et al., 2001), or in this research would be the **business model innovation (BMI) outcome**. The relationship between BMI outcome with BMI practice and business performance could be seen from **figure 18**.

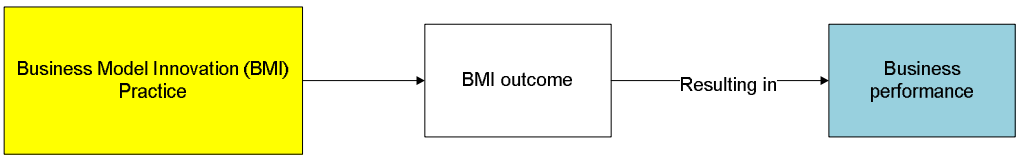


Figure 18 BMI outcomes as supporting construct

Different type of BMI practice can impact the BMI outcomes as follows

Radicalness of new BM. The outcome of the BMI process to the firm's BM can be an incremental or radical one. In the incremental BMI, the new process is only added on top of the existing process of the business model and doesn't require the firm to change their core logic. The new business model can be categorized as radical because it involve a large magnitude changes (Hartmann et al., 2013) and change the core logic of the firm (Cavalcante et al., 2011).

Disruptiveness of new BM. Related to the radicalness, the new BM could also be disruptive to market / industry or not. Even though the new business model is radical to the firm, it doesn't mean that it is a novel one among the industry / market. Its only when the new BM is *new to the market / industry* or *new to the world* that it the outcome would be considered as disruptive.

The author would like to see the impact of radicalness and disruptiveness of the BMI to the business performance. Some scholar mentioned that SMEs are more suited and will have better business performance by doing incremental innovations compared to radical innovation, because it is cheaper and can be deployed more rapidly by the entrepreneurs with different skills and backgrounds (Bhaskaran, 2006). Other scholar have a different opinion, where they emphasize disruptive business model innovations as important for both new firms that want to enter a market with established players and for established firms to respond to the new entrants (Markides & Sosa, 2013).

2.7.3 Overview of proposed conceptual model

The overview of the concepts alignment can be seen from the proposed conceptual model below (**figure 19**).

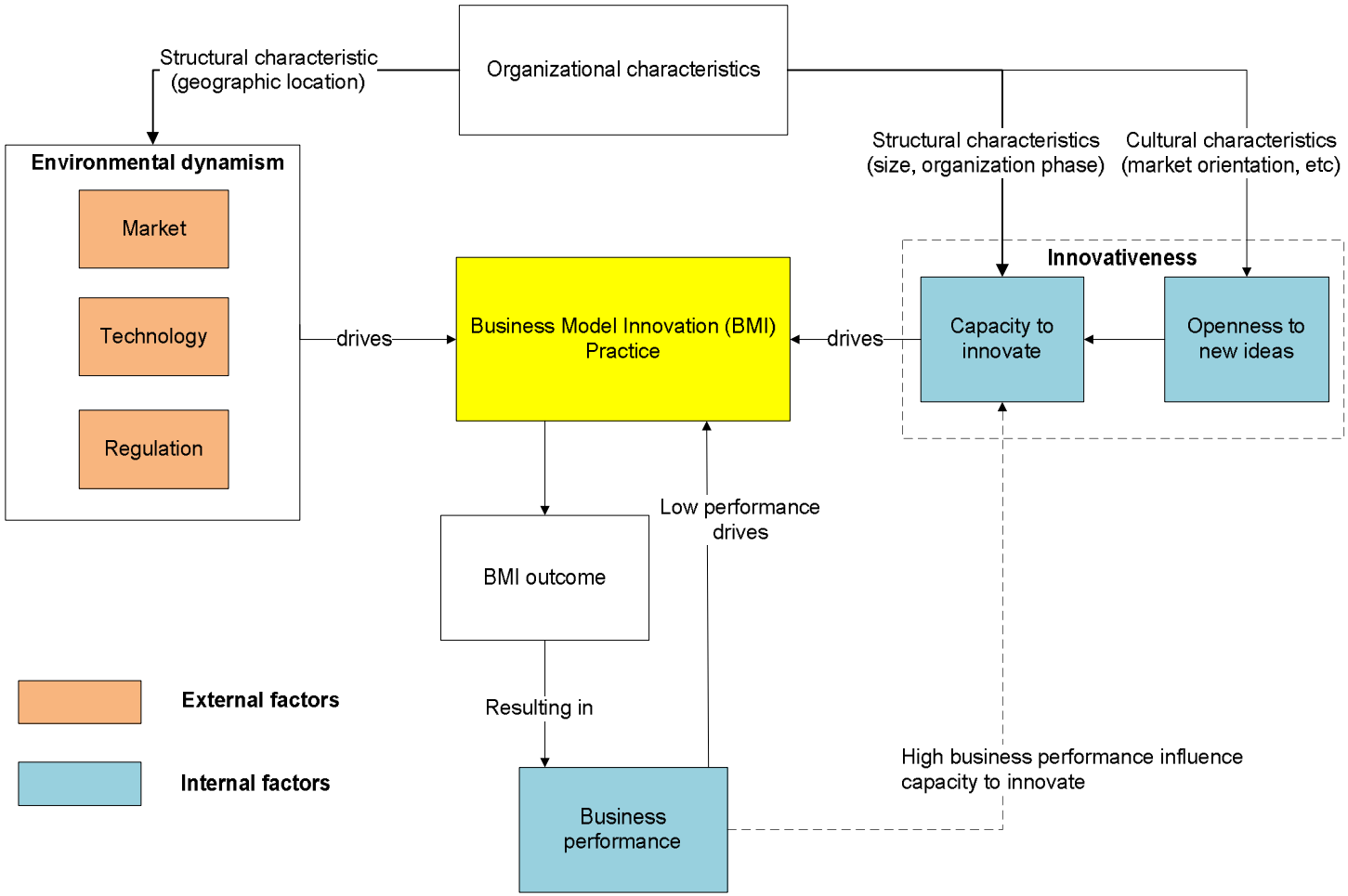


Figure 19 Proposed conceptual model

3. Research methodology

"Exploration is the engine that drives innovation" - Edith Widder

3.1 Introduction

This chapter will discuss the detail of the research methodology particularly the data collection, coding scheme design, coding process and also the reliability and validity measurements. The data collection will include defining selection and exclusion criteria for the case sampling. Coding scheme design will explore the variables to be included in the coding scheme, while coding process will discuss the actual process of coding the cases qualitatively as well as transforming it to quantitative data. Lastly, the we will discuss how this research will measure the reliability and validity of the coding.

3.2 Data collection

3.2.1 Case selection and exclusion criteria

The selection criteria in this research are divided into two type. First is the initial selection criteria using keywords such as "business model innovation", "case study", "business model" and "enterprise architecture". These keywords are going to be used to filter the cases that are collected in this research. By filtering, it means that the keywords are going to be used to check the relevancy of the cases collected to the purpose of this research by looking at the title, abstract or keywords section of the research.

Second, the selection process are further refined by using specific criteria, which are also going to act as exclusion criteria if the cases doesn't comply. The specific criteria would be:

- The cases should describe BMI by reporting changes in the BM elements for minimum full 2 pages in total
- The cases should reported the usage of BM ontology to change the BM. The usage of BM ontology by researchers who made the cases will also be included in this criteria.
- The cases should mention the factors or drivers of the BMI, which can be from the internal environment, external environment or both

3.2.2 Case sampling

After the selection criteria have been defined, we are ready to collect the sample cases. There are several steps to do this according to Larsson (1993).

First step would be determining the case collection sources. The search strategies should look for as many sources as possible to minimize source-specific biases. As literature comes with many forms and variants (Verschuren & Doorewaard, 2010), several channels can be used such as traditional sources (e.g. library), student thesis and dissertations, conference proceedings, online journal databases and (Scopus, Emerald, Elsevier, Science Direct, Google Scholar), consulting journals, business school repositories, or even data from Community Innovation Survey (CIS) Europe.

However, due to the time and resource limitation, this research will be narrowing the search strategy. Business model innovation is a relatively new topic in research, with not many case studies with this area available on academic databases. Furthermore, the focus of this research is the business model innovation practices by SMEs across Europe continent, which narrowing the scope of the cases even more. Therefore, this research will be contacting researchers in Europe that have done case studies in business model innovation to have a more relevant focus and time-saving (*purposive / judgement sampling*).

Second, the author will apply explicit screening mechanism to the collected case and reject the cases that appear to have little information value or demanding in resources (Osborn, Jaunch, Martin, & Glueck, 1981). These screening mechanism will have two filters as described above, which are the initial filtering by looking at the title, abstract or keywords of the cases. The second one is using the specific exclusion criteria. If the cases are not deemed enough, the author will look for more cases.

The overall procedure to of data collection can be described by **figure 20**.

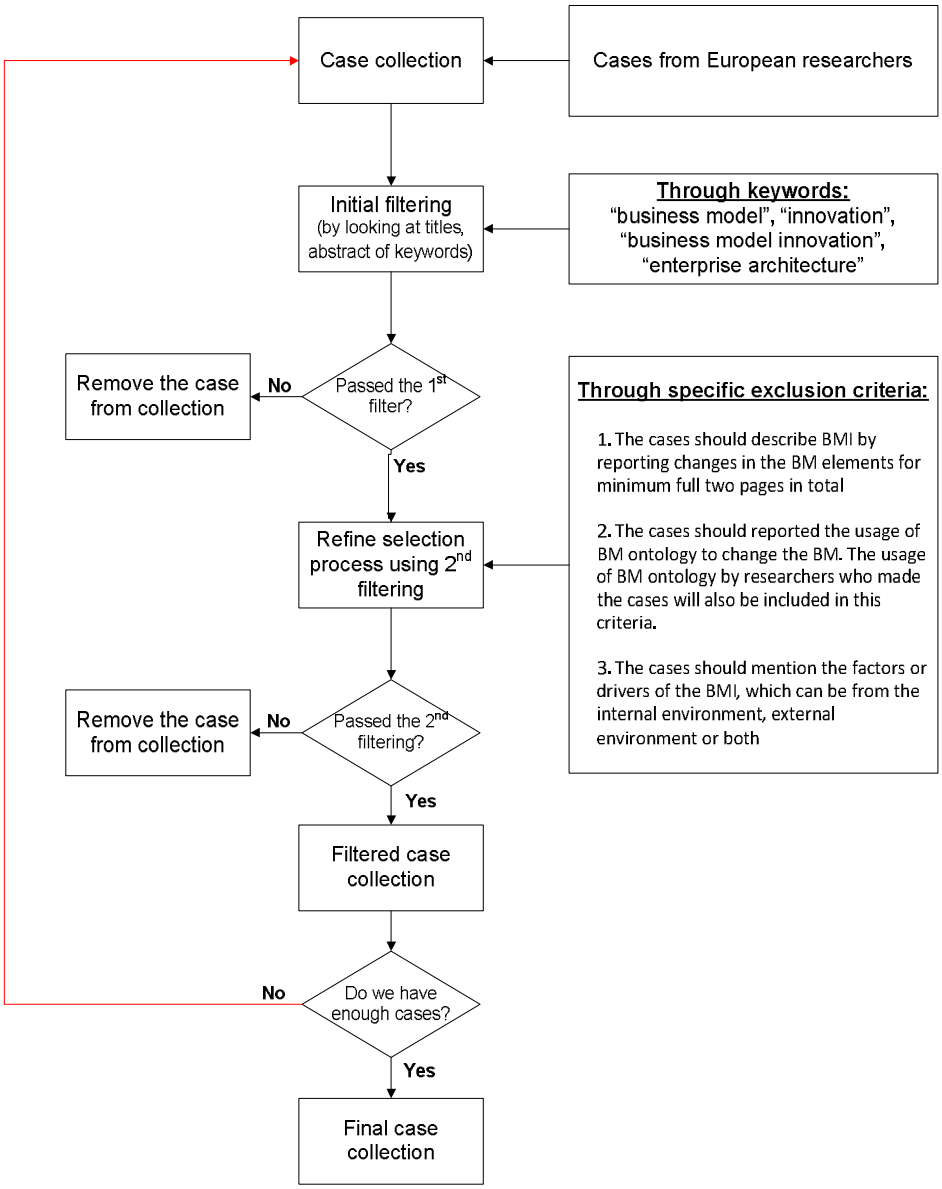


Figure 20 Selection criteria & sample collection flow

The data collection steps above is executed by the author for 2 months of the research time, parallel with coding process. Since the topic area is quite new, narrow scope of sampling sources and limited time, this research collected about 41 BMI cases as samples. However, due to our stringent selection & exclusion criteria, we remove around 14 cases and resulted in 27 final sample cases.

There are currently no information regarding the minimum sample size needed for case survey method (Jurisch, Wolf, & Krcmar, 2013), with several researches using case survey had various sample sizes ranging from 33 to 61 cases (Bullock, 1990; Larsson & Finkelstein, 1999; Lim, Acito, & Rusetski, 2006; Stahl, Kremershof, & Larsson, 2004). Therefore, this research deemed the sample size collected on this research to be sufficient and will proceed to the next step of the research using this final sample.

3.3 Coding scheme

The coding scheme is the core of case survey. It act as the guideline for the researchers and coders to convert qualitative data from the case studies into quantitative variables that can help define the research question operationally (Larsson, 1993). The coding scheme come in a form of set of questions and answers (a checklist) to collect the rich information in the cases (Lucas, 1974; Yin & Heald, 1975).

However, due to the exploratory nature of this research, there would be two phases in the coding scheme design process. The first phase is to use coding scheme from case survey method with open-ended questions in order to gather wider range of qualitative answers. The reason is because this research does not have a sufficient scale items from existing literatures, hence the author want to gather as much insights as possible by creating open-ended question. The coding process will begin after the qualitative coding scheme have been designed.

The second phase is to convert these qualitative coding answers into quantitative data, which can serve as an input to statistical analysis. The process of transforming the qualitative data into numerical data will be helped through the *qualitative content analysis* steps such as unitization and categorization (Krippendorff, 2004; Y. Zhang & Wildemuth, 2009). Furthermore, since the research will start from qualitative material and transformed into numerical data for further analysis using statistical tools to achieve generalizable results, it can also be called a *generalization design* (Srnka & Koeszegi, 2007). The two-phase framework of the coding scheme can be seen from **figure 21** below.

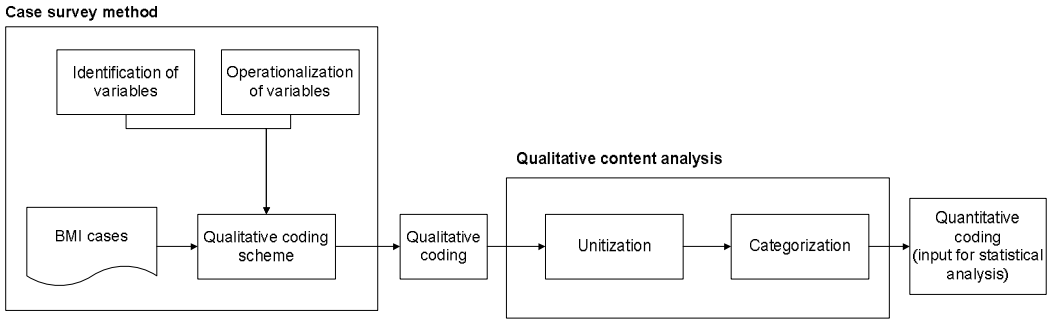


Figure 21 Two-phase framework of coding scheme

3.3.1 Designing the qualitative coding scheme

The case survey coding scheme design will start by identifying the relevant concepts and operationalize these concepts into variables (Jurisch et al., 2013)There are several variables that are needed to be gathered according to the case survey method (Larsson, 1993; Lucas, 1974; Yin & Heald, 1975) and from the operationalization of the concepts. Variables to be included in the coding scheme should stems from the theoretical domains definition and concepts alignment in chapter two.

However, it is to be noted that there would be some variables that are not essential to this research that would be included in the coding scheme. The inclusion of these variables are requested by the ENVISION project team, in order for them to do a wider research than the scope of this thesis. The distinction between the essential variables of this research and the ENVISION variables can be seen from **Appendix A**. The variables included in this research are as follows,

Nature of the cases / case quality. These variables are needed to be used in the statistical analysis at the end of the case survey method, in order to know whether the nature of case studies impacted the result of case survey or not (whether it create a bias). The variables recommended by Larsson (1993) are *research design/ data collection* (e.g. interview, desk researches, etc), *publication status / type* (unpublished, research journal, etc), and *time period of case study*.

Innovativeness concept would be the first construct that will be used to represent the internal factor of BMI. By using this variable, the author want to see the existence of the dimensions of innovativeness which are the "openness to new ideas" and "capacity to innovate" variables. From this variable, the author can see the innovativeness level of the firm.

The external factors will be covered in the **environmental dynamism** . Included in the environmental dynamism variables would be the changes in market, changes in technology and changes in regulatory. From this variable, the author can see the level of environmental dynamics faced by firm.

Business model innovation variables. The variables will derived from business model innovation concept and act as the core variables for this research. Examples of the variables in this theme would be *BMI driver* (e.g. external or internal). The BMI driver variable will enable us to see which are the external and internal factors of the firm that become the drivers for BMI. Other variables would be *changes in BM elements* and type of *BM ontologies used* to change BM (e.g. STOF, Canvas, VISOR, etc). *BM tooling* would be put as separate variable from *BM ontologies*, in order to differentiate one from the other and get more insights.

Operational alignment variables, which are included to get insights on new BM alignment with operational activities. Examples of variables such as *operational domain being changed* (process, information, infrastructures, etc) and type of *EA frameworks used* (Zachman framework, TOGAF, DEMO or ArchiMate).

Firm / organizational characteristics variables. These variables would be needed to be included in the coding scheme in order to make analysis regarding antecedents of factors that potentially affect the BMI practices. These variables can range from the firm's structural characteristics such as *company age*, *size*, *industry sector* (technology, automotive, retail, etc), *firm location* (north Europe, west Europe, etc), and *value offering* (e.g. product or service based), or the cultural characteristics such as *market orientation, entrepreneurial orientation, creative culture.*

Business model innovation outcome. Business model innovation can lead to other outcomes other than financial or efficiency. The ability to understand the firm own BM and re-allocate resources into a more productive course of actions will also contribute to the firm's innovation activities (Bock et al., 2012), hence highlighting the importance of BMI outcome. Hence the author will also included other outcomes of BMI such as *improvement of BM understanding* or *strategic flexibility* variables.

Business performance variables. Business performance concept would be included in the coding scheme since business performance can be both the internal driver and results of BMI. Business performance as internal driver will be included under the "BMI driver" variable, to differentiate with business performance as a result of BMI. There are two variables for business performance as results of BMI which are *performance metrics* to understand the actual metrics used by firms to measure the result of BMI and *metrics achievements* to see whether BMI affected the business performance or not.

Additionally, we are going to include a choice of "no information" for every questions, to avoid bias from coder inferences due to lack of information (Lucas, 1974). The case survey (qualitative) coding scheme can be seen in **Appendix A**. Once we finished designing the qualitative coding scheme, the research can proceed to the actual coding process.

3.3.2 Qualitative coding process

Larsson (1993) argued we need minimum two coders aside from the author itself to avoid bias. However, two coders option is not feasible in this research, due to resource and time limitation and this research will resort code with only one coder, which is the author itself. However, since this situation is not ideal, the coding bias possibility will be put as one of the research limitations.

Since this research is only using one coder, there is a great importance to create a formal *coding manual*. The coding manual is usually consists of definitions, or rules for assigning codes along with some examples (Weber, 1990). The coding manual is useful to have a consistency in the coding when there are multiple coders involved (Y. Zhang & Wildemuth, 2009). However, since there is only one coder in this research, the coding manual will be important to ensure the coding process is structured and consistent across every cases. Furthermore, a good coding manual will enable other researchers to check, validate or even replicate the coding steps that have been made by the lone coder. The coding manual for this research could be seen from **Appendix H**.

The coding manual acts as guidelines for the author in the coding process. On top of formal coding manual, the author include simple guidelines that involves definitions or examples in the coding scheme to help with the coding process as can be seen from **figure 22** below

No	Theme	Questions	CASE NAME & NUMBER
15	Environmental dynamism	Are there any turbulence in the environment of the firm (changes in market, technology, regulation, etc)?	
16	Entrepreurial orientation	Does the firm have a clear entreprenurial orientation? Entrepreneurial orientation is characterized by boldness and tolerance for risk that lead to new market entry	
17	Market orientation	Does the firm have a clear market orientation? A market orientation essentially involves doing something new or different in response to market conditions	

Some examples to guide the coding process

'Definitions' to guide the coding process

Figure 22 Definitions and examples to guide coding process

On top of simple guidelines on the coding scheme, the author also include several theoretical notes to help as guidelines. The theoretical notes is included, if the concept and variables used in the coding scheme will require a certain degree of elaboration due to its ambiguity or complex nature. For example, the author put organization life-cycle in the guideline section because it is not easy to differentiate between lifecycle such as startup stage or emerging growth stage. The example of the guideline can be seen from figure below. The theoretical notes and guidelines of the qualitative coding scheme can be seen from **Figure 23**.

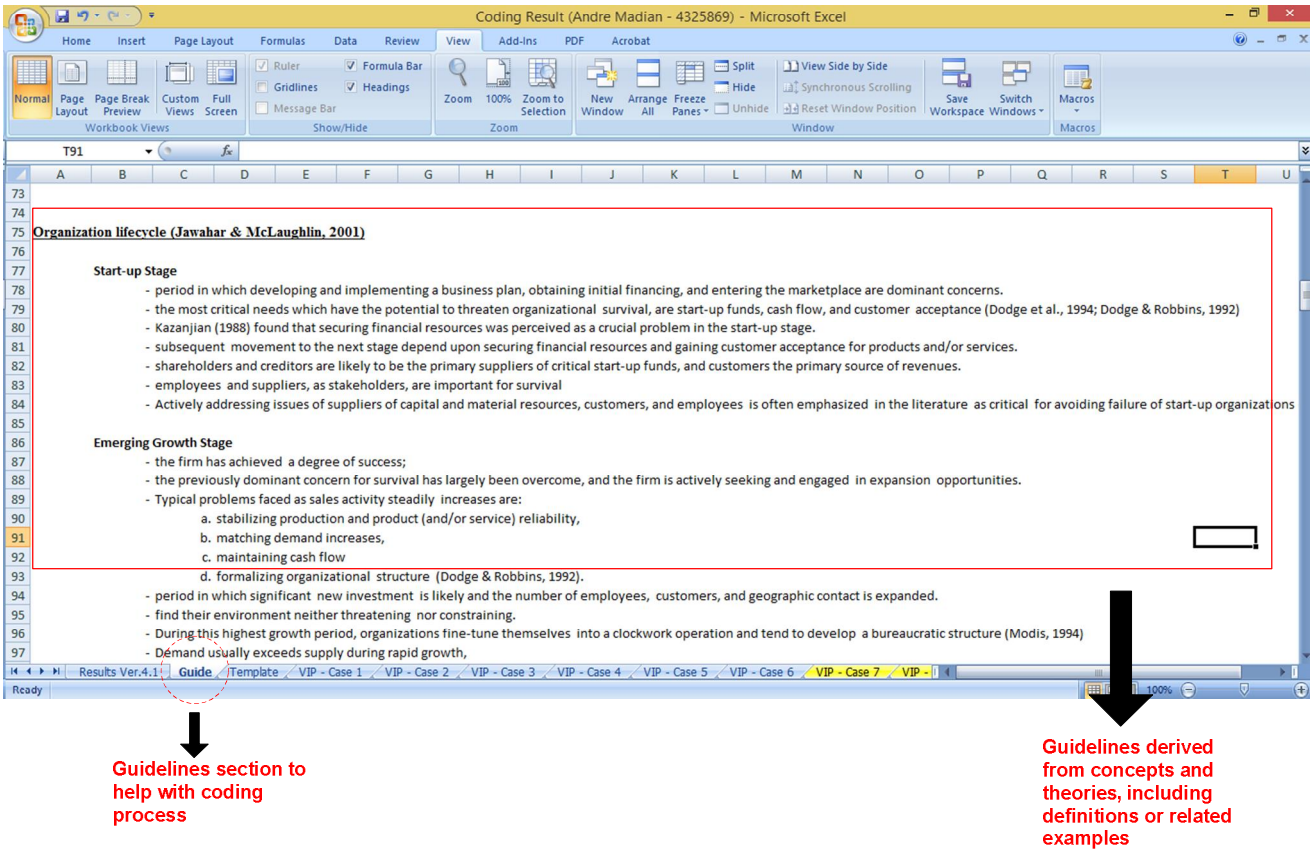


Figure 23 Theoretical notes as coding guidelines

The author also utilized *notes* during the coding process. The purpose of this notes is basically to record the coding process, including the difficulties and challenges found when coding the cases. The notes can help aiding the author to decide whether additional categories or variables would be needed to be included in the coding scheme, or in other words to enhance the iterative process of designing the coding scheme (White & Marsh, 2006).

The qualitative coding process resulted in a coding database consists of 27 cases and VIP frameworks (to help describing the network ecosystem and its dependencies). Since the database is quite extensive, the complete result of the qualitative coding process is not included in this document. The example of the coding can be seen on **Appendix B,** while example of VIP framework can be seen on **Appendix C**. If needed, the complete qualitative coding database and VIP frameworks can be acquired by contacting the author of this research.

3.3.3 Transforming qualitative coding into quantitative coding

To help transforming the qualitative data into quantitative material, the author is going to use *qualitative content analysis*. Qualitative content analysis can be defined as an "approach for the subjective interpretation of the context of data by using systematic classification process of coding and identifying patterns or themes" (Hsieh & Shannon, 2005) or "a technique to making valid inferences from texts to the contexts of use" (White & Marsh, 2006). It is a suitable technique to analyze the qualitative coding done in the previous section because it involves subjective interpretation of the coder regarding the texts within the cases.

Furthermore, the output of qualitative content analysis will become the input of quantitative analysis (Srnka & Koeszegi, 2007). This research is going to follow the guidelines to transform qualitative material into quantitative data from Srnka and Koeszegi (2007). In their guidelines, Srnka

and Koeszegi (2007) described five major steps which are (1) material sourcing, (2) transcription, (3) unitization, (4) categorization and (5) coding (quantitatively).

Several steps above already done using the case survey procedure by Larsson (1993). The first step is already done using case sampling process described in the previous sections. The second step, transcription process is not needed, because the cases are already in written form. The next three steps would be the core process of the quantification method, particularly steps (3) unitization and (4) categorization (Srnka & Koeszegi, 2007). These two steps reflects the qualitative process of content analysis which resulted in *codeable units* and *category scheme* (Krippendorff, 2004).

3.3.3.1 Unitization of qualitative data

Unitization involves choosing the right unit of analysis and assign these units into coding materials (Srnka & Koeszegi, 2007). Unit of analysis is the basic unit of texts that can be classified and also serve as the basis for reporting analysis (White & Marsh, 2006; Y. Zhang & Wildemuth, 2009).

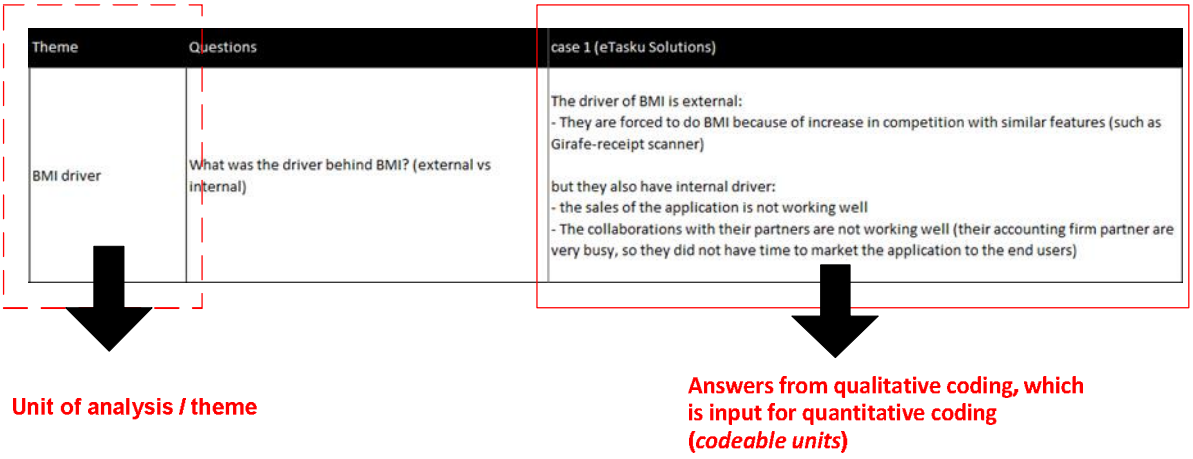


Figure 24 Unitization in coding scheme

The unit of analysis as the basis for coding will be determined by the research objective, research questions or the research hypothesis (Srnka & Koeszegi, 2007; White & Marsh, 2006). If the data is in a short statements or phrases and can be useful for the purpose of the research, it can usually be used directly as unit of analysis (Srnka & Koeszegi, 2007). Furthermore, qualitative content analysis can refer unit of analysis using individual themes instead of words or paragraphs (physical linguistic units) and this theme can be expressed in various forms (phrase or even an entire documents)(Y. Zhang & Wildemuth, 2009). In other words, the coder can assign the theme into texts of any size as long as the texts represents or described the theme which are derived from research objective (Y. Zhang & Wildemuth, 2009).

Following the explanation above, the unit of analysis in our content analysis would be the themes / variables of the case survey coding scheme that has been defined in previous sections. The reason is because these themes / variables are derived from the concepts that will help answer the research questions and research objectives. Therefore, whenever we found texts in the cases that represents the theme, we will code it into this specific theme.

The example is the 'BMI driver' theme in the case survey coding scheme (**figure 24**). This theme is derived from the business model innovation concepts that is aligned with the research objective or research questions of this study. The texts that are coded into or assigned with this theme will be related to the drivers of the BMI (whether its external or internal) and become the input for the following quantitative coding (*codeable units*).

3.3.3.2 Categorization of qualitative data

The next step after unitization would be the categorization. Categories can be seen as patterns that are expressed in the texts or derived from a thorough analysis of the texts (Hsieh & Shannon, 2005). This is the part where conversion process from qualitative data into quantitative data will happen.

The categories can be derived from the theories and these categories can be modified along the progress of analysis when new categories formed inductively (Miles & Huberman, 1984). The example of categories that emerge from theories are the Canvas and STOF categories for BM ontology theme, or the external and internal driver categories for BMI driver theme.

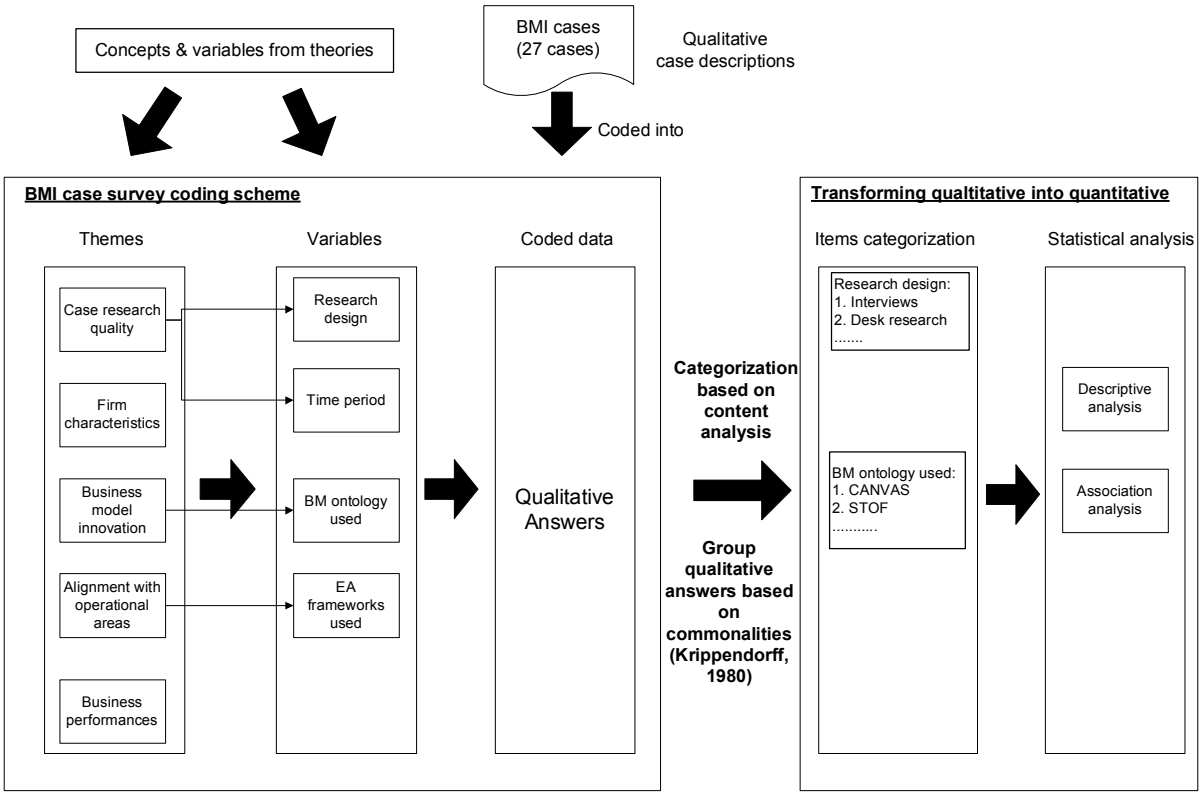


Figure 25 Transforming qualitative coding into quantitative data

In the case where theories are not available, the author will generate the categories inductively from the qualitative data (Y. Zhang & Wildemuth, 2009). To do this, we will use Krippendorf's (2004) definition, where a category can be defined as group of contents that have commonality, in which these categories would be mutually exclusive. Therefore, the author will look closely at the commonality of the texts to form the categories if there are no theories available. The examples would be for the texts of 'market area' theme or 'geographic location' theme, which can only be inductively generated from the data. The framework of converting qualitative answers into quantitative data can be seen from **figure 25**. Furthermore, the example of the categorization process can be seen from the coding manual on **Appendix H - Section II.A**.

From the categorization process, the author found that some answers from the qualitative coding are hard to be grouped together based on their commonalities. The reason is because the answers portrays a different combinations of answers and it is unique to each other, which resulting in vast amount of answer categories if the author will use it as it is. The example can be found on the "performance metrics" variable (**figure 26**), where the answers can be in combination of ROI, sales volume, profit, etc. Hence, multiple answers exists in these kind of answer / item categories and made it harder to do categorization.

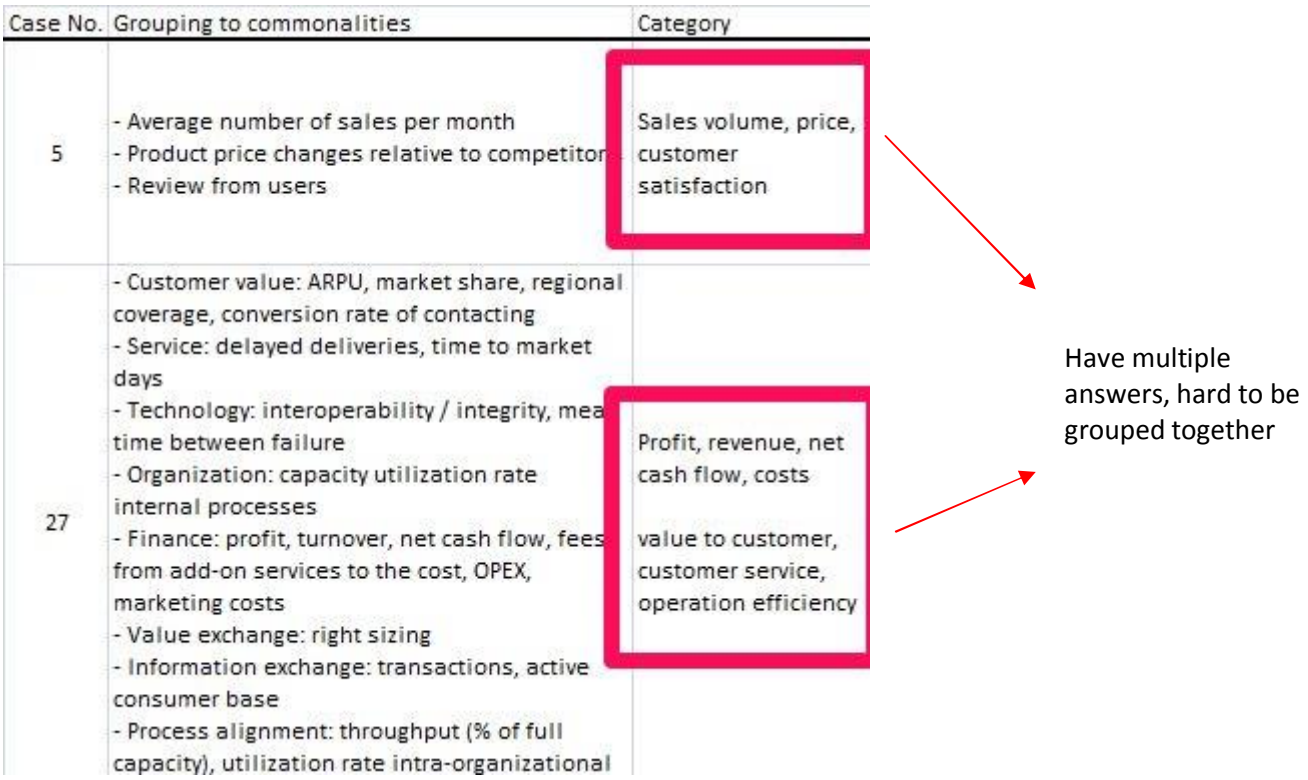


Figure 26 Performance metrics variable grouping example

When building categories, there are several ways to handle multiple answers (Dudley, 2006; Haladyna, Downing, & Rodriguez, 2002; Thayn, 2010). The options range from complex multiple choice (**Type-K**), multiple choice-multiple response (**MR**), and multiple true false (**MTF**).

To help choose the appropriate categorization method, this research will also consider other factors such as the feasibility of the statistical software that is going to be used. The author will be using SPSS to help with the statistical analysis due to familiarity and its graphical user-interface (GUI) that made it easier to use compared to other software such as R which relied on syntax to process the analysis which will need more time to learn it.

The SPSS software can handle "multiple responses" in two ways (Ho, 2014). The first alternative is to use **multiple-dichotomy method**, which created separate variables for each possible responses that will only contain two values such as (1) for "yes" or (0) for "no". The other alternative is to use **multiple-response** method, which use a pre-determined list of responses that is assigned with a numerical values such as (1) for sales volume, (2) for price, (3) for customer satisfaction and so on. Therefore, SPSS can handle the MTF or MR type of categorization.

Summarizing all the arguments above, this research will convert all nominal variables (with more than 2 answer categories) into binaries (nominal with only 2 answer categories) because: (1) it will be easier to make the categorization; (2) SPSS use multiple dichotomy (binaries) to handle multiple response variables. The summary of data type and variables to be reduced to binaries can be seen on **Appendix-E**.

3.3.3.3 Quantitative coding process

The categorization and conversion to binaries results in 158 variables (binary and ratio scale) to be coded. Furthermore, aside from conversion to binaries, there are two variables that are broken down into a more specific variables due to the rich information contained. These variables are the

"industry sector" that is broken down into "industry area" and "market segment" variables and the "BMI driver" variable that is broken down into "source of driver" and "type of driver" variables. The list of these binary variables can be seen from the **Appendix E**.

The quantitative coding process is done by the author by looking at the category that is already assigned on the previous steps. Since all of the variables are already reduced to binary variables, the code only involved the value of (1) and (0). However, because the author included "no information" answer in the qualitative coding, this research will need to find the treatment for this type of answer in the quantitative coding.

The "no information" code can also be seen as "don't know" response. This is because the author did not find any useful information from the case, hence the author did not know what to code. Hence, to avoid guessing, the author put the "no information" response. The "Don't Know" (DK) responses will be treated as missing values / data as suggested by several scholars (Schafer & Graham, 2002). Furthermore, others also mentioned to put the DK responses under the "missing values" cells in the SPSS tool (Seegers, 2009). Therefore the "no information" code will be treated as missing values / data. The missing values will be coded by author using value of "999" to make it very different from (1) and (0).

	Data collection					Publication Type							
Case	DC1	DC2	DC3	DC4	DC5	PT1	PT2	PT3	PT4	PT5	PT6	PT7	PT8
1	0	1	0	0	0	0	1	0	0	0	0	0	0
2	1	1	0	0	0	1	0	0	0	0	0	0	0
3	0	1	0	0	0	0	1	0	0	0	0	0	0
4	1	1	0	0	0	0	1	0	0	0	0	0	0
5	1	1	0	0	0	1	0	0	0	0	0	0	0
6	0	1	0	0	0	0	1	0	0	0	0	0	0
7	1	1	0	0	0	1	0	0	0	0	0	0	0
9	1	1	0	0	1	1	0	0	0	0	0	0	0
11	1	1	0	0	0	1	0	0	0	0	0	0	0
12	1	1	0	0	1	1	0	0	0	0	0	0	0
14	1	1	1	0	0	0	0	0	0	0	0	1	0
15	999	999	999	999	999	1	0	0	0	0	0	0	0

Figure 27 Example of quantitative coding

Due to the extensive nature of the quantitative coding table that have 27 (cases) x 158 (variables), it is not included in this report. However if it is needed, it can be acquired by contacting the author of this research. A simple example for the first variable "data collection" and second variable "publication type" can be seen from **figure 27**.

3.4 Reliability and validity of coding

The next step of the case survey would be to analyze the 'goodness' of measure. The goodness of measures is meant to make sure that the instrument developed in this research (the coding scheme) that intended to measure the concept is indeed accurately measuring the variables and in fact the research is actually measuring the concept that are defined to be measured (Sekaran, 2006). Sekaran (2006) recommended to measure reliability and validity of the instrument to analyze the 'goodness' of measure.

Reliability can be defined as the "indication of stability and consistency with which the instrument can measures the concept and also helps measuring the goodness of a measure" (Sekaran, 2006). Therefore the coding reliability in this research would mean whether the coding scheme as the "instrument" to assess the BMI cases would give a stable and consistent result if other people use it.

Validity is consists of internal and external validity. While *internal validity* refers as the degree of confidence that our instrument did actually measure the concept that we defined to be measured and not something else, *external validity* can be seen as the degree of generalizability of the result to the external environments (Sekaran, 2006). Furthermore, reliability is a prerequisite for validity, in other words when a measure is valid, it would be reliable as well, but not necessarily the other way around (Churchill Jr., 1979).

However, as mentioned before, since the first phase of the coding scheme is qualitative in nature, it will involve a lot of subjective interpretation of the data. When inquiries are influenced by the choice of theories and procedures to guide the data collection analysis, including interpretation of the findings (value-influenced), it can be categorized as *naturalistic inquiry* (Guba & Lincoln, 1982). The naturalistic inquiry is different from *rationalistic inquiry*, because rationalistic inquiry will guarantee the researcher neutrality, where the data will "speak for themselves" (Guba & Lincoln, 1982).

In the interpretive work, it is expected to be really hard to demonstrate reliability, and will need alternative means to measure it (Long & Johnson, 2000). Furthermore, Long and Johnson (2000) argued that these difficulties is to be expected, since a perfect validity will be the one who can guarantee reliability. Therefore, validity is an essential part of qualitative research, which may also need different assessment strategies to measure it (Long & Johnson, 2000). Therefore, this research will use alternative means to measure reliability and validity of the qualitative coding.

Guba and Lincoln (1982) proposed assess the rigor of qualitative coding and analysis process using four criteria which are the *credibility*, *transferability*, *dependability* and *confirmability*. *Credibility* is a substitute for internal validity, where it deals with the focus of the research and check whether the data already represent the construction of the world under study (Graneheim & Lundman, 2004; White & Marsh, 2006). *Transferability* is a substitute for external validity, which measuring whether the findings of the research can be applied into another study with comparable context (White & Marsh, 2006). *Dependability* is analogous to reliability, which mean that the research should be able to be replicated and repeatable under the same conditions in another time and place (Guba & Lincoln, 1982) C*onfirmability* refers to the degree where the characteristic of the data that described by the author, can be also confirmed by others when they review the research results (Y. Zhang & Wildemuth, 2009).

Hence, for the qualitative part of the coding, it would be appropriate to measure the reliability of the interpretive work using *dependability* criteria while validity will be measured using *credibility* and *transferability*. Even though the main purpose of c*onfirmability* criteria is to measure objectivity, the author believe it can also support reliability measurement, since it will see whether the data and findings are independent from coder's biases and perspectives (Guba & Lincoln, 1982).

3.4.1 Measuring coding reliability and resolving coding discrepancies

As mentioned above, this research should measure the coding reliability using *dependability* criteria due to its qualitative nature. The method to measure the dependability of the coding can be achieved through checking the consistency of research processes (Y. Zhang & Wildemuth, 2009). One strategy is to check coding consistency through inter-coder verification that use the same coding scheme to code the raw data (cases) (Y. Zhang & Wildemuth, 2009). Additionally, Larsson (1993) also recommended to measure inter-coder reliability for the coding of case survey method, which involve both qualitative and quantitative data. However, since this research will only use one coder to code the BMI cases, another type of measure should be used to check the coding reliability of both qualitative and quantitative coding.

This research will measure the dependability of the coding via audits materials and transparent coding process. The material that can be used in these audits include the raw data, theoretical notes, coding manuals, or other type of notes (Guba & Lincoln, 1982; Y. Zhang & Wildemuth, 2009). As mentioned in the previous sections, this research didn't use a formal coding manual, but it still include guidelines and theoretical notes in order to remove ambiguity in the variables and help achieving consistency in the coding processes. Process notes that described challenges and difficulties of coding are also available to establish dependability audit trails. The formal framework to combine the qualitative-quantitative method in the previous sections will help other researchers gain better understanding on coding process and enable them to replicate this research, which also contributes to reliability (Srnka & Koeszegi, 2007). Furthermore, variables and categories of the coding scheme are derived from theories in chapter two, which enables them to be repeatedly used and promote reliability (Srnka & Koeszegi, 2007). Therefore, this research already provide the necessary materials to establish dependability.

To help establishing reliability, validity measurements can also be used. As argued by Churchill, Jr (1979) above, when validity is established, reliability will be as well. Therefore dependability can be complemented by credibility criteria as the substitute of internal validity for qualitative coding. Credibility can also be seen as 'internal consistency' that show the textual work is consistent with the interpretation of the coder (Weber, 1990). To achieve credibility, the author involves several means such as checking interpretations compared to raw data and *member checking* (Guba & Lincoln, 1982).

The member checking process will involve case validation with the case owners and see if there are any discrepancies with the case owner's description about the case. If there are any discrepancies in the coding, then the case owner will notify the author to make the correction in the coding. The case owners can be seen from table below and the detail of the case name can be seen on **Appendix D**.

Table 8 BMI case owners

No	Institution	Case number
1	TU Delft (Netherlands) - 2 researchers	case 1 -22, case 24 - 25, case 28 - 30
2	University of Turku (Finland)	case 23, case 27
3	EVOLARIS (Austria)	case 26, case 31
4	INNOVALOR (Netherlands)	case 14
5	KTU(Lithuania)	case 32

There are several case owners involved in this research (**Table 8**). Two of the case owners are from TU Delft, which are also happens to be the supervisors of the author of this research. The rest of the case owners are from research institute across Europe such as University of Turku, EVOLARIS (research agency from Austria), INNOVALOR (a research agency in the Netherlands) and KTU from Lithuania. Therefore, the author checked the reliability of the coding by presenting the coding answers to each of the case owners and asked them for feedback and correction if there are discrepancies. When the original case owner read the same case coding and achieved the same conclusion as the coder, reliability of the coding will be established (Lucas, 1974). Note that some of the cases in table 8 are not used since it violated our criteria, thus leaving us with only 27 cases.

The member checking above will also help with the confirmability criteria. If dependability place the focus on the research processes, confirmability deals with the internal coherence of the research product such as data and findings of the research (Y. Zhang & Wildemuth, 2009). Therefore by asking the case owners to check the qualitative coding, they can confirm the data and the findings of this research by comparing to their own data. Furthermore, case owners can use the audit materials such as theoretical notes that is included in the coding scheme to confirm the data. Hence, once the coding have been validated by case owners, confirmability criteria will also be fulfilled.

3.4.2 Analyze the coding validity

There would be two steps in coding validity in this research. The first one would be to check the validity of the qualitative coding and the second one is to check the validity after it is converted into quantitative data.

3.4.2.1 Validity for qualitative coding

Because qualitative coding will involve a lot of interpretation regarding the texts on the cases, this research will use the *credibility* as a measure of internal validity of the qualitative coding. The formal framework and coding validation with case owners mentioned in the previous section will serve to provide credibility (internal validity) to the qualitative coding that mainly relies on the coder's interpretation (White & Marsh, 2006).

Member checking process result in changes for some of author's coding. Most of the case owners gave their feedbacks on the their respective cases and the author incorporate these feedbacks into the case coding. Most feedbacks are more on completing the missing values that are not found or not understandable by the author when reading the case. Hence, by aligning the author's coding with case owner's feedback, the author believe that credibility (internal validity) for the qualitative coding is established.

Some of the feedbacks from case owners indicate that some of the cases in the database are not suitable for this research. Some cases do not fall into the SME category, which are case 8 (law firm with very large numbers of employees) and case 19 (Zwitserleven). One case is found to be a non-BMI case, but more on EA implementation which is case 10 (educational service provider). These insights forced the author to exclude these cases from the samples, which made the final samples to be 27 cases.

The external validity for qualitative coding process will be measured through the *transferability* criteria. Guba and Lincoln (1982) described several ways to establish transferability, which the first one is by using *theoretical / purposive sampling*. By using purposive sampling, it is expected that researchers will gather a wide range of data with stringent conditions set by the researcher. As explained before in the data collection section, the samples are gathered from selected European researchers due to the availability of cases regarding BMI and geographical scope of this research (Europe). These cases have diverse characteristics such as different industries or value offering in order to have sufficient generalizability aspect. Furthermore, the sampling of these cases are using stringent selection and exclusion criteria that act as filter to the samples.

Second is by using a *thick description* that will provide enough information of the context of the findings (Guba & Lincoln, 1982). This is also supported by Zhang and Wildemuth (2009), who also argued that the researchers would be responsible to provide the data sets and rich descriptions that enable other researcher to judge whether the findings of the research can be transferred into another context or not. This research is able to provide the raw data (with the permission from case owner), the coding schemes, guidelines and notes in order to give enough information to other researchers. By reflecting on the two means of achieving transferability above, we conclude that this research already fulfilled this criteria and established external validity for the qualitative coding.

3.4.2.2 Validity for quantitative coding

To measure internal validity of the quantitative coding, the minimum criterion of validity to be used would be *construct validity* (Jurisch et al., 2013; Larsson & Finkelstein, 1999). Moreover, the construct validity is used to see whether the operationalization measures the concept it is supposed to measure (Bagozzi et al., 1991). To establish construct validity, Larsson & Finkelstein (1999) recommended to use *structural equation modelling* (particularly confirmatory factor analysis) to investigate the proposed relationships among variables and constructs.

However, the confirmatory factor analysis (CFA) is not suitable to be used for this research. The interpretation of findings from CFA is heavily relied on chi-square test as the commonly accepted statistic (Bagozzi et al., 1991) that influenced by sample size (Yoon & Uysal, 2005). If the sample size is too large, it may lead to the rejection of any model and if it is too small, it may accept any model even though it only have little variances (Bagozzi et al., 1991). The required sample size to obtain a converged and proper solution for CFA model would be around 150 samples (Anderson & Gerbing, 1988), which can't be fulfilled by this research since the sample size is only 27 cases. Therefore, the internal validity of the coding should be established from other approach.

The author will opt to use the result of previous *member checking* to establish internal validity of quantitative coding. Because the quantitative coding are derived straight from the qualitative coding that has been checked by the case owners in the previous steps, the author believe the internal validity of for the quantitative coding is already established.

For the external validity, Larsson and Finkelstein (1999) recommended to use t-test statistic to compare the samples used in this research with a larger samples that represents BMI. However, as mentioned before, due to several limitations, this research is only able to collect 27 BMI cases as the samples and are not able to collect larger samples. Therefore, to ensure generalizability, the author will also refer the external validity to the *transferability* criteria that have been explained in the previous section, especially with the usage of purposive sampling to represent BMI practices that include certain conditions for SMEs in Europe.

3.5 Conclusions on research methodology

This chapter present us with the data collection, coding scheme design, coding process and also reliability and validity measurement. The data collected in this research are using *purposive / judgement sampling* from several researchers in Europe that have done case studies in business model innovation to have a more relevant focus. The total samples collected in this research are 27 cases after filtering original samples with several criteria defined by the author. The case survey coding scheme are made with open-ended question with 43 questions (variables) which are applied to the cases. The qualitative answers are converted into quantitative data using categorization principle of qualitative content analysis which results in 158 variables (binary and ratio).

Due to the qualitative nature of the coding and also the limitation of sample size, this research use an alternative reliability and validity measurement compared to suggestion by Larsson (1993). Reliability of the coding are being measured through *dependability (e.g. transparent coding process / coding manual)* and *confirmability (e.g. member checking)*. Internal validity are substituted by establishing *credibility* via validation with case owners (member checking) , while external validity is substituted by establishing *transferability* using thick description of coding manual and the usage of purposive sampling.

The overall framework to measure the reliability and validity of this research can be seen from **figure 28** below.

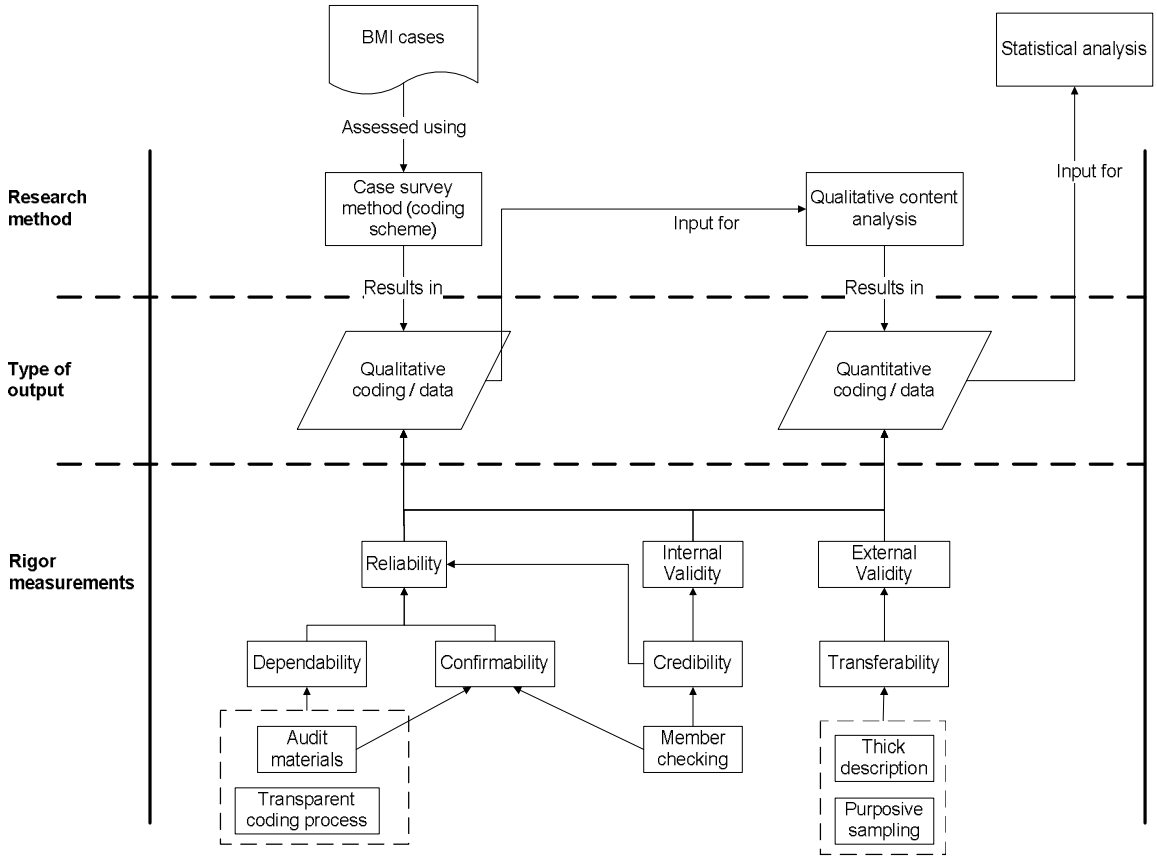


Figure 28 Rigor measurements

4. Results

"Innovation doesn't come just from giving people incentives; it comes from creating environments where their ideas can connect" - Steven Johnson

4.1 Introduction

This chapter will present the results of our quantitative data analysis. The result of the analysis will be used to answer the second research question as follows: What are the business model innovation patterns done by firms in response to their external and internal factors?.

To answer this second research questions, the analysis result will also be used to answer the sub-questions of the second research question, which are: (a) what are the external and internal factors that affecting the business model innovation?; (b) what are the BM ontology and EA frameworks used to guide the business model innovation process? ; and (c) what are the changes in the firm's BM and operational elements caused by BMI?

However, aside from answering the research question, the author will also analyzing other variables such as the firm size, cultural characteristics, or radicalness of the BM. This is meant to give more insights to the BMI practice that are done by the SMEs.

This chapter will be structured according to the concepts in our theoretical framework and the sections of our coding scheme to make it easier to understand which are: case quality, organizational characteristics of firms, factors and drivers to BMI, BMI practice, BMI outcome and business performance. However, before proceeding into data analysis, we need to do data entry first.

Before the author begin the data analysis, the quantitative coding would need to be inputted into the statistical software. It was already mentioned before in the previous section that this research will be using SPSS for the statistical software to help analyze the data. Therefore, the quantitative coding data from excel cells was migrated into the SPSS. Various supporting activities such as value labelling and defining missing variables are also done in this stage.

4.2 Data analysis

Once all of the data have been inputted into the SPSS, data analysis can begin. This research will begin the analysis by doing a descriptive analysis. Since most of the variables in the dataset are a dichotomous variables (binary), then the author resort to the most basic descriptive analysis, which is **frequency analysis.**

During this frequency analysis, the author would like to 'get a feel' of the data. By doing this, the author can get a descriptive sense on the characteristic of the data and the possible relation between variables. Once the author get a sense of the data, then the author will proceed to further analysis such as correlation or regression analysis if needed to test the association between variables.

Since most of the variables in the dataset are dichotomous variables, the author opt to aggregate some of the variables under one construct into one variable (composite variable) to do the correlation / regression analysis. This result in several composite variables that have different scales, such as interval or binary. Therefore, the author will use the appropriate statistical tests according to the corresponding scales of the variables.

The author will also look at the requirements of each statistical tests, especially normality of the data. For example, before doing Pearson correlation analysis, the author tested the normality of the data using Shapiro-Wilk test that is more suitable for small size samples (N<50) compared to Kolmogorov-Smirnov test.

Since there are missing values in our data, the following charts and tables in our data analysis will include the valid sample size (N) to have correct interpretation of the data. For example, since the full sample size of our data would be 27 (N=27), if the chart shows that N is only 25 (N=25), it means that there are 3 cases that don't have the value for that variables, and thus only 25 valid cases.

Furthermore, the value in the charts with multiple responses data will be based on 'responses' not 'amount of cases'. This is because, with multiple response data, the number of responses can exceed the number of sample. For example, data collection variable have multiple responses data with 48 responses in 26 valid cases, which mean in average each case have almost 2 responses.

4.2.1 Case quality

As mentioned before, this research would like to see whether case quality variables (data collection, publication type and time period) have impact on the substantive variables of this research. Therefore, this section will make a descriptive analysis on the case quality variables first.

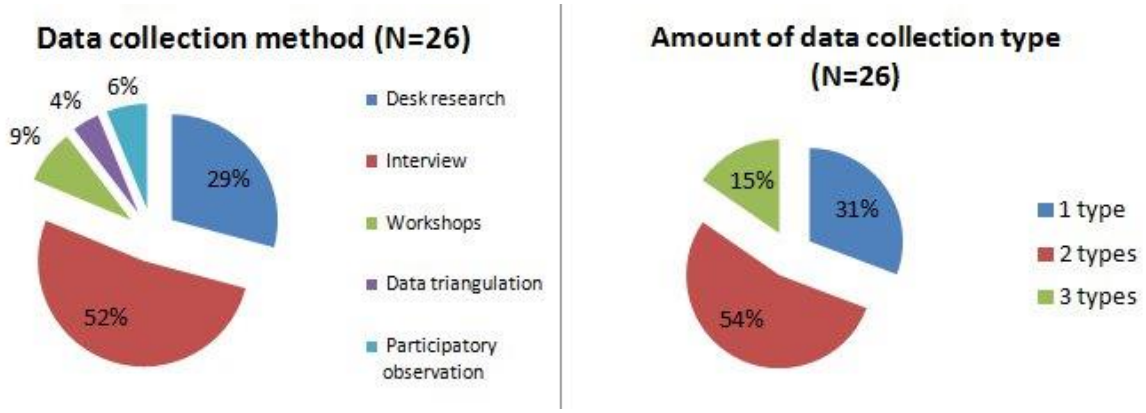


Figure 29 Data collection method

From **figure 29** above, we can see that there are five different methods of data collections used by the case studies collected in our case survey database. The most used methods of data collections would be "Interview" and "Desk research" that took account more than 80% of total method used when combined. Furthermore, the cases can have more than one data collection method such as case number 14 that have three data collection method which are the desk research, interview and workshops. More than 50% of the cases use two types of data collection method in their research.

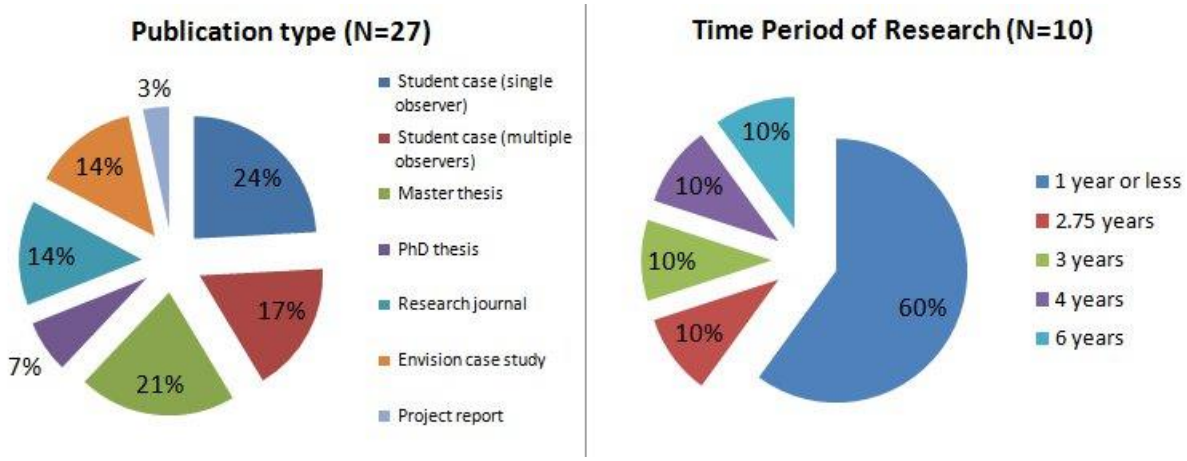


Figure 30 Publication type & period of researches

From **figure 30** above, there are six publication types among the cases collected during our case survey. The "student cases" contribute the most responses with 41% of total followed by "Master Thesis" with 21% responses. It is also need to be noted that the "student cases" consists of two types: "single observers" and "multiple observers", indicating the number of researchers working on the case. The time for the researchers to conduct BMI case studies also varies. The time needed span from only as short as 2 months to as long as 6 years. From the valid samples (no missing value) for this variable (10 cases), we can also see that 60% of it are done in a period of 1 year or less.

To check the association between case quality variables and the substantive variables (such as "changes in BM element"), the author intended to use regression analysis by using each of the aggregated substantive variable as a function of the three case quality variables. However, since each of the aggregated variables for the case quality have different scales, the author cannot do this. Therefore the author opt to do a correlation / regression analysis for each of the aggregated case quality variables to each of aggregated substantive variables, as can be seen on **Appendix F- Table F.1**

Our findings from this table suggested that there are no significant association between most of the case quality variables with the substantive variables. It means that the quality of the cases used as samples in this research did not significantly impacting the coding of the substantive variables. Furthermore, some variables cannot be tested using correlation analysis since it is not normally distributed, hence it did not fulfil the requirement of the correlation analysis.

The author is also interested to check the relationship between the case quality variables with the substantive variables through significance test. The author will check the significance of each category of the case quality variables with each of category of the substantive variable, which are dichotomous variables on their own (not aggregated). Thus, the feasible method to test the significance between binary variables would be chi-square statistics. However, due to the multiple response possibility for most of these variables, it means that these categories are not mutual exclusive to one another which are the requirements of chi-square analysis (Cochran, 1952). This made the chi-square test to be not feasible as can be summarized in **Appendix F - Table F.2**.

4.2.2 Organizational characteristics of firms

The organizational characteristics of a firm can be divided into structural characteristics and cultural characteristics. The author would like to analyze the structural characteristics first.

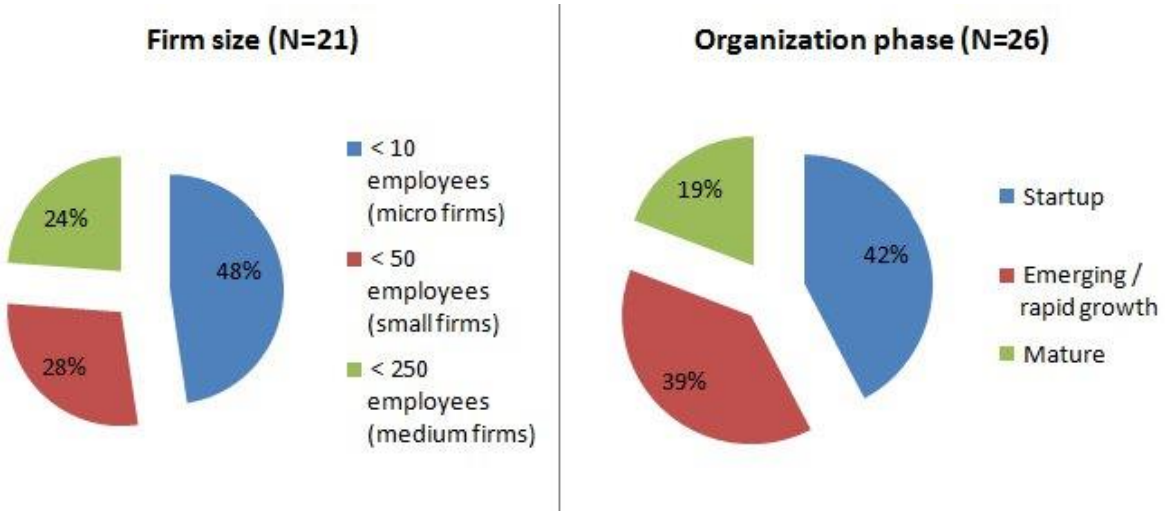


Figure 31 Firm size and organization phase

The firms in our samples varied in its structural properties (**figure 31**). In terms of size, there is almost an even number between Small-Medium firms (52%) and Micro firms (48%). The majority of these firms are either on the startup phase (42%) or in a phase where they have a rapid growth (39%). Only 19% of the firms in samples in the mature stage.

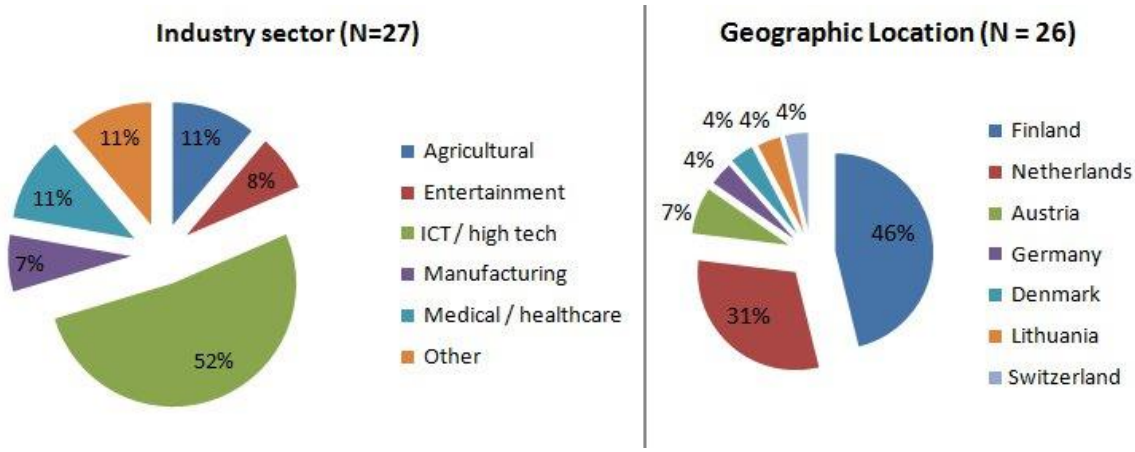


Figure 32 Industry and geographic location

The market where the firms operates also varied. Half of the firms (52%) in our samples are operating in the ICT / high-tech industry, including telecommunication. The majority of these firms serve the B2B segments (48%) or both B2C and B2B (33%). The industry area of the firms in our samples is aligned with the technology intensity possessed by most of the firms in our samples, where they have a high-tech technology intensity(89%).

Most of the firms are originated from Finland (46%) or Netherlands (31%). This is most probably because the case owners that are involved in this research are prominent in these area. In terms of market area, the firms are split equally (50%-50%) between serving national customers only or include international customers as well.

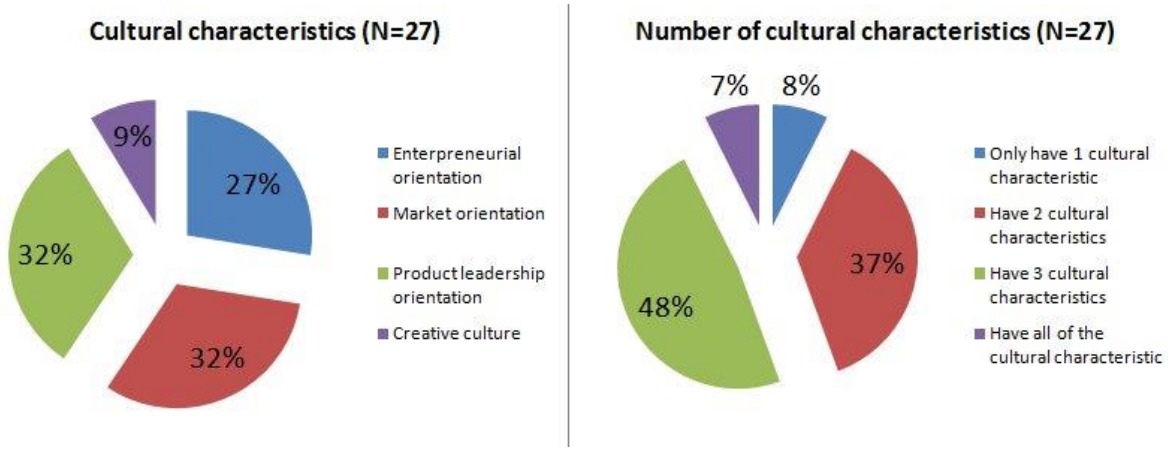


Figure 33 Cultural characteristics

Beside organization's structural characteristics, the author would like to explore the cultural characteristics of the firms (**figure 33**). From our research we found that all of the cultural characteristics that we defined previously exists among our samples. This research found that the major cultural characteristics that are owned by firms are the "market orientation", "product leadership orientation" and "entrepreneurial orientation" with only small responses on "creative culture". Furthermore, most of the firms (85%) have approximately 2-3 cultural characteristics within their company.

4.2.3 Factors and drivers to BMI

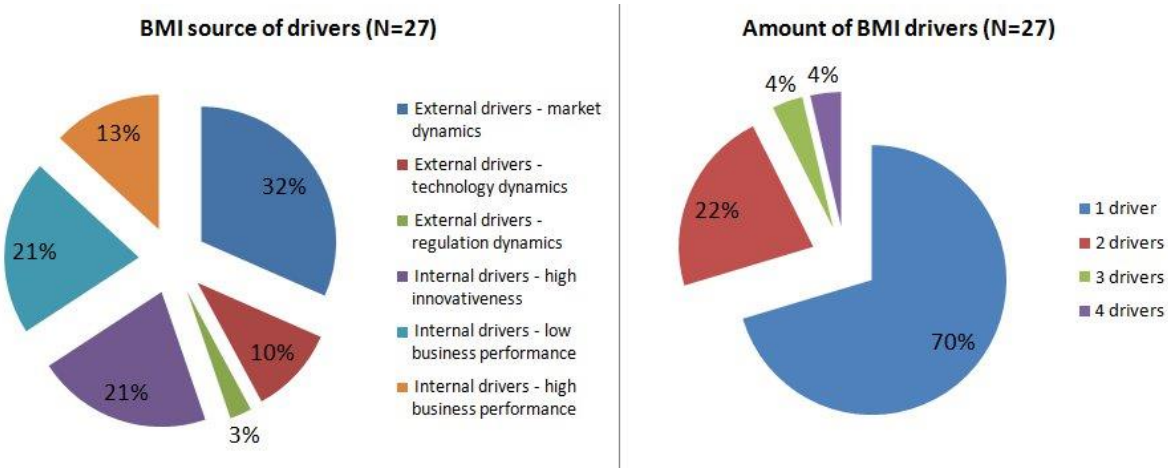


Figure 34 BMI source of drivers

Business model innovation (BMI) can be driven from external, internal or even both. From **figure 34**, we can see that internal drivers (55%) have a slightly bigger proportion than external drivers (45%) in triggering the BMI activities within a firm. However, the biggest driver of BMI came from the external side of the firm which is the "market dynamics" with 32% of contribution. The second and third biggest contributor of BMI driver came from "high innovativeness" and "low business performance" of a firm with 21% responses each. The rest of the drivers (26%) consists of "technology dynamics", "high business performances" and "regulatory dynamics".

Firms can have multiple drivers in order for them to do BMI. Most of the cases that are found by this research only have 1 BMI driver (70%), but there are almost a quarter (22%) of the cases that have 2 drivers, while minority of the cases (8%) have more than 2 BMI drivers.

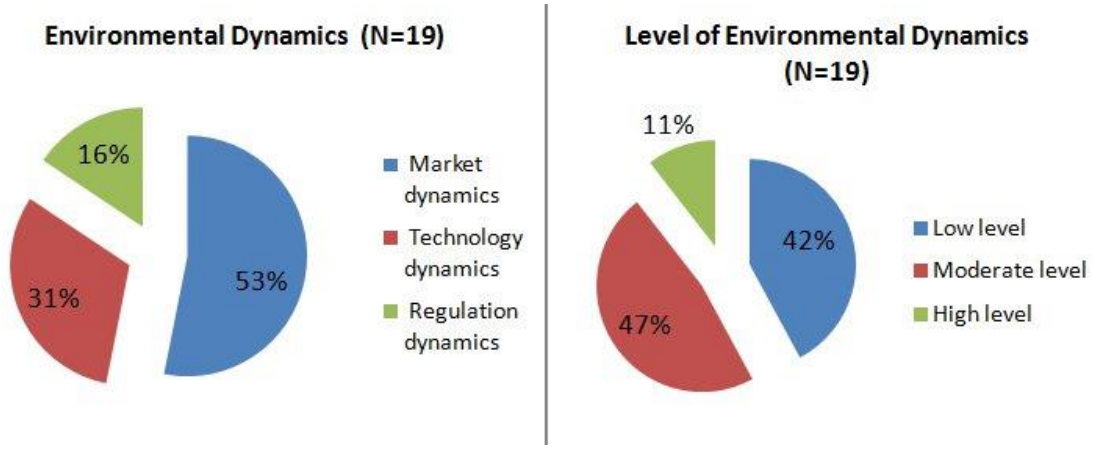


Figure 35 Environmental dynamics factor

To gain more insights from BMI drivers above, the author would like to explore the factors to BMI further. From **figure 35** above we can see that "market dynamics" is the dominant factor among other environmental dynamics with 53% of contributions. "Technology dynamics" would be the second contributor (31%), while "regulation dynamics" (16%) would be the factor that contribute the least share to the environmental dynamics among firms. This finding is aligned with the BMI drivers above, where "market dynamics" as an external factor would be the biggest driver to the BMI, followed by "technology dynamics" and "regulation dynamics".

Furthermore, each type of environmental dynamic factor is not an isolated event. There can be multiple dynamics exists within the external environment of the firm where for example, "market dynamics" and "technology dynamics" can exist at the same time. This can be seen from figure above where the majority of firms in our sample (47%) have a "moderate level" of environmental dynamics (2 factors), followed by "low level" (1 factor only) with 42% and "high level" (3 factors) of environmental dynamics with 11% proportion.

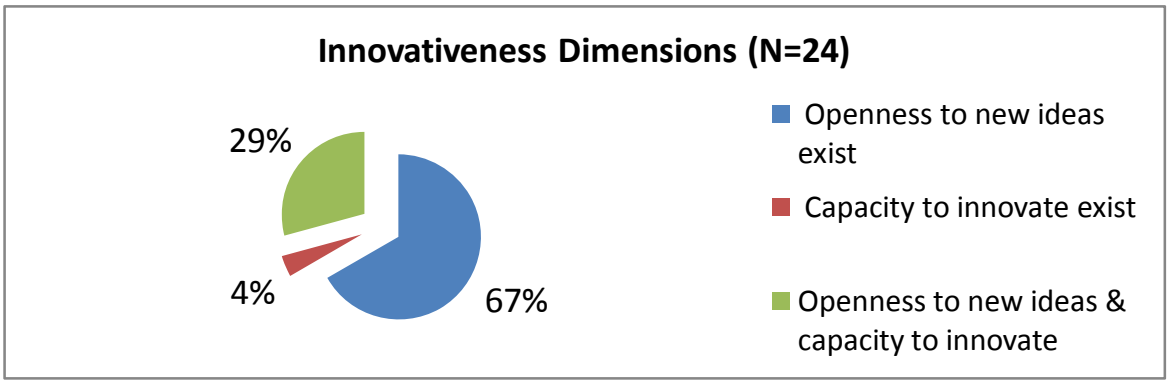


Figure 36 Innovativeness Dimension

Innovativeness as a factor that can drive BMI have two dimensions. From **figure 36** above, this research identified that "openness to new ideas" have the biggest contribution towards the innovativeness of the firm (67%). Secondly, 29% of the valid cases have both "openness to new ideas" and the "capacity to innovate". Only a very small number of cases have "capacity to innovate" alone when doing BMI (4%). This is aligned with our defined model and several articles that mentioned the importance of "openness to new ideas" as the antecedents of "capacity to innovate" and "innovativeness".

4.2.3.1 Impact of BMI driver source to type of BMI driver

Table 9 Source of driver impact to driver type (N = 27)

		BMI driver (type of driver)					
		Voluntary BMI			Forced to do BMI		
		Count	Column N %	Column Responses %	Count	Column N %	Column Responses %
BMI drivers (sources)	external drivers - market dynamics	7	41.2%	30.4%	5	50.0%	33.3%
	external drivers - technology dynamics	3	17.6%	13.0%	1	10.0%	6.7%
	external drivers - regulation dynamics	1	5.9%	4.3%	0	0.0%	0.0%
	internal drivers - high innovativeness	7	41.2%	30.4%	1	10.0%	6.7%
	internal drivers - low business performance	0	0.0%	0.0%	8	80.0%	53.3%
	internal drivers - high business performance	5	29.4%	21.7%	0	0.0%	0.0%
	Total	17	100.0%	100.0%	10	100.0%	100.0%

The author would like to see which BMI drivers encouraged SMEs to do voluntary BMI and which one forced the SMEs to do BMI. To do that, the author use the "custom table" feature of SPSS to cross-tabulate between the "BMI source of drivers" and "BMI type of driver" in **Table 9**. As we can see from Table 9 above, the total count for "voluntary BMI" and "forced to do BMI" would be 17 cases and 10 cases that would have a minimum one BMI driver included. However, when we look closer, the sum of the "Count" will not equal to the total. For example, the total responses of "Voluntary BMI" would be (7+3+1+8+0+4) = 23 responses in 17 cases. It means that there are some cases where there are more than one response of BMI drivers (multiple responses).

Since each cases can have more than one BMI drivers (multiple responses), the author will also include additional summary statistics on top of the regular "Count" number of responses such as "Column N%" and "Column Responses %". The "Column N %" is based on the actual number of *cases* that contain at least one BMI driver. The number 100% in the "Column N%" for Voluntary BMI would be 17 cases and this number would be the base for calculating the percentage of each responses. For example, if we calculate the percentage of "market dynamics" of "voluntary BMI" in this column it will results in (7/17) = 41.2%. Hence, the sum of percentage on this column will not be equal to 100% since it is responses divided by cases.

The "Column Responses %" is based on the actual *responses* in the case (which can have multiple responses), therefore the number 100% for Voluntary BMI would be 23 responses and this will be the base to calculate the percentage. As we can see, the percentage of "market dynamics" of "voluntary BMI" in the this column would be (7/23) = 30.4%, which is different with our calculations in the "Column N%". The author will proceed to use this "column responses %" number as the base of analysis, since it is easier to interpret.

From **Table 9** we can see that different sources of BMI drivers can either forced firms to do BMI or it can encourage firm to do BMI voluntarily. Our findings suggests that most of the firms would be forced to do BMI when they have a "low business performance" driver (53%) or "market dynamics" driver (33%). Most of the responses indicate that SMEs will do BMI voluntarily when they have a

"high innovativeness" (30.4%) or "market dynamics" (30.4%) driver. Thus, we can also see that SMEs can be either forced to do BMI or do BMI voluntarily when "market dynamics" drivers exists.

From above, the author felt there maybe association between the source of BMI drivers with the driver type (forced / voluntary). Since the dependent variable (type of driver) have dichotomous scale and the aggregated form of the independent variable (BMI driver) have interval scale, the author opt to use the binary logistic regression and point-biserial coefficient to see the correlation between both variables.

However, from the correlation analysis using logistic regression, the author found that both external and internal drivers to BMI did not correlated significantly to the type of drivers (forced or voluntary BMI) (p value > 0.05). Furthermore, the point-biserial coefficient cannot be calculated since the variables did not meet the requirement for normality of data. The statistical result can be seen on **Appendix G - Table G.1**. The author also want to test the significance of each variables of "BMI drivers" and "driver type" by chi-square analysis. However, this cannot be done since the categories of "BMI drivers" are not mutually exclusive between one and the other.

4.2.3.2 Impact of structural characteristics to BMI drivers

The author also interested whether firms characteristics may also determine the BMI drivers. To get the insight, the author use the "cross tabulation" feature of SPSS with "organization phase" and "BMI drivers" as included as the row (explanatory variable) and column (response variable) respectively. The author also included "firm size" as an additional layer of "organization phase" in order to enrich the insights.

The result of this cross-tabulation can be seen in the **Appendix F - Table F.3**. The categories with zero responses are excluded from this table to reduce the clutter and make easier interpretation. There are 21 valid cases in this result with micro-size firm having the most cases (48%) with 10 cases. Therefore, the author will analyze this by each of the firm size.

Our findings suggest that micro-size firm (< 10 employees), experienced drivers to do BMI in "startup" and "rapid growth" phase. The biggest driver in the startup phase would be the "low business performance" and "market dynamics" that contributed 75% of the drivers experiences. In the rapid growth phase, the micro-size firm have an even amount of drivers between "high innovativeness" and "market dynamics".

Small firms (<50 employees) will face BMI drivers along three phases: "startup", "rapid growth" and "mature" phase. During startup phase, the small firms will be driven to do BMI because of "high innovativeness" (100%), while "high business performance" would be the major driver in rapid growth stage with 50% responses. At the end, during mature phase, the small firms will be driven to do BMI because of "market dynamics".

Medium firms (<250 employees) will only face BMI drivers in "rapid growth" and "mature phases". During rapid growth phase, the medium-size firms will be driven by "low business performance". On the other hand, mix drivers of "market dynamics", "technology dynamics", "high innovativeness" and "low business performances" are found during the mature stage with almost equal proportions (22% each).

The aggregated scale for both 'firm size' and 'organization phase' are binaries (independent variable) while the "external drivers" and "internal drivers" variable have interval scale (dependent variables). The only option to do association test with this type of variable is by using Point-Biserial Coefficient. However the variables did not meet the requirement for normality of the data as can be seen on **Appendix G - Table G.2**. Thus, correlation analysis using Point-Biserial coefficient cannot be done. The author also cannot do chi-square statistics since the categories of "BMI drivers" are not mutually exclusive one from the other.

Table 10 Geographic location and BMI drivers

	Finland			Netherlands			Others		
	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %
external drivers - market dynamics	6	50.0%	40.0%	5	62.5%	31.3%	0	0%	0%
external drivers - technology dynamics	1	8.3%	6.7%	3	37.5%	18.8%	0	0%	0%
external drivers - regulation dynamics	0	0.0%	0.0%	1	12.5%	6.3%	0	0%	0%
internal drivers - high innovativeness	3	25.0%	20.0%	3	37.5%	18.8%	2	33%	33%
internal drivers - low business performance	3	25.0%	20.0%	2	25.0%	12.5%	3	50%	50%
internal drivers - high business performance	2	16.7%	13.3%	2	25.0%	12.5%	1	17%	17%
Total	12	100.0%	100.0%	8	100.0%	100.0%	6	100%	100%

This research would also look at the impact of geographic location to the type of BMI drivers of the firm. To do that, the author use the "custom table" feature of SPSS to cross-tabulate between the "BMI source of drivers" and "Geographic Location" of the SMEs in **Table 10**. The author combined other firm origins such as Austria, Germany, Denmark, Lithuania and Switzerland into "other" category since it only counts for a small number of responses.

As we can see from Table 10 above, the total count for Finland would be 12, which mean there would be 12 cases originated from Finland that contain at least one BMI driver. The total responses for Finland cases however, would be (6+1+0+3+3+2) = 15 responses in 12 cases. It means that there are some cases where there are more than one response of BMI drivers (multiple responses).

As with Table 9, since each cases can have more than one BMI drivers (multiple responses), the author will also include additional summary statistics on top of the regular "Count" number of responses such as "Column N%" and "Column Responses %". The "Column N %" is based on the actual number of *cases* that contain at least one BMI driver, while the "Column Responses %" is based on the actual *responses* in the case (which can have multiple responses). The author will proceed to use this "column responses %" number as the base of analysis, since it is easier to interpret.

Our findings suggested that "market dynamics" and "high innovativeness" factor will be the dominant BMI drivers for both Netherlands and Finland. However, "market dynamics" and "high innovativeness" drivers in Finland are more dominant with compared in Netherlands. Aside from these two drivers, both countries experienced different drivers. SMEs in Finland also have "low business performance" as one of its major drivers, while "technology dynamics" act as additional driver for SMEs in Netherlands.

Furthermore, from the table 10 above, we can see that only Finland and Netherlands have environmental dynamics as drivers, with the other European countries in our sample have "low business performance" as the dominant BMI driver (50%). However, this could also be a bias from small sample size and narrow data collection source that we have in this research.

To analyze the association between "Geographic location" and "BMI drivers", the author opt to use Point Biserial coefficient since the aggregated variables contain both binary (IV) and interval scale (DV). However the variables did not meet the requirement for normality of the data as can be seen on **Appendix G - Table G.3**. Thus, correlation analysis using Point-Biserial coefficient cannot be done. The author also cannot do chi-square statistics since the categories of "BMI drivers" are not mutually exclusive one from the other.

4.2.3.3 Impact of cultural characteristics to BMI drivers

Aside from structural characteristic of the firm, this research is also interested to explore the impact of cultural characteristics to the drivers that encourage firms to do BMI. To do that, the author use the "custom table" feature of SPSS to cross-tabulate between the "cultural characteristics" and "BMI drivers" of the SMEs in **Table 11**. Furthermore, the author only included the top 3 drivers (market dynamics, high innovativeness, low business performance) as being mentioned before in this table, since it is the dominant drivers.

As with the tables before, the total count would be the total valid cases for each categories which may not tally with the "counts" above it due to multiple responses. Therefore the author also included the "column N %" and "column responses %" to accommodate the multiple responses value. However, as before, the author will use the "column response %" as the basis for analysis.

Table 11 Cultural characteristic impact to BMI drivers

	external drivers - market dynamics			internal drivers - high innovativeness			internal drivers - low business performance		
	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %
Entrepreneurial orientation	7	58.3%	22.6%	7	77.8%	30.4%	7	87.5%	33.3%
Market orientation	11	91.7%	35.5%	8	88.9%	34.8%	6	75.0%	28.6%
Product leadership orientation	11	91.7%	35.5%	6	66.7%	26.1%	6	75.0%	28.6%
Creative culture	2	16.7%	6.5%	2	22.2%	8.7%	2	25.0%	9.5%
Total	12	100.0%	100.0%	9	100.0%	100.0%	8	100.0%	100.0%

The existence of "market orientation" and "product leadership orientation" are found to be contributing 70% of cultural characteristic when SMEs are driven by "market dynamics" to do BMI. Meanwhile, the "market orientation" and "entrepreneurial orientation" contributed to the "high innovativeness" driver. On the other hand "low business performance" driver of the firm are supported mostly by "entrepreneurial orientation" but also influenced by "market orientation" and "product leadership orientation".

From above, the author felt there maybe association between the cultural characteristic with the BMI drivers (external / internal). Since both "cultural characteristic" variables and "external drivers" and "internal drivers" variable have interval scale, the author opt to use the Pearson correlation coefficient to see the correlation between them. However the variables did not meet the requirement for normality of the data as can be seen on **Appendix G - Table G.4**. Thus, correlation analysis using Pearson Correlation coefficient cannot be done. The author also cannot do chi-square statistics since the categories of "BMI drivers" are not mutually exclusive one from the other.

4.2.4 BMI practice

As mentioned before, this research would divide the BMI practice into two types, "new BM to the firm" and "BM modification". The majority of the BMI cases in this research (63%) have "BM modification" type, where BMI is changing the existing / previous BM. Only 37% of the cases are "new BM to the firm".

The BMI practice have several phases. Our research found that most of the existing BMI cases are either in the "BM re-design" phase (33%) or already in "BM implementation" phase (33%). This implies that the existing BMI cases are either just started (in design phase) or it is already completed or ready for implementation. When combining the "BM redesign" with "BM design" phase, we can also have see that BMI studies are mostly used in the design phase (59%). This is aligned with the focus of our research which is to understand the BMI practice especially during "design" phase.

4.2.4.1 Changes in BM elements and selection of BM ontology

To analyze the BMI practice, the author would like to revisit the definition of BMI for this research, which are the *incremental or radical changes (or additions) in one or more elements of business model including the strategic choices in which the firm create and capture value within a value network*. It means that the core activities when in business model innovation (BMI) would be adding or changing the elements within the business model of a firm. From **figure 37**, the author found that the elements that are mostly changed by the SMEs in BMI practice are "new services", "change in organizational network" and "changes in target market" which contributed almost 40% of all responses.

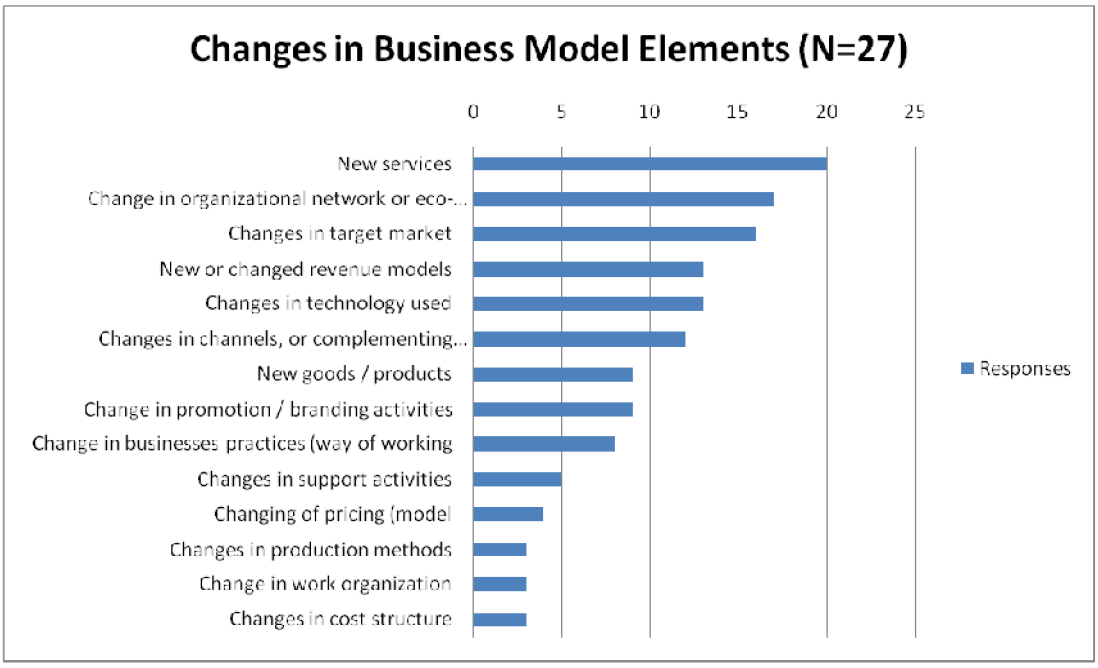


Figure 37 Changes in BM elements

The author also interested to see whether different source of drivers have an impact to the changes in BM elements. From **Appendix F - Table F.4**, we can see that whatever the source of driver are (external or internal), the "changes in services" and "change in organizational network" are still the most changes elements in BM. However, "changes in technology" have slightly bigger responses than "changes in target market" when BMI is driven by external factors, therefore the author would like to analyze it into a more deeper level to gain more insights.

The author found some differences in BM changes when the drivers are broken down into more detail level (**Appendix F - Table F.5)**. These differences would be analyzed only for the three major

BMI drivers (market dynamics, high innovativeness, low business performances). The differences would be that "changes in technology" would also be major contributor when firms are driven by the "market dynamics" driver. On the other hand, "changes in products" would also a major contributor when SMEs experienced the "high innovativeness" driver. Furthermore, SMEs also tend to have "changes in business practices" when they are driven by "low business performance".

To help change the BM elements, there are four different BM ontology used by the firms in our samples. CANVAS ontology is the most popular BM ontology with almost half the share (44%) compared to other ontologies such as STOF (28%), VISOR (16%) and CSOFT (12%). The author also found that regardless of whether its external or internal drivers, the most used BM ontology to analyze and change the BM are Canvas and STOF ontologies (**Appendix F - Table F.6)**.

To analyze the association between BMI drivers and BM ontology selection, the author opt to use logistic regression and point-biserial coefficient. This is because the "external drivers" and "internal drivers" as independent variable have interval scale, while the "BM ontology selection" variable have binary scale. From the results of logistic regression on **Appendix G - Table G.5**., external and internal drivers cannot be added significantly as predictor to BM ontology selection. Furthermore, the variables did not meet the requirement for normality of the data, thus, correlation analysis using Point-Biserial coefficient cannot be done. The author also cannot do chi-square statistics since the categories of "BMI drivers" are not mutually exclusive one from the other.

Different needs in BM element changes can yield different usage of BM ontologies as can be seen on **table 12**. As with tables before this, the total number would be the number of valid cases, not the total number of the responses. For example, the total number of CANVAS is 14, which mean there are 14 valid cases that used CANVAS as its BM ontology that contain minimum one changes in the BM elements. The total responses for CANVAS is 69 responses inside 14 cases, which mean that in average there are changes in approximately 5 BM elements every time CANVAS is used.

Table 12 BM element changes with BM ontology selection

	CANVAS		CSOFT		STOF		VISOR	
	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %
New goods / products	5	7.2%	2	10.0%	3	6.1%	2	8.0%
New services	10	14.5%	2	10.0%	8	16.3%	3	12.0%
Changes in production methods	2	2.9%	1	5.0%	1	2.0%	1	4.0%
Changes in support activities	3	4.3%	1	5.0%	2	4.1%	0	0.0%
Changes in channels	11	15.9%	1	5.0%	2	4.1%	1	4.0%
Changing of pricing (model)	0	0.0%	1	5.0%	3	6.1%	1	4.0%
New or changed revenue models	8	11.6%	1	5.0%	4	8.2%	2	8.0%
Change in promotion / branding	4	5.8%	2	10.0%	4	8.2%	1	4.0%
Change in businesses practices	4	5.8%	2	10.0%	1	2.0%	4	16.0%
Change in organizational network	7	10.1%	3	15.0%	7	14.3%	4	16.0%

Change in work organization	1	1.4%	0	0.0%	1	2.0%	1	4.0%
Changes in target market	7	10.1%	2	10.0%	7	14.3%	2	8.0%
Changes in technology used	5	7.2%	2	10.0%	5	10.2%	3	12.0%
Changes in cost structure	2	2.9%	0	0.0%	1	2.0%	0	0.0%
Total	14	100.0%	4	100.0%	9	100.0%	5	100.0%

To understand the pattern, the author highlighted top two changes (based on percentages) in the BM elements when using each BM ontology. The author found that BM elements that are changed using Canvas model are the "services" and "channels". When using CSOFT ontology, most changes are done on the "organizational network" element. However, the users of CSOFT ontology also made changes in several areas such as "new products", "new services", "new promotion method", "business practices", "target market" and "technology used". The STOF model mostly catered the changes on "services", "organizational network" and "target market". When VISOR is used, the changes on BM elements are mostly found on "new services", "business practices", "organizational network" and "technology used".

To test the association between both variables, the author opt to use logistic regression and point-biserial coefficient, since the aggregated form of "BM element changes" (IV) have interval scale, while "BM ontology selection"(DV) have binary scale. However, the statistical result of logistic regression on **Appendix G - Table G.6** indicates that there are no statistically significant association between both variables. Moreover, the variables did not meet the requirement for normality of the data, thus, correlation analysis using Point-Biserial coefficient cannot be done. The author also cannot do chi-square statistics since the categories of both "BM element changes" and "BM ontology selection" are not mutually exclusive one from the other.

4.2.4.2 Changes in operational area and EA frameworks selection

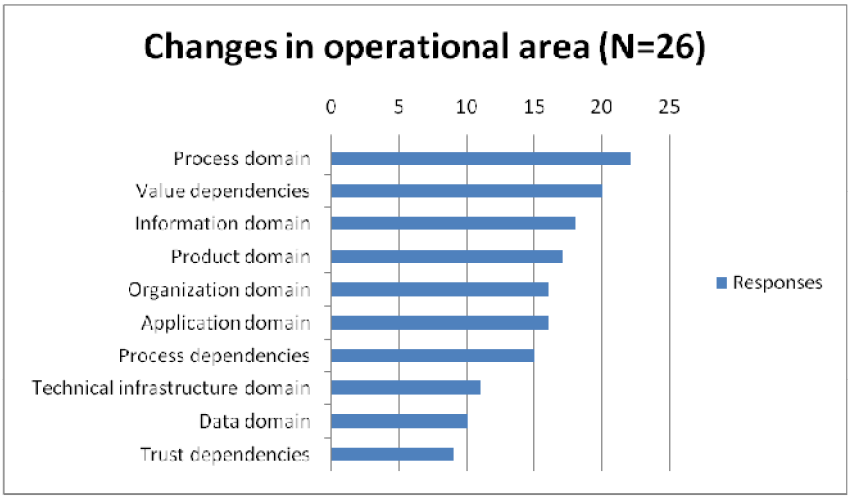


Figure 38 Changes in operational area

The changes in business model will also impacting operational areas (Morris et al., 2005). Our findings in **figure 38** suggest that the major changes in operational area involves changes in "process domain", "value dependencies" and "information domain". This mean that the three layers of VIP framework are in the top 3 of operational changes.

Since the changes in "operational area" are resulted from the changes in "BM elements", the author is interested to test the association between them. From testing the data normality requirements of Pearson correlation using Shapiro-Wilk test (**Appendix G - Table G.7**), we found that the data is not normally distributed. Thus, the author cannot do the statistical analysis. The author also cannot do chi-square statistics since the categories of both "BM element changes" and "operational changes" are not mutually exclusive one from the other.

Different source of drivers can also pose some difference aside from the three major operational changes mentioned above as seen in **Appendix F - Table F.7**. The author found that when external drivers exists, firms are also experience changes in their "process dependencies". When internal drivers exists, changes in "organization domain" become one of the most prominent changes. When the author went into deeper level (**Appendix F - Table F.8**), the "process dependencies" are mostly found when "market dynamics" exists, while changes in "organization domain" will happen with "low business performance" driver.

To help managing the changes in the operational area, some firms in our samples used an EA framework as a guide. From our findings, there are three EA frameworks used by some of the firms, which are the ArchiMate, TOGAF and Carnagie Mellon. ArchiMate was the prominent EA frameworks being used to guide the operational changes (78%). However, it is to be noted that among 27 cases in our samples, only 9 cases used EA frameworks (30%), hence it is subject to bias.

4.2.4.3 Alignment of BM ontology and EA frameworks

Since the author expect that operational changes are done subsequently after the changes in BM, the author will look at the combination choice of BM ontology and EA frameworks as a guide to these changes in **table 13**. The total number is the total valid case (N), for example the total for ArchiMate is 7, which mean there are 7 cases that used ArchiMate have used minimum one BM ontology as well.

Table 13 Alignment of BM ontology selection with EA frameworks

	ArchiMate			TOGAF			Carnagie Mellon		
	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %
CANVAS	3	42.9%	30.0%	1	100.0%	100.0%	0	0.0%	0.0%
CSOFT	2	28.6%	20.0%	0	0.0%	0.0%	1	100.0%	100.0%
STOF	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
VISOR	5	71.4%	50.0%	0	0.0%	0.0%	0	0.0%	0.0%
Total	7	100.0%	100.0%	1	100.0%	100.0%	1	100.0%	100.0%

The total responses for ArchiMate is 10 responses in 7 cases, which mean that there are several cases that used several BM ontologies (multiple responses) whenever ArchiMate was selected as EA frameworks. As with tables with multiple responses before, the author included "column N%" and "column responses %" to have better interpretation of data with multiple responses.

From Table 14 above we can see ArchiMate is the most popular EA frameworks to do the guide the operational changes (7 cases out of 9 cases that used EA). The usage of ArchiMate is linked mostly with VISOR (50% responses) that exists in 71% of our samples and CANVAS ontology (30%) that exists in 43% of our samples. One interesting fact that is found by the author is that there are no cases that used EA frameworks when these cases used STOF as their BM ontology.

Hence it would be interesting to see the association between the BM ontology and EA framework selection. The author used Phi Coefficient to test the association between "BM ontology selection" and "EA frameworks selection". The author found that there is no statistically significant correlation between BM ontology selection and EA frameworks selection (**Appendix G - Table G.8**). The author also cannot do chi-square statistics between these variables since the categories of "BM ontology selection" are not mutually exclusive one from the other.

4.2.4.4 Users of BM ontologies and EA frameworks

After knowing that BM ontology and EA frameworks are used to guide the changes in the firm, the author is interested to know the users of these ontologies / frameworks. The author make cross comparison between the usage of BM ontology and its users in table 15. As with the table structure before, the total number is the total valid case (N), for example the total for researcher is 20, which mean there are 20 cases where researchers have used minimum one BM ontology. We can also see that the total responses for researchers are 24 in 20 cases, which mean some researchers used more than one BM ontologies.

Table 14 BM ontology users with BM ontology selection

	Firm			Researchers / Consultants			Both firm and researcher / consultants		
	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %
CANVAS	1	100.0%	100.0%	8	40.0%	33.3%	1	100.0%	50.0%
CSOFT	0	0.0%	0.0%	3	15.0%	12.5%	0	0.0%	0.0%
STOF	0	0.0%	0.0%	9	45.0%	37.5%	0	0.0%	0.0%
VISOR	0	0.0%	0.0%	4	20.0%	16.7%	1	100.0%	50.0%
Total	1	100.0%	100.0%	20	100.0%	100.0%	1	100.0%	100.0%

From **table 14** above, the author found that 90% of the all the cases (20 out of 22 valid cases) have researchers / consultant as the users of BM ontology. There are only 5% of the cases (1 case) where the firm itself that initiate and use the BM ontology to guide the BMI process. Meanwhile, there are also only 5% of the case(1 case) where both firms and researchers use the BM ontology together. We also found that Canvas is always used by either firms or researchers. However, STOF ontology is slightly more popular to researchers (37.5%) compared to Canvas ontology (33%).

However, when testing the association between "BM ontology users" and "BM ontology selection" using the Phi coefficient (since both aggregated variables have dichotomous scale), we found no statistically significant correlation (**Appendix G - Table G.9**). The author cannot do chi-square statistics between these variables since the categories of "BM ontology selection" are not mutually exclusive one from the other. Furthermore, for all cases that used EA frameworks (9 cases), all of them (100%) involved researcher as the users of the framework and not the firm itself. Not a single firm in the samples used EA frameworks by themselves.

4.2.5 BMI outcome

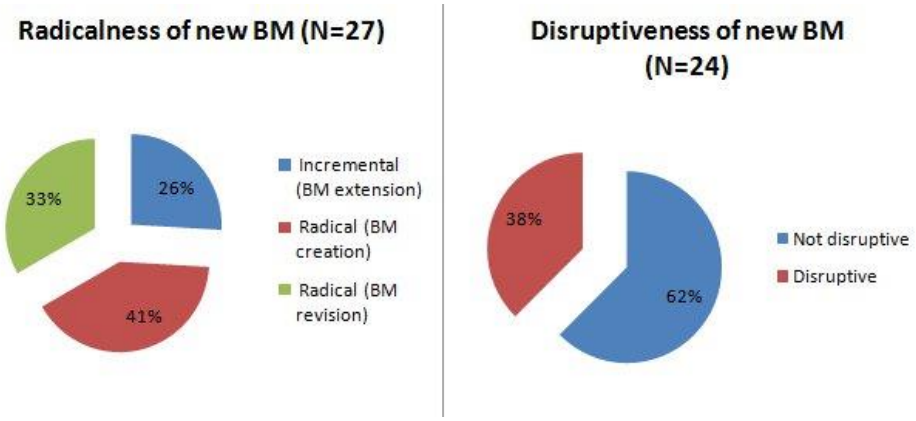


Figure 39 Radicalness and Disruptiveness of new BM

The outcome of an innovation could be incremental or radical in nature, and even disruptive to the industry. Our findings in **figure 39** suggested that most the of the BMI activities done by firms in our samples (74%) resulted in "radical BM", with only 26% of "incremental BM". Among these radical BM, most of them are "BM creation" (41%) while "BM revision" accounted for 33% of the samples.

Among these radical BMs, the author is also interested whether it is also disruptive (new to the market/industry/world). Our findings suggest that most of the new BMs are not disruptive (62%), and only 38% of them can be seen as disruptive.

Table 15 Organization phase and radicalness of BMI

	Incremental (BM extension)		Radical (BM creation)		Radical (BM revision)	
	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %
Startup	2	28.6%	6	60.0%	3	33.3%
Rapid growth	4	57.1%	3	30.0%	3	33.3%
Mature	1	14.3%	1	10.0%	3	33.3%
Total	7	100.0%	10	100.0%	9	100.0%

From cross-comparing the organization phase and radicalness of the new BM (**Table 15),** the author found several facts. Most of the occurrences of radical BMI (BM creation) happens for firms in "startup" stage (60%). The incremental BMI (BM extension) occurs mostly on firms in "rapid growth" stage (57.1%). Interestingly, the radical BMI that involve revision of core logic of the BM (BM revision) can happen almost in all stages of a firm (33% for each stages).

Table 16 BMI driver impact to radicalness of BMI

	Incremental (BM extension)			Radical (BM creation)			Radical (BM revision)		
	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %	Count	Column N %	Column Responses %
external drivers - market dynamics	2	28.57%	20.00%	6	54.55%	40.00%	4	44.44%	30.77%
external drivers - technology dynamics	1	14.29%	10.00%	2	18.18%	13.33%	1	11.11%	7.69%
external drivers - regulation dynamics	0	0.00%	0.00%	1	9.09%	6.67%	0	0.00%	0.00%
internal drivers - high innovativeness	2	28.57%	20.00%	6	54.55%	40.00%	0	0.00%	0.00%
internal drivers - low business performance	2	28.57%	20.00%	0	0.00%	0.00%	6	66.67%	46.15%
internal drivers - high business performance	3	42.86%	30.00%	0	0.00%	0.00%	2	22.22%	15.38%
Total	7	100.00%	100.00%	11	100.00%	100.00%	9	100.00%	100.00%

The author also interested to see the impact of BMI drivers to the radicalness of the BMI. To get this insight, the author made a cross comparison between the BMI drivers and BMI radicalness using "custom table" feature in SPSS, which resulted in **table 16** above. As with the table structure before, the total number is the total valid case (N), for example the total for BM creation is 11, which mean there are 11 valid cases where it contains minimum one BMI drivers. We can also see that the total responses for BM creation are 15 responses in 11 cases, which mean that some cases of BM creation have more than one BMI drivers (multiple responses).

From the table above the author found several interesting facts. Incremental BMI (BM extension) is mostly driven by "high business performance" (30%). The radical BMI (BM creation) is mostly driven by "high innovativeness" (40%) and "market dynamics" (40%). The radical BMI (BM revision) is mostly driven by "low business performance"(46%).

The author is interested to test the association between these BMI drivers and radicalness of BMI using Phi Coefficients. However, since the aggregated form of the "BMI radicalness" variable only contain Constanta (only have value of 1), the correlation analysis cannot be done. The author also cannot do chi-square statistics between these variables since the categories of "BMI drivers" are not mutually exclusive one from the other.

4.2.6 Business performance

One of the major BMI drivers that we found in this research is due to "low business performance". Therefore, the author is very interested whether the BMI practice have an impact to improve the firm's business performance. Unfortunately, most of the cases(70%) have no information on whether the BMI improved the firm's business performance or not. This is aligned with our other findings where most of the firms (59%) are still on the "design" or "re-design" phase and haven't implemented the changes from BMI yet. Only 33% of the firms in our samples already implemented the BMI. However, our findings from the small amount of valid cases (N=8) suggested that BMI did improve the firm's business performance (88%) because it help the SMEs achieving their business performance metrics.

The author is also interested to see the impact of BMI disruptiveness to the metric achievement of the 8 cases above. From looking at the 8 cases, this research found that when BM is disruptive (1 case), the metric is not achieved, hence BMI does not improve business performance. On the contrary, all of the non-disruptive BM (7 cases) achieved their metrics, which can be seen as improving their business performance.

From the statistical analysis using Phi Coefficient (**Appendix G - Table G.10**), the author found a significant correlation between "disruptiveness of BMI" to the "metric achievement". Interestingly, the "disruptiveness of BMI" is negatively associated with "metric achievement", which means that when the BMI is disruptive, the business performance metric is not achieved and thus, business performance is not improved. However, the author would like to remind that the valid cases for this analysis is only 8 sample, which can make the interpretation to be bias.

Furthermore, we can also see from this table that when tested with chi-square, the result is also significant. However, since 75% of the cell value is less than 5, it did not meet the requirement of chi-square test, where there should be not more than 20% of the cell's count that is less than 5 (Cochran, 1952). Hence, the result of the chi-square test may be invalid.

4.3 Conclusion of results

This chapter discussed the result of the quantitative data analysis. The result discussed in this chapter are mainly descriptive analysis of the quantitative data in order to made sense of the data. Association test (such as Pearson correlation analysis) and significance test (such as chi-square) are also performed in this chapter to confirm the significance of the results statistically. However, most of the statistical tests results in either "not significant" or the data did not meet the requirements to do the tests. Therefore, this research will mostly used the descriptive analysis to gain insights on the BMI pattern.

These results will be used as a base to answer the second research question along with its sub-questions as mentioned in the introduction part of this chapter. The answers to these research questions would be discussed on the following discussions and conclusion chapter.

5. Discussions

"Innovation is not the result of chance, it's the result of action" - Phil McKinney

The previous chapters conclude the core of case survey and content analysis procedures. Chapter 3 presented us with the coding scheme design, coding process, reliability - validity measurements and also data transformation from qualitative to quantitative data. Chapter 4 presented us with the results of the data analysis which involve descriptive analysis to get 'sense' of the data and also correlation / regression analysis to see the possible association between the variables. Thus, this chapter will discuss the findings from Chapter 4 and its meanings.

Different type of firms will have different type of drivers to do BMI. Our findings on **Table 9** suggests that most of the firms (53%) would be forced to do BMI when they have a "low business performance" driver. From **Appendix F - Table F.3** we found that the "low business performance" driver are mostly found in micro-size firm (startup phase), which probably the case because startup firms are still trying to gain customer acceptance and securing financial resources (Dodge et al., 1994; Dodge & Robbins, 1992; Jawahar & McLaughlin, 2001). Thus the low business performance may happen because the value offering of these startups did not meet customer needs and its impacting their cash flows. This is also supported by Brannback et al (2014) which argued that startups usually need quick hits in terms of financial performance such as cashflow and profitability to ensure survival. Thus, the author believe that this is quite logical since low business performance may threaten the survival of the company, startups may rethink the way they do business.

Most of the firms (30%) will do BMI voluntarily when they have a "high innovativeness" driver (**table 9**). From **Appendix F - Table F.3**, the author found that the "high innovativeness" driver are found to be a big contributor for small-size firms (startup phase) and medium-size firms (mature phase). With high innovativeness, these firms may have an innovative product or services but they don't have a suitable BM yet to deliver it to the market, which encourage them to do BMI voluntarily.

The high innovativeness level in small startup firms would likely because they have more "openness to new ideas". There would be more closeness between startup customers with the startup managers due to its small size, which may enable the managers to quickly identify customer needs and provide ideas of improvements (Hausman, 2005). Small startup firms also characterized with less bureaucracy which can improve communication and inter-organizational trusts that can break down the barriers to have innovative ideas and improve firm's innovativeness (Hausman, 2005; Olson, Walker Orville C., & Ruekert, 1995).

On the other hand, the high level of innovativeness within medium-size firms on mature phase may have caused by their higher "capacity to innovate" . This is supported by argument of Jawahar and McLaughlin (2001) that mentioned firms in mature phase will have a strong cash flows. It means that medium firms in mature phase will have the sufficient resources to innovate. However, firms in mature phase will tend to pursue a risk-averse strategy (Jawahar & McLaughlin, 2001), which contradict the notion of BMI that needs transformation of the firm's way of doing business which can be seen as risky actions.

There may be other factors from that comes into play for medium-size firms in mature phase to consider doing BMI. This could be seen from our findings in **Appendix F - Table F.3** that suggested medium-size firms in mature phase also experienced other drivers equally such as "market dynamics", "technology dynamics" and "low business performance on top of the "high innovativeness" driver. Furthermore, when looking at the data in this table, there are 9 responses for 4 cases, which mean there would be minimum 2 drivers for each medium-size firms in mature phase. Therefore, the author believe that "high innovativeness" driver alone will not suffice as a driver to do BMI for medium-firms in mature phase.

This research also found that firms can be either forced to do BMI or do BMI voluntarily when they are driven by "market dynamics" factor (**table 10**). In this case, the author argue that this situation depends whether this market dynamics would threaten the survival of the firm or not. Our findings in **Appendix F - Table F.3** suggest that "market dynamics" became one of major BMI drivers for micro-size firms (both startup and rapid growth phase).

Micro-size firms in startup and rapid growth phase will face market dynamics differently. The author believe that since micro-size firms in startup phase are still seeking customer acceptance (Jawahar & McLaughlin, 2001), they will be forced to do BMI once they found out that the customer / market preferences did not meet their current value offering.

Micro size firms in rapid growth stage on the other hand already received some success from their business and looking for expansion opportunities (Jawahar & McLaughlin, 2001). Therefore, this type of firm can have a significant investments to meet the changing needs of the customer / market such as adding new services or improving their technology infrastructure. Thus, they will have a voluntary type of BMI.

Cultural characteristic can be a supporting factor to BMI driver. The existence of "market orientation" and "product leadership orientation" are found to be the major cultural factor (70%) that supported BMI when "market dynamics" exist as a driver (**table 11**). The existence of these two characteristics most likely helped the firms to quickly react to the changes in market or customer preferences. This supported by several literatures that suggest that market orientation can drive firms to improve their processes in an innovative ways to suit the market / customer needs (Sorescu et al., 2011; Zomerdijk & Voss, 2010).

In a volatile market where customers are changing their preferences rapidly, the author believe that products or services that have a cutting edge features compared to the competitors will attract customers to do the initial trial. By having market orientation, the firms can identify these changing market needs, however the author believe it is the product leadership orientation that can help the company to deliver these needs by consistently delivering a state-of-the art value offering (Treacy & Wiersema, 1993).

Meanwhile, the "market orientation" and "entrepreneurial orientation" contributed as major cultural factors (65%) that contributed to the "high innovativeness" driver. As mentioned before, market orientation will help the firm to design value offerings that are new or different in response to market conditions (Jaworski & Kohli, 1993). However, this would be supported greatly when the founders or management of the firms have entrepreneurial mindset. The new value offerings that can be developed from firm's resources will depend on management's entrepreneurial ability to find innovative combinations. In other words, while superior value offerings can be developed via market orientation, it is the entrepreneurial orientation that drives these activities (Hult et al., 2004).

The author also found that "entrepreneurial orientation" would be the major cultural factor (33%) to "low business performance" driver of the firm. When management of firms have high entrepreneurial orientation, the author believe that they will not be satisfied with the low level of

performance and will strive to introduce new solutions such as new product offering or new markets. This is supported by the trait of entrepreneurial orientation that involve boldness and tolerance for risks (Cooper et al., 1989; Lumpkin & Dess, 1996), which enable them to take radical steps to improve the performance or features of their value offering innovatively.

These improvements of their value offering could be supported by the existence of "market orientation" (28.6% of responses) and "product leadership orientation" (28.6% of responses) as well. By having these two cultural factors, the SME could make a relevant and cutting edge value offering that met customer needs, which can lead to improvement in their low business performance.

Alignment of changes in BM elements and operational areas. Our findings suggested that the "changes in services", "change in organizational network" and "changes in target market" are the elements in BM that are mostly changed. The changes in "services" element of the business model aligned with the value offered by firms in the samples with more than half of them (52%) have a service-type value offering. Furthermore these findings also aligned with the findings from other scholar, where they found that 68% of BMI projects were focused on value proposition (such as new services), target customer (or target market) and value chain (or organizational network) (Lindgren, 2012).

To understand the changes made on services element, the author want to look at the major driver which is "market dynamics". With market dynamics, it could be said that firms are facing changing customer preferences or rapid competitor entry. One of the changes in customer's demand would be in a form of product or service customization (Applegate, 2000; Chung et al., 2004). Another type of "changes in services" that we found on our samples would be when firms are converting from product-based offering into service-based offering.

As an example, the author will use case number 22 (Dialogues Technology) in the database. Dialogues Technology changed a practice where big data analytics are sold as software (products) into a big data platform that that provide service customization to SMEs. In this sense, they made a transition of value offering from product-based offering into customized-services based offering via cloud technology.

The author believe the "changes in services" also related to the changes in "organizational network or ecosystem" element. To deliver customization and deliver innovative products or services, firms will need to focus on their core processes and outsourced the non-core activities or external resources to third party suppliers, which will lead to greater reliance on networked of partners / suppliers (Chung et al., 2004; Denicolai et al., 2014; Huang et al., 2013). This is also supported by Lindgren (2012) that found the SMEs begin to realize the importance of networks, where they are starting to include more partners into the BMI process.

Moreover, the changes in "organizational network" is also a way for these SMEs to bridge resource gap with larger firms to improve their innovativeness and competitiveness (Nieto & Santamaría, 2010). This can also be seen from the example of case 22 above, where they outsourced the analytical processes of big data to the independent data scientists.

It means that "changes in services" and "organizational network" will create changes in the "process domain" in the operational side of the firm. As with example with Dialogues Technology above, they will need to make additional process to accommodate their platform. It is not only the customer that they need to think of, but they need to do certain screening processes to data scientists who wants to join the platform.

This is supported by the findings that all of the firms in our cases (100%) relied on their partners to create or deliver values. Thus, firms that want to change their core logic of doing business (incrementally or radically) to suit customer needs will most likely make some changes in the

relationship with their existing partners or even add new partners to do outsourcing activities. This will lead to the "changes in value dependencies" in the operational area, since new actors in the value network have may have new values that is essential to the new BM of the firm. Taking example of case 22 again, this can be seen from the data scientist that provide "big data analysis" value, which is the core value offering of the focal firm's platform.

Furthermore, to deliver the value customization, firms need to change their traditional view of their value chain into value network that involve greater information exchange to deliver tailored products (Chung et al., 2004). Therefore, it made sense that "information domain" is one of the operational area that is majorly impacted by the changes in "services" and "organizational network". As with example with case 22 above, actor within the network will involve heavily in information exchange. SMEs (as customer of the platform) will put their company data and analysis requirements to the platform, while data scientist will also fill out their data such as domain expertise.

"Changes in target market" may also have connection with "market dynamics" as the biggest driver of BMI. This market situation are especially volatile in high tech markets with its dynamic and complex nature that can make firms changing their target market over a product lifecycle (Rosen Jonathan E. Schroeder, Elizabeth F. Purinton., 1998). This is aligned with our database where 52% of the firms in our samples are in the high-tech industry. The example would be case number 4 (Derigo) that change their target market from SMEs to large corporations due to the dynamics in the market. However, this finding can also meant that there would be a possible bias in our data, which may yield different result if the industry area in the database are more diverse.

Different type of drivers made several differences to the changes in BM and operational area. On top of the three major BM changes, there are several major changes in the BM subjective to the drivers experienced by the firms. When firms are driven by external factors, "changes in technology" element would also be a major contributor. At first, the author assumed that the usage of technology will changed mainly because of "technology dynamics" factor, however after looking at the data, most of the technology will be changed when "market dynamics" exist.

This is supported by argument in literature that the changes in customer preferences (market dynamics) can trigger the usage of new technology to cope with these changes (Tripsas, 2008). The author will use the example of case number 14 (Optomed) where the firm adopted a new technology (cloud computing) not because the cloud computing exists, but because they need to deliver a new value proposition with lower costs in order to overcome cheaper product demand from customers and cheaper alternatives from competitors.

The "changes in technology" above could impacted their "process dependencies". This is most likely because the dynamics in market or technology made the existing process of the firms to be obsolete and prompt them to be more dependent to other actor's process in the value network to execute the new BM. From example with Optomed above, they are becoming more dependent with the process from ophthalmologist, where Optomed need to ensure the diagnosis delivery process through the cloud services are done correctly.

This would be a different case when internal factors exists. From the data, the author found that "changes in products" would be made by the SMEs when they have "high innovativeness" driver. Since innovativeness can be seen as firm's propensity to innovate or propensity to adopt innovation (Damanpour, 1991; J. E. Ettlie et al., 1984), the author found it to be logical that firms with high innovativeness would innovate their products. The example can be seen from case number 26 (Tyromotion) where the firm have a focus in R&D for product development (high innovativeness) that results in a new mobile application (new product). This prompted them to change the rest of their business model to accommodate the new product.

Other major BMI driver, "low business performance" will encouraged firms to have "changes in business practices". The example can be seen from case number 1 in our database (eTasku), where they experienced low sales for their application because their partners (who supposed to sell it) did not understand the true benefit of the application. They are changing the way they work (such as doing demo physically or using teleconference) to explain the benefit of their product more clearly to their partners, in hope that they in turn can sell it better to end customers.

Furthermore, this "low business performance" will create changes in "organizational domain". This could happen because firms are forced to streamline their organization structures or assigning new roles to its employee in order to deliver the value in new BM to improve their business performance. Taking example with case 1 (eTasku) above, they added two people with marketing skills to help them in approaching the partners with the new business practices above.

CANVAS ontology is the most used BM ontology compared to other ontologies (44% of responses). The author believe this is because Canvas is the most general ontology and easy to use for brainstorming and gathering initial ideas because of its visualization blocks. Canvas ontology is one of the most widely adopted BM ontology by practitioner because the visual blocks help structure the thinking process, facilitate comparison between alternative BMs and also a good option for people with no engineering background (Fritscher & Pigneur, 2014).

The author also found different usage of the BM ontologies. Canvas model are mostly used to change the services and channels in the BM elements. The author believe that this is quite logical because the Canvas ontology contain the building blocks necessary to change it (Osterwalder & Pigneur, 2010), which are the "value proposition" block to brainstorm idea of new services and the "channel" block to gain insights on new channel to deliver these new services.

Our data suggest that STOF are mainly used to change the services, organizational network and target market. The changes in services and organizational network are aligned with the focus of STOF model that emphasize on the customer and value network for a service-based business model (Bouwman et al., 2008). Furthermore, the author believe that changes in target market are also relevant to be done by STOF since this ontology also put importance on market segmentation on its service domain (Bouwman et al., 2008).

We found that CSOFT are mainly used to change the organizational network elements, but also used to change diverse range of elements such as target market, technology or value offering (product / services). From the literature we found that CSOFT put importance of business networks to deliver complex products and services based on long term relationship with customers (Heikkilä et al., 2008), thus it made sense that "organizational network" become the focal changes with this ontology along with "product" and "services" elements.

VISOR are used to changed the business practices, organizational network, services and technology used. These changes could be catered by VISOR because this ontology have focus in creating an all-digital business model with strong emphasis in usage of technology (such as platform) (El Sawy & Pereira, 2013). Furthermore, with the changing the traditional way of work into a digital type using VISOR, it become made sense that the business practices elements also changed.

The usage of BM ontology however, also depends on the type of users**.** From **table 14**, the author found that 90% of the cases have researchers / consultant as the users of BM ontology, with STOF ontology have a slightly higher usage (38%) compared to Canvas (33%). There are only 2 cases in our database where the firms are involved as the users of BM ontology, and not surprisingly, both firms used Canvas ontology. The author believe this is because other ontologies other than Canvas (such as STOF) are more familiar to academic setting. The visualization and representation depicted by Canvas seems to be more appealing to business audience(Janssen, Lankhorst, Haaker, & Vos, 2012).

Furthermore, according to author's personal opinion and experience, the Canvas popularity as BM ontology among practitioners may have supported by its marketing and wide distributions in business section of mainstream bookstores. This made it to be easily found by non-academician such as entrepreneurs and business people.

The prominent EA framework would be the ArchiMate (78%), possibly because it can be aligned with the CANVAS ontology (Iacob et al., 2012; Meertens et al., 2012) which is also happened to be the most BM ontology used by firms in our samples. This also supported when the author compare the usage of BM ontology and EA frameworks in Table 16 where 75% of cases that used Canvas ontology will also used ArchiMate as the framework for enterprise architecture.

Scholars perceived the Canvas ontology to be helpful in highlighting and compare BM patterns (Fritscher & Pigneur, 2011), which can would be useful to classify the implication of these patterns at IT infrastructure level to help with the alignment with changes in operational area (Weill & Vitale, 2002). The ArchiMate is also can well connected to BM Canvas because the three layers of ArchiMate (business, application and infrastructure) can accommodate most of Canvas building blocks, except for the "activities" and "resources" block (Fritscher & Pigneur, 2011).

But interestingly, the author also found that in cases where VISOR ontology are used, all of these cases (100%) will also selected ArchiMate as the EA frameworks. VISOR is a business model ontology that have focus in all-digital business and interface elements (El Sawy & Pereira, 2013), which may suitable for ArchiMate since this EA framework have application and IT infrastructure layers (Fritscher & Pigneur, 2011) that can accommodate it. However, the author did not found any research papers that tried to connect VISOR ontology with ArchiMate aside from a Master Thesis by Rahmati (2013) that used VIP framework as the alignment approach between them.

Another interesting notion is that whenever STOF is used as the BM ontology, the cases were not using EA frameworks. The author believe this finding does not mean that STOF cannot be aligned with EA frameworks, since other scholars did the STOF-ArchiMate alignment (Janssen et al., 2012). It is possible that this research did not found the alignment between STOF and ArchiMate due to small sample size of cases, which could create bias on the alignment combination.

The finding for EA framework users is more startling, with all of the users (100%) are researchers. This is most likely because startups and SMEs did not feel the need to use complex frameworks such as EA due to the small size of their operation or they are simply not aware about the EA framework benefit . This is supported by several scholars confirming the notion that EA is a generally unknown concept to SMEs, and even when SMEs have a link between strategy and their processes, none of them use EA as the framework (Bernaert et al., 2014).

All of the statistical result done by the author produce non-significant results. Non-significant results mean that the author failed to reject the null hypotheses (no association or no differences between variables). However, even though we failed to reject null hypotheses, it does not mean that the null hypotheses is true (D. H. Johnson, 1999).

The non-significant results may have been contributed by the small sample size of this research. This argument also supported by other scholar that argue that a null hypotheses may indeed false but the there is a lack of power to prove otherwise since the small sample size can be too small to indicate significance (D. H. Johnson, 1999). This problem becomes even more complex with the existence of missing values, since the SPSS software will only compute the cases with no missing values (valid cases), which made the small size samples to be even more smaller in actual computation.

6. Conclusions

"We cannot solve our problems with the same thinking we used when we created them" - Albert Einstein

6.1 Evaluating the research objective and research questions

The main objective of this research would be as follows,

> ***"To gain better understanding on business model innovation pattern in SMEs by providing insights regarding the possible changes made on business model and operational elements in response to firm's external and internal factors"***

This objective are set for this research after the author found a knowledge gap in the literature regarding BMI practice in SMEs. This research then proceed in an exploratory nature with case survey method in order to gain better understanding of BMI pattern in SMEs. Furthermore, in order to achieve the research objective, this research defined the main research question as follows:

> ***"What are the insights on the possible changes of business model and operational elements during BMI process in response to firm's external and internal factors, in order to have better understanding on business model innovation pattern in SMEs?"***

This main research question is answered by several conclusions of the sub-research questions .The first research question was formulated as follows, " ***what are the relevant aspects of business model innovation that should be included as assessment criteria?"***

This research question was answered by conducting literature review. There are several aspects of BMI that are included as criteria to assess BMI best practice in this research. BMI drivers are included as the first criteria of assessment to see which external and internal factors drive the BMI practice. From literature review, the author found that the external factors that can be included as drivers to BMI would be the market dynamics, technology dynamics and regulatory dynamics. On the other hand, the internal factors included in this research are the innovativeness and business performance level.

The second important aspects of BMI that served as the main criteria in this research would be business model aspects. One important aspect of business model would be the BM ontologies. This is because BM ontology can be used to guide the BMI process since it contain building blocks that explained the BM elements that could be changed. Furthermore, since SMEs faced with vast selection of BM ontologies, the author felt it would be beneficial to explore which BM ontologies are actually selected by SMEs from the actual BMI practice.

Third aspect would be the enterprise architecture aspects. This is included because the author found in the literature review that a new BM must be translated into its operational aspect. One important aspect would be the EA frameworks, since it presented a guide for SMEs to make transformation in its operational side. The EA frameworks itself contain several operational domains that are useful to identify the changes in operational level.

On top of the main aspects above, we also included several supporting aspects. The first one would be the organizational characteristics, since the author found from the literature review that it may be an important antecedents to the external and internal factors of the firm. The organization characteristics itself could come in a form of structural properties such as firm size or cultural such as orientation to the market. Furthermore, this research also included aspects such as radicalness and disruptiveness of BMI to learn different levels of BMI that can be done by SMEs. We also perceive that the achievements of performance metrics to be important to see whether BMI had impact to SMEs business performances.

The second research question was formulated as follows, ***"What are the patterns of business model innovation done by SMEs in response to their external and internal factors?"***

To answer the second research question, several sub-questions will need to be answered. The first sub-question for second research question would be ***"2(a) What are the external and internal factors of SMEs that are driving them to do business model innovation?"***

This research found that dynamics in the market can either forced the SMEs to change their BM or encouraged them to change their BM voluntarily. This driver are mostly found in the cases with micro-size firms. This research believe that the forced BMI mostly experienced by micro-size firms in startup phase, since they are still aiming for customer's acceptance. On the other hand, micro-size firm in rapid growth phase will do BMI voluntarily because of this driver since they are looking for expansion opportunities via new services or new target markets.

Firms that have a high level of innovativeness will be encouraged to do BMI voluntarily. Most of this driver are found in cases with small-size firms (startup phase) and medium-size firms (mature phase). This research believe that the small-size firm in startup phase have high level of innovativeness because they are more open to new ideas and flexible than bigger firms. On the other hand, medium-size firms in mature phase will have high level of innovativeness because they have bigger innovation capacity than smaller firms. Some of the cases with high level of innovativeness involved SMEs with a novel products or services that in need of new BM to deliver it to the market.

SMEs that experienced a declining business performance are forced to do BMI. This is mostly found in a micro-size firm in startup stage. It is usually happen because the value offering of these startups did not meet customer needs and its impacting their cash flows, thus they need to change their business logic to survive. This answers the first sub-question of the second research question.

The second sub-question for second research question would be ***"2(b) What are the BM ontologies and EA frameworks used to guide the business model innovation process in SMEs?"***

The research found that the most used BM ontology to do BMI or to analyze BM changes would be Canvas and STOF ontology. This research also found that most of the users of BM ontology would be researchers / consultants (external stakeholder) of the firm. Researchers slightly preferred STOF more than Canvas. This is a different case when firms are the users of BM ontologies, where all of them used Canvas as their BM ontology. This is probably because Canvas is more familiar to business setting compared to any other BM ontologies.

The most used EA frameworks among the SMEs in our samples would be ArchiMate. The ArchiMate framework is mostly combined with Canvas and VISOR ontology when the cases tried to make alignment between the changes in BM and operational elements. This research also found that the users of EA frameworks in these cases are all external stakeholders to the SMEs (either researchers or consultants). Therefore we can make a conclusion that it seems SMEs are generally not aware of EA as a tool to guide their enterprise transformation. This answered the second sub-question for the second research question.

The third sub-question for the second research question would be ***"2(c) What are the changes in the SME's business model and operational elements caused by BMI?"***

The research found that when performing BMI, most firms changed their business model in services, organizational network and target market elements. This research believe that the adjustment in firm's services could be related to the changes of preferences in the market. One of the example regarding the market dynamics would be the customer demand for more personalization. In order to deliver customized or innovative services, firms may need to make some adjustments in their relationship with other actors in the value network, such as focusing on their core processes and outsource the non-core activities to third parties. The market volatility could also made the SMEs change the customer segments to be targeted, since the original target market may have changed their preferences.

The research also found the operational elements that were changed by the firms would be related to its process domain, information domain and value dependencies. This may be explained by the changes in BM elements. The combination of changes in services and organizational network to deliver customized solutions to customers can impacted these operational elements. New services in the value network will created new processes to be incorporated in the SMEs operation. Meanwhile, new actors in the network may bring new value objects that is essential to new BM of the focal firm, thus creating changes in the value dependencies. Furthermore, new value offering that aim to deliver customized services and depended on its value network will need greater information exchange, hence it made sense that the information domain would also be impacted. This answered the third sub-question of the second research question.

Certain BMI drivers can also trigger certain BM and operational changes on the top of changes mentioned above. We found that the volatility in the market may encourage firms to change their usage of technology. This is because SMEs will try to adopt new technology to cope with changing customer preferences (such as demand for low cost services), with the adoption of cloud technology. The changes in technology could impacted their process dependencies with other actor (such as cloud hosting). This research also found that a high level of innovativeness will prompt the firms to change or add new products in their portfolio. This is because with high level of innovative orientation, tendency of SMEs to create or adopt more innovation to improve their products would be higher. This also mean that product domain is impacted. Meanwhile, a significant decline in the business performances could made the SMEs to change their business practices, which also made sense because the SMEs may need to rethink their way of working in order to improve their business performance. The changes in business practices may also impacted the organizational domain.

6.2 Contributions and implications of the research

6.2.1 Scientific contributions

The author believe the result of this research have some contribution to the academic environment. First, this research complement other research regarding BMI best practices that have been done by several scholars (Barjak, Niedermann, et al., 2014; Bucherer et al., 2012; Mitchell & Coles, 2004), by adding insights regarding BMI patterns of SMEs. This research identified external and internal factors of SMEs that could drive BMI practice and analyze its impact to the possible changes in BM and its impact on operational level. Furthermore, this research also identified the suitable BM ontologies and EA frameworks to analyze and guide the SMEs transformation.

Second, this research provided general frameworks to assess the changes in BM and operational level. There are a lot of BM ontologies and EA frameworks that can be used by firms or researchers to plan or analyze enterprise transformation, which can be confusing or too complex at times. This research tried to solve this problem by mapping the BM ontology with BMI and innovations definition, resulting in 16 generic BM elements. Rather than selecting certain BM ontologies to

analyze firm's BMI, researchers can use the these BM elements a starting point to get initial sense of BM changes in a firm. Afterwards, researchers can opt to use certain BM ontologies to make further assessments based on this initial assessments. The same case could be said in analyzing the operational changes in a firm. Initial identification of firm's operational changes can be done by using the generic operational elements made in this research, instead of jumping straight into using EA frameworks.

Third, the introduction of EA as part of BMI could also expand the scope of BMI practice. The term business model innovation could imply that the changes are made on the business model level only. However, throughout this research we see the importance of making connection between the changes in BM level and on the EA level. Without taking account of the changes in operational domain via EA, the execution of the BMI may not run smoothly or even worse, it may threaten the firm's survival. Therefore, this research could contribute in raising awareness and encourage researchers to incorporate changes in operational and usage of EA as an integrated part of BMI practice.

Fourth, this research also contributed in defining the disruptiveness of a BMI practice. By using the definitions derived in this research, the academic society can use it to identify the BMI level of firms. This could be an important foundation for subsequent researches in the BMI area. Since a disruptive BMI practice would need to result in novel BMs that are truly new to the industry, it may connect the BMI field with the business intelligence field. This is because to create a new BM to the industry, it would need a knowledge regarding competitor's BM, which may be helped by business intelligence knowledge.

Fifth, we believe that this research also contributed to the Management of Technology (MoT) discipline. By providing a better understanding on business model innovation practice, it could identify the possible changes that may happen within a firm and its value network, while providing insights on how technology influencing these changes. These insights could also help researchers to anticipate a wider societal trends of disruptive businesses and understand the mechanism behind it.

Sixth, this research provide a methodological contribution. Due to the exploratory nature of this research, the author need to adjust the case survey method. The example of case survey method by Lucas (1974), Yin & Heald (1975), and Larsson (1993) were all using closed question checklists (with Likert scale or similar), which is a straightforward method to convert the richness of qualitative data on the cases into quantitative data. However, since it is exploratory, this research cannot set a pre-defined answers categories since the author don't want to limit the scope of the answers.

Inspired by the work of de Reuver et al (2009) and Srnka and Koeszegi (2007), the author then combined the case survey method with qualitative content analysis. The case survey coding scheme was made as open-ended questions to gather all the available answers first from the cases in qualitative manner, and then convert it to quantitative data with a qualitative content analysis. By combining qualitative and quantitative method, a research can accomplish two goals as argued by Srnka and Koeszegi (2007) which are (1) enabling a discovery-oriented research and (2) ensuring scientific rigor and having generalizable results from qualitative data.

Seventh, this research provide means to replicate the case survey of BMI with different settings. The coding manual that is included in this research can also help other researchers to replicate this research with similar type of settings and objective. This could help increase more research being done in this topic and lead to more understanding regarding BMI best practices.

6.2.2 Practical implications

There could be several practical implications stems from this research. First, the insights on BMI patterns among existing practice of SMEs gathered in this research can be used as an input to develop BMI tools. This is aligned with the goal of ENVISION project to help SMEs innovate their business model, in which a BMI tool can provide the mean to do it.

The BMI drivers found in this research could be included as the starting point of analysis in the BMI tool. By identifying certain external and internal factors of the firm, the algorithm of the tool can proceed to recommend certain changes to be made in the BM and operational elements of the firm. Furthermore, since it is found in this research that majority of SMEs are not aware of the BM ontologies and EA frameworks, it would be better if the BMI tool use the generic BM and operational elements created in this research instead. Furthermore, by using network analysis to gain insights from the VIP frameworks, the project team can find significant relationships between actors, how to utilize it and incorporate it into the BMI tool as one of the features.

Second, It is found in this research that SMEs (especially the high-tech one) are moving toward services by using technology such as the cloud computing. The author believe that the trigger would be the software companies that converted their traditional software into Software-as-a-Service (SaaS). We believe that this trend will impact traditional companies as well. Traditional companies (such as clothing company) are moving towards digitization of their work by using software, thus creating a new market for the SaaS company. Furthermore, the SaaS company will tend to focus on one unique and specialized value proposition for their software, hence the traditional companies will need to work with other vendors as well to transform their company. This transition may require the traditional companies to change their business model in a radical way. Hence, we believe that BMI that was done by a company will have wide implication, which is triggering another BMI practice for other companies in the market.

The third implication of BMI findings in this research would be the increase in data and information flows. With more and more companies using cloud technology and SaaS, it means that there would be more data that flows into the servers. Furthermore, adding new actors in organization network will also prompt more information sharing (which are sometimes to be sensitive). These data would be a source of valuable information for every parties in the network (for the firm itself and competitors). On one hand, the firm could try to harness this big data in order to improve their competitive advantage, but on the other hand these sensitive data could be a target for hacking. Therefore, the information-intensive impact of BMI would put certain domain such as big data analysis and cyber security to be important.

Fourth implication would relate to privacy issue. From the third implication above, we already see that firms could harness more information from the data in their servers. However, sometimes information contains really sensitive customer's data, where the usage of this data could breach customer's privacy. Therefore, firms that leverage technology to change their services should ensure that their new business model (or its elements) do not violate the privacy laws.

Fifth implication of our findings would be related to impact of BM disruptiveness to society. The changes in services and organizational network could bred startups such as Uber or AirBnb that utilize resources of other actors in their network to provide services that are considered disruptive in the industry. However, sometimes the disruptiveness of a new BM could not be accepted by some part of society. As an example, Uber services that utilize private cars to be hired are seen to be illegal competitors of the official taxi companies which caused uproars in several countries (including US, France and Indonesia). Therefore, we believe that every BMI practice in the future would also need to analyze its social impact and make specific adjustments according to it.

Sixth, our findings implicate that government involvements would be essential. The governments as business regulators will need to adapt faster to the rapid growth of BMI practice and understand how technologies plays important role in it. Governments need to define proper policies and laws to protect customers and ensure healthy business competitions. On the other hand, when governments become more proficient in responding to BMI practices, firms are expected to be more creative since they should adhere to a more stringent boundaries when changing their business model.

6.3 Limitation of research

In doing this research, the author realize there are some limitations exists. The first one would be that the result of this research depends on the quality of original cases. Since the data of this research are gathered directly from the cases, the result would not be better than the original cases. This is also one of the main weaknesses of case survey that have been mentioned by several scholars (de Reuver et al., 2009; Larsson, 1993; Yin & Heald, 1975).

Aligned with above limitations, since most of the cases are from student cases (41% of samples), the quality of the data may not be that high. This is because the author assumed that student cases will have lower quality than research journals, since it didn't have the same high standards or criteria requirements to publish a research journal.

Most of the cases that we have are collected from researchers from universities across Europe. It means that the BMI cases are mostly driven by the students or researchers which could limit the findings. This is aligned with our data that suggest that most of the BM and EA ontology users are researchers / consultants. We felt that this may pose some bias in the selection of the ontologies / frameworks, since it may related to the researcher's particular interest in certain ontologies or it is suggested to the student by their teacher in the class (however, students were flexible to choose the ontologies). Therefore, the selection pattern of the BM and EA ontologies may not be the properties of the cases itself, but more on the researcher's preferences.

Related to the above limitation, the BMI cases made by different students may have the same supervisors as a part of their assignments. If we assumed that the BMI patterns identified on those cases were influenced by the supervisor's preference, there may be some violations in the independence of observations between these BMI cases. This could mean that the validity (especially on external validity) of the findings on this research may be affected, since the preferences of the supervisors in assessing the BMI practice may not be generalized.

With the time and resource limitation, the author didn't use the multiple coders as part of the case survey approach. The original case survey approach suggested by several scholars need to use multiple coders in order to achieve reliability of the coding and avoid coding bias (Larsson, 1993; Lucas, 1974; Yin & Heald, 1975). Even though the author used "member checking" approach by asking original case owners to validate the author's coding in order to establish reliability, it can be said that this research didn't use one of the main procedures that made case survey to be a good research approach. Therefore, the bias level in this research may be higher than if it used multiple coders.

Other limitations are related to the case samples itself. Since the topic of business model innovation is quite new, having a narrow scope of sampling source, limited time and very specific exclusion criteria, there are only a limited cases that can be collected by the author in this research. Therefore the author only collected small size of samples, which may not representative of the actual conditions of BMI within SMEs. Furthermore, the firms on the cases are mostly originated Finland and Netherlands area. The little variations on the origin of the cases may also hinder the generalizability of the results found on this research, since it may not represent the SMEs in Europe

as a whole. This is also the argument made in literature, where purposive sampling (as done in this research) have a lower generalizability trait compared to random sampling (Sekaran, 2006).

As mentioned before, the characteristic of the data such as the small sample sizes, missing values may led to non-significant results of the statistical analysis. This restricted the author to prove the association or impact between variables statistically. Thus, the results of this research are only based on description of the data found and association are made based on literatures, which the author believe to be a weaker results than if it can be proven statistically.

6.4 Future research

The first recommendation for future research using case survey would be to use multiple coders / raters and the appropriate inter-reliability measurement. The author believe having multiple coders is important to increase the confidence about the results reliability, especially if the results are going to be published.

The author suggest to use Krippendorf's Alpha to measure the inter-rater reliability when incorporating content analysis in the case survey. This is because reliability measurements that used percent-agreement as suggested by Larsson (1993) did not account for chance and thus the data are far from reliable (Krippendorff, 2004). Furthermore, other reliability measurements that used association coefficient, such as Cranach's alpha or Pearson correlation only indicate the degree to predict the other variables, while inter-rater reliability should measure agreement (whether A=B, not A predicting B) (Krippendorff, 2004). It is better to use Krippendorf's Alpha, since it took account the disagreement when chance prevails, applicable to small and large samples alike, suitable for different type of scales (nominal, ordinal, interval, ratio) and can handle missing values (Krippendorff, 2004).

The second recommendation is to have more samples when doing BMI case survey. The first is related to its size. The author believe that the results can have a better statistical significance when it has a larger sample sizes. The second is the scope of the samples. The author believe to have a better aggregated insights, the samples should be collected from wider range of the region (example: the sample collected originated from all regions of Europe in an equal proportion). The wider range of the cases should also contributed to a better generalizability too.

Third, the author recommend to use *cluster analysis* to get more insights of BMI best practices. The results on this research are only describing the patterns of the BMI practices. There can be various combinatorial patterns in the BMI practices such as which type of firms (according to size, location, value offering) will have certain combination of changes in their BM elements and operational area. Several scholars argued that classification approach would be the best way to deal with combinatorial patterns since it reduces the complexity of the variables (Hambrick, 1984; Lim et al., 2006). Cluster analysis is appropriate to do classification, since it can find similarities between objects into the same group, which can also be seen as the art to find groups in data (Kaufman & Rousseeuw, 2005).

However, when dealing with a lot of categorical data like in this research, other type of cluster analysis should be used. Some scholar believe that latent class analysis would be more appropriate to do cluster analysis for categorical data (Goodman, 1974; N. L. Zhang, 2004). This is because when the data are categorical, it is assumed that it is generated by latent class (LC) model, where the clusters (class variable) need to be identified because it is not observed (latent) (N. L. Zhang, 2004). Thus, it can be said that the LC analysis is using a model-based clustering technique. This technique is similar to non-hierarchical clustering techniques (such as K-means) that involve maximizing log-likelihood functions, which aimed to minimize within-cluster variation while maximizing between-cluster variation (Hagenaars & McCutcheon, 2002). To help with this analysis, usage of statistical software such as Latent GOLD can be used.

Fourth recommendation is to do *configuration analysis* to find the best path or combinations when making changes / configuration during BMI. This research found that BMI involve making decisions on what to change in the BM elements (and its operational aspects) to respond to different drivers. The author believe that different drivers / different BM changes would lead to situations with different causal paths that can have different outcomes, which is suitable to be analyzed with configurational perspective (El Sawy, Malhotra, Park, & Pavlou, 2010; Pawson & Tilley, 1997).

This research recommend to use the configuration perspective made by Henfridsson and Bygstad (2013)as the base of the analysis. In their article, they have important elements where (1) certain contextual conditions will impact the (2) combination of mechanisms that may lead to (3) achievement of objective. Some of the elements of the configuration analysis can be substituted with the elements of our research:

1. *Contextual conditions* , could be filled in by the BMI drivers or even the organizational characteristics because it represents different contextual conditions of the firms
2. *Mechanism* , could be filled in by the BMI practice / mechanism, such as the changes in BM elements that is connected with the changes in operational elements
3. *Outcome (success)* , could be filled in with business performances (whether BMI improve business performances or not)

Since there are a lot of variables used in this research, we recommend to restrict it when doing configuration analysis. The variables could be reduced by using the most frequent findings on our research such as:

- 3 BMI drivers (market dynamics, high innovativeness, low business performances)
- 5 BM changes (services, organizational network, target market, products, technology used)
- 3 operational changes (process domain, value dependencies, information domain)
- 1 Outcome (metric achievements)

The fifth recommendation for further research is to do *network analysis* to gain more insights from the VIP frameworks done in this research. The VIP frameworks contain the relationship descriptions in terms of value exchange, information exchange and process between actors in a value network. With network analysis, it can identify the location and the prominence of a firm in the network (Borgatti, Mehra, Brass, & Labianca, 2009). The firm's position in the value network can determine the opportunities and obstacles faced by the firms, since it is argued that firm with high connectedness in the network have advantage in terms of information and thus have higher power over other actors in the network (Borgatti et al., 2009). The result of network analysis can yield important insights for SMEs that perform BMI because the changes in the organizational network can potentially alter the firm's power either positively or negatively. Example of the insights that may yield positive impact would be finding the 'weak ties' in the network to discover novel information that could be used to improve the firm's competitive advantage. Other questions that can be asked would be how do the SMEs pick their partners? or how we can predict the SME's power relative to its partners by looking at its centrality in the network?

The sixth recommendation is to seek possibilities in creating integrated BMI ontology. From this research, the author believe that BMI is not only a matter of changing the BM elements, but analysis on its impact to the operational side is also an essential aspect to be included. So far, the author only found BM ontology or EA frameworks that described separately in the literature , with no integrated ontologies. Even though there are several scholars that tried to make connection between them, the author believe that the new BMI ontology should be grounded up from the element levels to avoid influence from certain BM and EA ontologies. The generic BM elements and operational elements created in this research can be used as a basis to create such integrated ontology.

The seventh recommendation is to do research on BMI and its relation to society. As mentioned before in the previous section, disruptive way of doing business may lead to rejection by some part of the society. Therefore, we believe it would be interesting to answer several questions such as what are the impacts of disruptive BM to the competitors and society? which factors within the society needs to be included in the BMI practice to ensure acceptance of disruptive value offering? Or how can technologies provide means to ensure disruptive BMs are accepted by society?

6.5 Reflection of research

6.5.1 Reflection on business model innovation

When reflecting back at the BMI mapping, the author have slightly different view than other scholars regarding BMI position compared to other type of innovation. Many literatures mentioned that BMI act as addition or complement to other well-known innovation (such as product or process innovation). However, the author believe rather than a complement, BMI could become the starting point of innovations. This is because business model concept contain a lot of elements that could be innovated by the firms. For example, when it is identified that firm need to change their product or services, it could also be said that the firm need to perform product innovation. Another example, when firms changed the business practice and work organization elements, it could be a form of organization innovation. Thus, if this perspective is used, the plan to perform BMI itself could serve as the catalyst of various innovations within a company.

6.5.2 Reflection on data analysis

A lot of challenges came up during data analysis phase. The author found many missing values on the dataset. This is because the coder (author) put "no information" answers when the coder can't derive the answers from the cases according to the coding rules defined before. Even though the practice of putting "no information" answers is aligned with the case survey approach to reduce the probability of coder in making assumption or guessing (Larsson, 1993; Lucas, 1974; Yin & Heald, 1975), this made it challenging to do the statistical analysis. This is supported by several scholars that argued that most data analysis procedures were not designed to handle data with a lot of missing values and researchers will face computational challenges (Schafer & Graham, 2002).

On top of missing values, the author also found the characteristic of the data to be varied. When doing data analysis, the author found different scales for the aggregated variables. To make it even complex, the author also found a lot of variables with multiple responses in the datasets, which mean that the answer categories within the variables to be non-mutually exclusive. This led to an extensive work in order to identify the possible statistical techniques for each two variables that are set to be analyzed statistically.

The missing values, different scales and non-mutual exclusive data limit the statistical analysis that can be done by the author. For example, even though the author already identified that both variables have binary scales and wanted to do chi-square test, the author cannot proceed with it when it is found that it is not mutually exclusive. Another example with the chi-square, even though the author can proceed with it, it is found that the result may be invalid because it did not met the requirement of the chi-square. Chi-square need the count data in cells to be more than 1 and there should be not more than 20% of the cell's count that is less than 5 (Cochran, 1952), which cannot be fulfilled by the data in this research due to missing values.

References

Abernathy, W. J., & Utterback, J. M. (1978). Patterns of industrial innovation. *Technology Review*, 40–47.

Ackoff, R. L. (1989). From Data to Wisdom. *Journal Of Applied Systems Analysis*, *16*, 3–9. Retrieved from http://www.citeulike.org/group/8357/article/6930744

Acs, Z. J., & Audretsch, D. B. (1988). Innovation in Large and Small Firms: An Empirical Analysis. *The American Economic Review*, *78*(4), 678–690. doi:10.2307/1811167

Afuah, A., & Tucci, C. L. (2003). *Internet Business Models and Strategies: Text and Cases*. *McGrawHill international editions Management organization series* (Vol. 2). Retrieved from http://dl.acm.org/citation.cfm?id=579520

Aghion, P., Van Reenen, J., & Zingales, L. (2013). Innovation and institutional ownership. *American Economic Review*, *103*(1), 277–304. doi:10.1257/aer.103.1.277

Aiken, M., Bacharach, S. B., & French, J. L. (1980). Organizational Structure, Work Process, and Proposal Making in Administrative Bureaucracies. *Academy of Management Journal*. doi:10.2307/255553

Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems.* doi:10.1057/ejis.2010.21

Alt, R., & Zimmermann, H.-D. (2001). Introduction to Special Section - Business Models. *Electronic Markets - The International Journal*, *11*, 1019–6781. doi:10.2139/ssrn.1018067

Amabile, T. M., & Khaire, M. (2008). Creativity and the role of the leader. *Harvard Business Review*, *86*, 100–9.

Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal*, *22*, 493–520. doi:10.1002/smj.187

Amit, R., & Zott, C. (2012). Creating Value Through Business Model Innovation. *MIT Sloan Management Review*, *53*, 41–49. Retrieved from http://sloanreview.mit.edu/article/creating-value-through-business-model-innovation/

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*. doi:10.1037/0033-2909.103.3.411

Applegate, L. M. (2000). Emerging E-Business Models: Lessons from the Field. *Harvard Business Review*, *79*, 79–87. Retrieved from https://www.u-cursos.cl/ingenieria/2009/1/IN75J/1/material_docente/objeto/210577

Aragón-Correa, J. A., García-Morales, V. J., & Cordón-Pozo, E. (2007). Leadership and organizational learning's role on innovation and performance: Lessons from Spain. *Industrial Marketing Management*, *36*(3), 349–359. doi:10.1016/j.indmarman.2005.09.006

ArchiMate. (2014). Why ArchiMate? Retrieved January 14, 2015, from http://www.archimate.nl/en/about_archimate/

Baden-Fuller, C., & Morgan, M. S. (2010). Business models as models. *Long Range Planning*, *43*, 156–171. doi:10.1016/j.lrp.2010.02.005

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing Construct Validity in Organizational Research. *Administrative Science Quarterly*, *36*, 421–458. doi:10.2307/2393203

Ballon, P. (2007). Business modelling revisited: the configuration of control and value. *Info*. doi:10.1108/14636690710816417

Barba-Sánchez, V., Martínez-Ruiz, M. P., & Jiménez-Zarco, A. I. (2007). Drivers , Benefits and Challenges of ICT Adoption by Small and Medium Sized Enterprises (SMEs): A Literature Review. *Problems and Perspectives in Management*, *5*(1), 103–114.

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management Decision*, *47*(8), 1323–1339. doi:10.1108/00251740910984578

Barjak, F., Bill, M., & Perrett, P. (2014). Paving the way for a new composite indicator on business model innovations. *druid8.sit.aau.dk*. Retrieved from http://druid8.sit.aau.dk/druid/acc_papers/bv3u6xd92u5a93h43ob051b7v74y.pdf

Barjak, F., Niedermann, A., & Perrett, P. (2014). *The Need for Innovations in Business Models*. Switzerland. Retrieved from http://ri-policy-analysis.eu/fileadmin/RIPolicies/documents/BMI/Policy_Brief/ERIAB-BMI_PB_new_business_models.pdf

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*. doi:10.1177/014920639101700108

Berman, S. J., Kesterson-Townes, L., Marshall, A., & Srivathsa, R. (2012). How cloud computing enables process and business model innovation. *Strategy & Leadership*. doi:10.1108/10878571211242920

Bernaert, M., Poels, G., Snoeck, M., & De Backer, M. (2014). Enterprise Architecture for Small and Medium-Sized Enterprises: A Starting Point for Bringing EA to SMEs, Based on Adoption Models. *Information Systems for Small and Medium-Sized Enterprises*, 67–96. doi:10.1007/978-3-642-38244-4_4

Bhaskaran, S. (2006). Incremental Innovation and Business Performance: Small and Medium-Size Food E... *Journal of Small Business Management*, *44*(1), 64–80.

Bock, A. J., Opsahl, T., George, G., & Gann, D. M. (2012). The Effects of Culture and Structure on Strategic Flexibility during Business Model Innovation. *Journal of Management Studies*, *49*(2), 279–305. doi:10.1111/j.1467-6486.2011.01030.x

Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network Analysis in the Social Sciences. *Science*, *323*(April), 892–896. doi:10.1126/science.1165821

Bougrain, F., & Haudeville, B. (2002). Innovation, collaboration and SMEs internai research capacities. *Research Policy*, *31*(5), 735–747. doi:10.1016/S0048-7333(01)00144-5

Bouwman, H., De Vos, H., & Haaker, T. (2008). *Mobile service innovation and business models*. *Mobile Service Innovation and Business Models*. doi:10.1007/978-3-540-79238-3

Bouwman, H., Reuver, M. De, & Solaimani, S. (2012). Business models tooling and a research agenda, 1–28. Retrieved from http://aisel.aisnet.org/bled2012_special_issue/7/

Brännback, M., Carsrud, A. L., & Kiviluoto, N. (2012). *Understanding the Myth of High Growth Firms, The Theory of the Greater Fool*. London: Springer. doi:10.1007/978-88-470-2658-2

Brännback, M., Carsrud, A., Renko, M., Östermark, R., Aaltonen, J., & Kiviluoto, N. (2009). Growth and profitability in small privately held biotech firms: preliminary findings. *New Biotechnology*. doi:10.1016/j.nbt.2009.03.006

Bruque, S., & Moyano, J. (2007). Organisational determinants of information technology adoption and implementation in SMEs: The case of family and cooperative firms. *Technovation*, *27*(5), 241–253. doi:10.1016/j.technovation.2006.12.003

Bucherer, E., Eisert, U., & Gassmann, O. (2012). Towards Systematic Business Model Innovation: Lessons from Product Innovation Management. *Creativity and Innovation Management*, *21*(2), 183–198. doi:10.1111/j.1467-8691.2012.00637.x

Bullock, R. J. (1990). A Case Meta-Analysis of Gainsharing Plans as Organization Development Interventions. *The Journal of Applied Behavioral Science*. doi:10.1177/0021886390263011

Cainelli, G., Evangelista, R., & Savona, M. (2006). Innovation and economic performance in services: A firm-level analysis. *Cambridge Journal of Economics*, *30*(3), 435–458. doi:10.1093/cje/bei067

Calia, R. C., Guerrini, F. M., & Moura, G. L. (2007). Innovation networks: From technological development to business model reconfiguration. *Technovation*, *27*, 426–432. doi:10.1016/j.technovation.2006.08.003

Casadesus-Masanell, R., & Ricart, J. (2010). From strategy to business models and onto tactics. *Long Range Planning*, (November). Retrieved from http://www.sciencedirect.com/science/article/pii/S0024630110000051

Cavalcante, S., Kesting, P., & Ulhøi, J. (2011). Business model dynamics and innovation: (re)establishing the missing linkages. *Management Decision*, *49*(8), 1327–1342. doi:10.1108/00251741111163142

Cefis, E., & Marsili, O. (2005). A matter of life and death: Innovation and firm survival. *Industrial and Corporate Change*, *14*, 1167–1192. doi:10.1093/icc/dth081

Chen, J.-S., Hung Tai Tsou, & Huang, A. Y.-H. (2009). Service Delivery Innovation: Antecedents and Impact on Firm Performance. *Journal of Service Research*. doi:10.1177/1094670509338619

Chesbrough, H. (2003). *Open Innovation*. *Innovation* (Vol. 2006). Retrieved from http://www.saine.co.za/

Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*. doi:10.1108/10878570710833714

Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning*, *43*, 354–363. doi:10.1016/j.lrp.2009.07.010

Chesbrough, H., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, *11*, 529–555. doi:10.1093/icc/11.3.529

Christensen, J., & Drejer, I. (2005). The strategic importance of location: Location decisions and the effects of firm location on innovation and knowledge acquisition. *European Planning Studies*. doi:10.1080/09654310500187862

Chung, W. W. C., Yam, A. Y. K., & Chan, M. F. S. (2004). Networked enterprise: A new business model for global sourcing. *International Journal of Production Economics*. doi:10.1016/S0925-5273(03)00222-6

Churchill Jr., G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, *16*(1), 64–73. doi:10.2307/3150876

Cloo, J., Op't Land, M., Proper, E., & Waage, M. (2009). Positioning Enterprise Architecture. In *Enterprise Architecture* (pp. 25–47). doi:10.1007/978-3-540-85232-2_3

Cochran, W. G. (1952). The χ^2 Test of Goodness of Fit. *The Annals of Mathematical Statistics*. doi:10.1214/aoms/1177729380

Cohen, B., & Kietzmann, J. (2014). Ride On! Mobility Business Models for the Sharing Economy. *Organization & Environment*. doi:10.1177/1086026614546199

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, *35*(1), 128–152. doi:10.2307/2393553

Cooper, A. C., Woo, C. Y., & Dunkelberg, W. C. (1989). Entrepreneurship and the initial size of firms. *Journal of Business Venturing*. doi:10.1016/0883-9026(89)90004-9

Curtis, B., Kellner, M. I., & Over, J. (1992). Process Modeling. *Communications of the ACM*, *35*, 75–90. doi:10.1145/130994.130998

Damanpour, F. (1991). ORGANIZATIONAL INNOVATION: A META-ANALYSIS OF EFFECTS OF DETERMINANTS AND MODERATORS. *Academy of Management Journal*. doi:10.2307/256406

Damanpour, F., & Gopalakrishnan, S. (1998). Theories of organizational structure and innovation adoption: the role of environmental change. *Journal of Engineering and Technology Management*. doi:10.1016/S0923-4748(97)00029-5

Davenport, T. H. (1993). Process Innovation: Reengineering Work Through Information Technology. *Academy of Management Perspectives*. doi:10.5465/AME.1993.9411302338

Davenport, T. H., & Short, J. E. (1990). The New Industrial Engineering: Information Technology and Business Process Redesign | MIT Sloan Management Review. Retrieved February 27, 2015, from http://sloanreview.mit.edu/article/the-new-industrial-engineering-information-technology-and-business-process-redesign/

De Jong, J. P. J. (2013). The Decision to Exploit Opportunities for Innovation: A Study of High-Tech Small-Business Owners. *Entrepreneurship Theory and Practice*, *37*(2), 281–301. doi:10.1111/j.1540-6520.2011.00459.x

De Reuver, M., Bouwman, H., & Haaker, T. (2013). Business Model Roadmapping: a Practical Approach To Come From an Existing To a Desired Business Model. *International Journal of Innovation Management*, *17*, 1340006. doi:10.1142/S1363919613400069

De Reuver, M., Bouwman, H., & Maclnnes, I. (2009). Business model dynamics: a case survey. *Journal of Theoretical and Applied Electronic Commerce Research*. doi:10.4067/S0718-18762009000100002

Demil, B., & Lecocq, X. (2010). Business model evolution: In search of dynamic consistency. *Long Range Planning*, *43*, 227–246. doi:10.1016/j.lrp.2010.02.004

Denicolai, S., Ramirez, M., & Tidd, J. (2014). Creating and capturing value from external knowledge: the moderating role of knowledge intensity. *R&D Management*, *44*(3), 248–264. doi:10.1111/radm.12065

Dodge, H. R., Fullerton, S., & Robbins, J. E. (1994). Stage of the organizational life cycle and competition as mediators of problem perception for small businesses. *Strategic Management Journal*, *15*(2), 121–134. doi:10.1002/smj.4250150204

Dodge, H. R., & Robbins, J. E. (1992). An Empirical Investigation of the Organizational Life Cycle Model for Small Business Development and Survival. *Journal of Small Business Management*, *30*(1), 27–37. doi:Article

Downs, G. W., & Mohr, L. B. (1976). Conceptual Issues in the Study of Innovation. *Administrative Science Quarterly*, *21*(4), 700–714. doi:10.2307/2391725

Drucker, P. F. (2001). *The Essential Drucker*. NewYork: HarperCollins. Retrieved from http://books.google.com/books?id=bpy7KvlKOv4C&pgis=1

Dudley, A. (2006). Multiple dichotomous-scored items in second language testing: investigating the multiple true–false item type under norm-referenced conditions. *Language Testing*. doi:10.1191/0265532206lt327oa

El Sawy, O. A., Malhotra, A., Park, Y., & Pavlou, P. A. (2010). Seeking the configurations of digital ecodynamics: It takes three to tango. *Information Systems Research*, *21*(4), 835–848. doi:10.1287/isre.1100.0326

El Sawy, O. A., & Pereira, F. (2013). *Business Modelling in the Dynamic Digital Space - An Ecosystem Approach*. Springer. doi:10.1007/978-3-642-31765-1

Eriksson, C. I., Kalling, T., Åkesson, M., & Fredberg, T. (2008). Business Models for M-services : exploring the e-newspaper case from a consumer view. *Journal of Electronic Commerce in Organizations*, *6*, 29–57. Retrieved from http://search.proquest.com/docview/236430433?accountid=14611

Ettlie, J. E., Bridges, W. P., & O'Keefe, R. D. (1984). Organization Strategy and Structural Differences for Radical Versus Incremental Innovation. *Management Science*. doi:10.1287/mnsc.30.6.682

Ettlie, J. E., & Reza, E. M. (1992). Organizational Integration and Process Innovation. *Academy of Management Journal*, *35*(4), 795–827. doi:10.2307/256316

European Union. (2003). COMMISSION RECOMMENDATION of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. *Official Journal of the European Union*, 36–41. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:EN:PDF

Feldman, M. P. (1994). Knowledge complementarity and innovation. *Small Business Economics*, *6*(5), 363–372. doi:10.1007/BF01065139

Fielt, E. (2011). *Understanding business models*. *Business Service Management Whitepaper* (Vol. 3). Retrieved from http://eprints.qut.edu.au/41609/1/Business_Service_Management_Volume_3_Mar2011_Understanding_Business_Models_Final.pdf\nhttp://www.smartservicescrc.com.au/PDF/Business Service Management Volume 3.pdf

Forsman, H., & Temel, S. (2011). Innovation and Business Performance in Small Enterprises: an Enterprise-Level Analysis. *International Journal of Innovation Management*. doi:10.1142/S1363919611003258

Freel, M. S. (2000). Do Small Innovating Firms Outperform Non-Innovators ? *Small Business Economics*, *14*, 195–210. doi:10.1023/A:1008100206266

Fritscher, B., & Pigneur, Y. (2010). Supporting business model modelling: A compromise between creativity and constraints. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 5963 LNCS, pp. 28–43). doi:10.1007/978-3-642-11797-8_3

Fritscher, B., & Pigneur, Y. (2011). Business IT Alignment from Business Model to Enterprise Architecture. In *Advanced Information Systems Engineering Workshops* (Vol. 84, pp. 4–15). doi:10.1007/978-3-642-22056-2_2

Fritscher, B., & Pigneur, Y. (2014). Computer Aided Business Model Design: Analysis of Key Features Adopted by Users. *2014 47th Hawaii International Conference on System Sciences*, 3929–3938. doi:10.1109/HICSS.2014.487

Galunic, C., & Rodan, S. (1998). Resource recombinations in the firm: knowledge structures and the potential for Schumpeterian innovation. *Strategic Management Journal*, *19*(12), 1193–1201. doi:http://dx.doi.org/10.1002/(sici)1097-0266(1998120)19:12%3C1193::aid-smj5%3E3.3.co;2-6

Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: A literature review. *Journal of Product Innovation Management*, *19*, 110–132. doi:10.1016/S0737-6782(01)00132-1

Gennari, J. H., Musen, M. a, Fergerson, R. W., Grosso, W. E., Crubézy, M., Eriksson, H., … Tu, S. W. (2003). The evolution of Protégé: an environment for knowledge-based systems development. *International Journal of Human-Computer Studies*, *58*(1), 89–123. doi:10.1016/S1071-5819(02)00127-1

George, G., & Bock, A. J. (2011). The Business Model in Practice and its Implications for Entrepreneurship Research. *Entrepreneurship: Theory and Practice*, *35*(1), 83–111. doi:10.1111/j.1540-6520.2010.00424.x

Ghaziani, A., & Ventresca, M. J. (2005). Keywords and cultural change: Frame analysis of business model public talk, 1975-2000. *Sociological Forum*, *20*, 523–559. doi:10.1007/s11206-005-9057-0

Giesen, E., Berman, S. J., Bell, R., & Blitz, A. (2007). Three ways to successfully innovate your business model. *Strategy & Leadership*. doi:10.1108/10878570710833732

Giesen, E., Riddleberger, E., Christner, R., & Bell, R. (2010). Seizing the advantage. When and how to innovate your business model. *Strategy & Leadership*, *38*(4), 17 – 26. doi:10.1080/03071840008446544

Goethals, F. (2009). The Unified Business Model Framework. *Little Economie & Management*, *9*, 1–47. Retrieved from http://lem.icl-lille.fr/Portals/2/actus/DP_200909.pdf

Goodman, L. A. (1974). Exploratory latent structure analysis using both identifiable and unidentifiable models. *Biometrika*, *61*(2), 215. doi:10.2307/2334349

Goodstein, J., Boeker, W., & Stephan, J. (1996). Professional Interests and Strategic Flexibility: A Political Perspective on Organizational Contracting. *Strategic Management Journal*, *17*(7), 577–586. doi:10.2307/2486734

Gordijn, J., & Akkermans, H. (2001). Designing and evaluating E-business models. *IEEE Intelligent Systems and Their Applications*, *16*, 11–17. doi:10.1109/5254.941353

Gordijn, J., Akkermans, H., Koks, A., & Schildwacht, J. (2004). *User manual e 3 -value editor*. Amsterdam: Vrije Universiteit Amsterdam.

Gordijn, J., Osterwalder, A., & Pigneur, Y. (2005). Comparing two Business Model Ontologies for Designing e-Business Models and Value Constellations. In *18th Bled eConference - eIntegration in Action* (pp. 1–17).

Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*. doi:10.1016/j.nedt.2003.10.001

Granstrand, O., & Sjolander, S. (1990). The acquisition of technology and small firms by large firms. *Journal of Economic Behavior & Organization*, *13*, 367–386. doi:10.1016/0167-2681(90)90006-Y

Gruber, T. (1995). Toward principles for the design of ontologies used for knowledge sharing. *International Journal of Human-Computer Studies*, *43*(5-6), 907–928. doi:10.1006/ijhc.1995.1081

Guba, E. G., & Lincoln, Y. S. (1982). Epistemological and methodological bases of naturalistic inquiry. *Educational Communication & Technology*, *30*(4), 233–252. doi:10.1007/BF02765185

Gulati, R., & Puranam, P. (2009). Renewal Through Reorganization: The Value of Inconsistencies Between Formal and Informal Organization. *Organization Science*. doi:10.1287/orsc.1090.0421

Günzel, F., & Holm, A. B. (2013). One size does not fit all - understanding the front-end and back-end of business model innovation. *International Journal of Innovation Management*, *17*(1), 1340002–1340034. doi:10.1142/S1363919613400021

Hagenaars, J., & McCutcheon, A. (2002). *Applied Latent Class Analysis*. *Methodology*. New York: Cambridge University Press.

Haladyna, T. M., Downing, S. M., & Rodriguez, M. C. (2002). A Review of Multiple-Choice Item-Writing Guidelines for Classroom Assessment. *Applied Measurement in Education*. doi:10.1207/S15324818AME1503_5

Hambrick, D. C. (1984). Taxonomic Approaches to Studying Strategy: Some Conceptual and Methodological Issues. *Journal of Management*. doi:10.1177/014920638401000104

Hamel, G., & Prahalad, C. K. (1994). *Competing for the future*. Boston, MA: Harvard Business School Press.

Hammer, M., & Champy, J. (1993). Business process re-engineering. *London: Nicholas Brealey*. Retrieved from http://www.afcesa.af.mil/shared/media/document/AFD-071221-084.pdf\npapers2://publication/uuid/28F9B209-A065-4E2B-9052-CD083B266F48

Hansen, J. A. (1992). Innovation, firm size, and firm age. *Small Business Economics*, *4*, 37–44. doi:10.1007/BF00402214

Harmon, P. (2010). The Scope and Evolution of Business Process Management. In *Handbook on Business Process Management 1* (pp. 37–81). doi:10.1007/978-3-642-00416-2

Hartmann, M., Oriani, R., & Bateman, H. (2013). The Performance Effect of Business Model Innovation: An Empirical Analysis of Pension Funds. *druid8.sit.aau.dk*. Retrieved from http://druid8.sit.aau.dk/acc_papers/7t0xd95tfjict3vdq39qx68b8sdc.pdf

Hausman, A. (2005). Innovativeness among small businesses: Theory and propositions for future research. *Industrial Marketing Management*, *34*(8), 773–782. doi:10.1016/j.indmarman.2004.12.009

Hayashi, A. M. (2009). Do You Have A “Plan B”? | MIT Sloan Management Review. Retrieved March 1, 2015, from http://sloanreview.mit.edu/article/do-you-have-a-plan-b/

Hedman, J., & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European Journal of Information Systems*. doi:10.1057/palgrave.ejis.3000446

Heikkilä, J., Heikkilä, M., & Tinnilä, M. (2008). Electronic Commerce : Concepts , Methodologies , Information Science reference. In *Electronic Commerce:Concepts, Methodologies, Tools, and Applications* (pp. 221–231). New York.

Heikkilä, J., Tyrväinen, P., & Heikkilä, M. (2010). Designing for performance-a technique for business model estimation. *Proceedings of EBRF 2010, Research Forum to Understand Business in Knowledge Society*, 1–15. Retrieved from https://jyx.jyu.fi/dspace/handle/123456789/40780

Henfridsson, O., & Bygstad, B. (2013). The Generative Mechanisms of Digital Infrastructure Evolution. *MIS Quarterly*, *37*(3), 907–931.

Herrera, L., & Nieto, M. (2008). The national innovation policy effect according to firm location. *Technovation*, *28*, 540–550. doi:10.1016/j.technovation.2008.02.009

Heunks, F. J. (1998). Innovation, Creativity and Success. *Small Business Economics*, *10*(3), 263–272. doi:10.1177/103841118001800207

Hewitt-Dundas, N. (2006). Resource and capability constraints to innovation in small and large plants. *Small Business Economics*. doi:10.1007/s11187-005-2140-3

Ho, R. (2014). *Handbook of Univariate and Multivariate Data Analysis with IBM SPSS* (2nd ed.). FL: Taylor & Francis Group.

Hoffman, K., Parejo, M., Bessant, J., & Perren, L. (1998). Small firms, R&D, technology and innovation in the UK: a literature review. *Technovation*. doi:10.1016/S0166-4972(97)00102-8

Hollanders, H., & Arundel, A. (2007). Differences in socio-economic conditions and regulatory environment : explaining variations in national innovation performance and policy implications. *INNO-Metrics Thematic Paper*.

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288. doi:10.1177/1049732305276687

Huang, H.-C., Lai, M.-C., Lin, L.-H., & Chen, C.-T. (2013). Overcoming organizational inertia to strengthen business model innovation. An open innovation perspective. *Journal of Organizational Change Management*, *26*(6), 977–1002. doi:10.1108/JOCM-04-2012-0047

Huergo, E., & Jaumandreu, J. (2004). Firms' age, process innovation and productivity growth. *International Journal of Industrial Organization*, *22*, 541–559. doi:10.1016/j.ijindorg.2003.12.002

Huizingh, E. K. R. E. (2002). Towards Successful E-Business Strategies: A Hierarchy of Three Management Models. *Journal of Marketing Management*, *18*(March 2015), 721–747. doi:10.1362/0267257022780615

Hult, G. T. M., Hurley, R. F., & Knight, G. a. (2004). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management*, *33*(5), 429–438. doi:10.1016/j.indmarman.2003.08.015

Hurley, R. F., & Hult, G. T. M. (1998). Innovation, Market Orientation, and Organizational Learning: An Integration and Empirical Examination. *Journal of Marketing*, *62*(3), 42–54. doi:10.2307/1251742

Iacob, M. E., Meertens, L. O., Jonkers, H., Quartel, D. a C., Nieuwenhuis, L. J. M., & Sinderen, M. J. (2012). From enterprise architecture to business models and back. *Software & Systems Modeling*. doi:10.1007/s10270-012-0304-6

Itami, H., & Nishino, K. (2010). Killing two birds with one stone: Profit for now and learning for the future. *Long Range Planning*, *43*, 364–369. doi:10.1016/j.lrp.2009.07.007

Jacobs, D., & Kotzé, P. (2011). Enterprise architecture for small and medium enterprise growth. *Advances in Enterprise …*. Retrieved from http://link.springer.com/chapter/10.1007/978-3-642-21058-7_5

Janssen, W., Lankhorst, M., Haaker, T., & Vos, H. de. (2012). From Service Innovation to Service Engineering. In *Cloud Computing and Services Science* (pp. 33–51). New York: Springer Science+Business Media. doi:10.1007/978-1-4614-2326-3 2

Janssen, W., van Buuren, R., & Gordijn, J. (2005). Business Case Modelling for E-Services. *Telematica*, 1–12.

Jawahar, I. M., & McLaughlin, G. L. (2001). Toward a Descriptive Stakeholder Theory: An Organizational Life Cycle Approach. *The Academy of Management Review*. doi:10.2307/259184

Jaworski, B. J., & Kohli, A. K. (1993). Market Orientation: Antecedents and Consequences. *Journal of Marketing*, *57*(3), 53–70. doi:10.2307/1251854

Johansson, B., & Lööf, H. (2008). Innovation activities explained by firm attributes and location. *Economics of Innovation and New Technology*, *17*(6), 533–552. doi:10.1080/10438590701407349

Johnson, D. H. (1999). The Insignificance of Statistical Significance Testing. *The Journal of Wildlife Management*, *63*(3), 763–772. doi:10.2307/3802789

Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, *86*(12). doi:10.1111/j.0955-6419.2005.00347.x

Jonkers, H., Lankhorst, M. M., Buuren, R. Van, Hoppenbrouwers, S., Bonsangue, M., & Torre, L. Van Der. (2004). Concepts for modelling enterprise architectures. *International Journal of Cooperative Information Systems*, *13*, 257–287. doi:10.1142/S0218843004000985

Jurisch, M., Wolf, P., & Krcmar, H. (2013). Using the Case Survey Method for Synthesizing Case Study Evidence in Information Systems Research, 1–8. Retrieved from http://aisel.aisnet.org/amcis2013/ResearchMethods/GeneralPresentations/5/

Kannebley, S., Sekkel, J. V., & Araújo, B. C. (2010). Economic performance of Brazilian manufacturing firms: A counterfactual analysis of innovation impacts. *Small Business Economics*, *34*(3), 339–353. doi:10.1007/s11187-008-9118-x

Kaplan, R. S., & Norton, D. P. (2000). Having trouble with your strategy? Then map it. *Harvard Business Review*, *78*(5), 167–176, 202.

Kaufman, L., & Rousseeuw, P. J. (2005). *Finding Groups in Data, An Introduction to Cluster Analysis*. Hoboken, New Jersey: John Wiley & Sons, Ltd.

Kazanjian, R. K. (1988). RELATION OF DOMINANT PROBLEMS TO STAGES GROWTH IN TECHNOLOGY-BASED NEW VENTURES. *Academy of Management Journal*. doi:10.2307/256548

Kemp, R. G. M., Folkeringa, M., de Jong, J. P. J., & Wubben, E. F. M. (2003). *Innovation and firm performance*. Zoetermeer: EIM Business & Policy Research.

Kline, S. J., & Rosenberg, N. (1986). An Overview of Innovation. *European Journal of Innovation Management*. doi:10.1108/14601069810368485

Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology*. *Education* (Vol. 79). doi:10.2307/2288384

Lankhorst, M. M. (2004). Enterprise architecture modelling—the issue of integration. *Advanced Engineering Informatics*. doi:10.1016/j.aei.2005.01.005

Larsson, R. (1993). Case Survey Methodology: Quantitative Analysis of Patterns across Case Studies. *The Academy of Management Journal*, *36*, 1515–1546. doi:10.2307/256820

Larsson, R., & Finkelstein, S. (1999). Integrating Strategic, Organizational, and Human Resource Perspectives on Mergers and Acquisitions: A Case Survey of Synergy Realization. *Organization Science*. doi:10.1287/orsc.10.1.1

Lee, R. G., & Dale, B. G. (1998). Business process management: a review and evaluation. *Business Process Management Journal*, *4*, 214. doi:10.1108/14637159810224322

Lee, Y., Shin, J., & Park, Y. (2012). The changing pattern of SME's innovativeness through business model globalization. *Technological Forecasting and Social Change*, *79*(5), 832–842. doi:10.1016/j.techfore.2011.10.008

Leenders, M., & Wierenga, B. (2002). The effectiveness of different mechanisms for integrating marketing and R&D. *Journal of Product Innovation Management*, *19*(4), 305–317. doi:10.1016/S0737-6782(02)00147-9

Lewin, A. Y., & Massini, S. (2003). Knowledge Creation and Organizational Capabilities of Innovating and Imitating Firms. *Knowledge Creation Diffusion Utilization*, *pp*, 209–251.

Lim, L. K. S., Acito, F., & Rusetski, A. (2006). Development of archetypes of international marketing strategy. *Journal of International Business Studies*. doi:10.1057/palgrave.jibs.8400206

Linder, J., & Cantrell, S. (2000). *Changing Business Models : Surveying the Landscape*. Accenture Institute for Strategic Change.

Lindgardt, Z., Reeves, M., Stalk, G., & Deimler, M. S. (2009). Business Model Innovation: When the Game Gets Tough, Change the Game. *Boston Consulting Group*, (December), 9. doi:10.1108/10878570710833714

Lindgren, P. (2011). *NEW Global ICT-based Business Models*. The River Publishers Series in Standardisation.

Lindgren, P. (2012). Business Model Innovation Leadership: How Do SME's Strategically Lead Business Model Innovation? *International Journal of Business and Management*. doi:10.5539/ijbm.v7n14p53

Long, T., & Johnson, M. (2000). Rigour, reliability and validity in qualitative research. *Clinical Effectiveness in Nursing*, *4*, 30–37. doi:10.1054/cein.2000.0106

Lucas, W. A. (1974). *The Case Survey Method: Aggregating Case Experience*. Santa Monica, CA.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*(1), 135–172. doi:10.5465/AMR.1996.9602161568

Magretta, J. (1998). The power of virtual integration: an interview with Dell Computer's Michael Dell. Interview by Joan Magretta. *Harvard Business Review*, *76*(2), 73–84. doi:Interview

Magretta, J. (2002). Why business models matter. *Harvard Business Review*. doi:10.1016/j.cub.2005.06.028

Mahajan, V., Srinivasan, R., & Wind, J. (2002). The Dot.com Retail Failures of 2000: Were There Any Winners? *Journal of the Academy of Marketing Science*. doi:10.1177/009207002236919

Markard, J., & Truffer, B. (2006). Innovation processes in large technical systems: Market liberalization as a driver for radical change? *Research Policy*, *35*(5), 609–625. doi:10.1016/j.respol.2006.02.008

Markides, C. (2006). Disruptive Innovation: In Need of Better Theory*. *Journal of Product Innovation Management*, *23*(1), 19–25. doi:10.1111/j.1540-5885.2005.00177.x

Markides, C., & Sosa, L. (2013). Pioneering and first mover advantages: The importance of business models. *Long Range Planning*, *46*(4-5), 325–334. doi:10.1016/j.lrp.2013.06.002

McDermott, C. M., & O'Connor, G. C. (2002). Managing radical innovation: An overview of emergent strategy issues. *Journal of Product Innovation Management*, *19*, 424–438. doi:10.1016/S0737-6782(02)00174-1

McGrath, R. G. (2010). Business models: A discovery driven approach. *Long Range Planning*, *43*, 247–261. doi:10.1016/j.lrp.2009.07.005

McPhillips, S., & Merlo, O. (2008). Media convergence and the evolving media business model: an overview and strategic opportunities. *The Marketing Review*. doi:10.1362/146934708X337663

Meertens, L. O., Iacob, M. E., Nieuwenhuis, L. J. M., Sinderen, M. J. Van, & Bizzdesign, B. V. (2012). Mapping the Business Model Canvas to ArchiMate. In *Proceedings of the 27th Annual ACM Symposium on Applied Computing* (pp. 1694–1701). doi:10.1145/2245276.2232049

Meuter, M. L., Bitner, M. J., Ostrom, A. L., & Brown, S. W. (2005). Choosing Among Alternative Service Delivery Modes: An Investigation of Customer Trial of Self-Service Technologies. *Journal of Marketing*. doi:10.1509/jmkg.69.2.61.60759

Miles, M. B., & Huberman, A. M. (1984). *Qualitative Data Analysis: A Sourcebook of New Methods*. *SAGE PUBL INC P O BOX 5024 BEVERLY HILLS CA 90210USA 1984 264*. Retrieved from http://www.loc.gov/catdir/enhancements/fy0654/84002140-d.html

Mintzberg, H. (1978). Patterns in Strategy Formation. *Management Science*. doi:10.1287/mnsc.24.9.934

Mitchell, D. W., & Coles, C. B. (2004). Business model innovation breakthrough moves. *Journal of Business Strategy*, *25*(1), 16–26. doi:10.1108/02756660410515976

Modis, T. (1994). Forecasting the rise and fall of almost anything. *The Futurist*.

Mohr, L. B. (1969). Determinants of Innovation in Organizations. *The American Political Science Review*, *63*(1), 111–126. doi:10.2307/1954288

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: Toward a unified perspective. *Journal of Business Research*, *58*, 726–735. doi:10.1016/j.jbusres.2003.11.001

Morris, M., Shirokova, G., & Shatalov, A. (2013). The Business Model and Firm Performance: The Case of Russian Food Service Ventures. *Journal of Small Business Management*, *51*(1), 46–65. doi:10.1111/j.1540-627X.2012.00377.x

Nadkarni, S., & Narayanan, V. K. (2007). Strategic schemas, strategic flexibility, and firm performance: The moderating role of industry clockspeed. *Strategic Management Journal*, *28*(3), 243–270. doi:10.1002/smj.576

Neely, A., Filippini, R., Forza, C., Vinelli, A., & Hii, J. (2001). A framework for analysing business performance, firm innovation and related contextual factors: perceptions of managers and policy makers in two European regions. *Integrated Manufacturing Systems*. doi:10.1108/09576060110384307

Nieto, J., & Santamaría, L. (2010). Technological Collaboration : Bridging the Innovation Gap, *48*(1), 44–69.

Nohria, N., & Gulati, R. (1996). Is slack good or bad for innovation? *Academy of Management Journal*, *39*(5), 1245–1264. doi:10.2307/256998

O'Regan, N., Ghobadian, A., & Sims, M. (2006). Fast tracking innovation in manufacturing SMEs. In *Technovation* (Vol. 26, pp. 251–261). doi:10.1016/j.technovation.2005.01.003

OECD. (2005). *Oslo Manual - The measurement of scientific and technological activities. Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*. *Guidelines for Collecting and Interpreting Innovation …*. Retrieved from http://www.oecd.org/science/inno/2367580.pdf

Olson, E. M., Walker Orville C., J., & Ruekert, R. W. (1995). Organizing for Effective New Product Development: The Moderating Role of Product Innovativeness. *Journal of Marketing*, *59*(1), pp. 48–62. doi:10.2307/1252014

Onetti, A., Zucchella, A., Jones, M. V., & McDougall-Covin, P. P. (2010). Internationalization, innovation and entrepreneurship: business models for new technology-based firms. *Journal of Management & Governance*, *16*, 337–368. doi:10.1007/s10997-010-9154-1

Osborn, R. N., Jaunch, L. R., Martin, T. N., & Glueck, W. F. (1981). Research Notes. THE EVENT OF CEO SUCCESSION, PERFORMANCE, AND ENVIRONMENTAL CONDITIONS. *Academy of Management Journal*. doi:10.2307/255833

Osterwalder, A. (2004). *The Business Model Ontology - A Proposition in a Design Science Approach*. *Business*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.134.8520&rep=rep1&type=pdf\nhttp://www.stanford.edu/group/mse278/cgi-bin/wordpress/wp-content/uploads/2010/01/TheBusiness-Model-Ontology.pdf

Osterwalder, A., & Pigneur, Y. (2002). An e-business model ontology for modeling e-business. *15th Bled Electronic Commerce Conference, June 17-19*, 12. doi:10.1.1.16.633

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation*. *A Handbook for Visionaries, Game Changers, and Challengers*. Retrieved from http://books.google.com.au/books?id=fklTInjiPQAC&printsec=frontcover&dq=intitle:Business+Model+Generation+A+Handbook+for+Visionaries+Game+Changers+and+Challengers&cd=1&source=gbs_api\npapers2://publication/uuid/2DC52F55-F67F-429D-BC0D-E78D85AED7E7

Osterwalder, A., & Pigneur, Y. (2011). Aligning Profit and Purpose through Business Model Innovation. *Responsible Management Practices for the 21st Century*, 61–75.

Osterwalder, A., Pigneur, Y., & Tucci, C. (2005). Clarifying business models: origins, present, and future of the concept. *Communications of the Association for Information Systems*, *15*, 1–43. doi:10.1.1.83.7452

Oxford Dictionaries. (2015a). factor - definition of factor in English from the Oxford dictionary. Retrieved May 12, 2015, from http://www.oxforddictionaries.com/definition/english/factor

Oxford Dictionaries. (2015b). pattern - definition of pattern in English from the Oxford dictionary. Retrieved August 4, 2015, from http://www.oxforddictionaries.com/definition/english/pattern

Padgett, D., & Mulvey, M. S. (2007). Differentiation Via Technology: Strategic Positioning of Services Following the Introduction of Disruptive Technology. *Journal of Retailing*, *83*(4), 375–391. doi:10.1016/j.jretai.2007.03.010

Pateli, A. G., & Giaglis, G. M. (2004). A research framework for analysing eBusiness models. *European Journal of Information Systems*. doi:10.1057/palgrave.ejis.3000513

Patzelt, H., Zu Knyphausen-Aufseß, D., & Nikol, P. (2008). Top management teams, business models, and performance of biotechnology ventures: An upper echelon perspective. *British Journal of Management*, *19*, 205–221. doi:10.1111/j.1467-8551.2007.00552.x

Pauwels, K., & Weiss, A. (2008). Moving from Free to Fee: How Online Firms Market to Change Their Business Model Successfully. *Journal of Marketing*. doi:10.1509/jmkg.72.3.14

Pawson, R., & Tilley, N. (1997). *Realistic Evaluation*. SAGE Publication.

Pelham, A. M., & Wilson, D. T. (1995). A Longitudinal Study of the Impact of Market Structure, Firm Structure, Strategy, and Market Orientation Culture on Dimensions of Small-Firm Performance. *Journal of the Academy of Marketing Science*. doi:10.1177/009207039602400103

Peppard, J., & Rylander, A. (2006). From Value Chain to Value Network:. Insights for Mobile Operators. *European Management Journal*, *24*, 128–141. doi:10.1016/j.emj.2006.03.003

Piergiovanni, R., Santarelli, E., & Vivarelli, M. (1997). From Which Source Do Small Firms Derive Their Innovative Inputs? Some Evidence from Italian Industry. *Review of Industrial Organization*, *12*(2), 243–258. doi:10.1023/A:1007781501147

Pisano, G. P. (1990). The R&D Boundaries of the Firm: An Empirical Analysis. *Administrative Science Quarterly*, *35*(1), 153–176. doi:10.2307/2393554

Porter, M. E. (1996). What is Strategy? *Harvard Business Review*, *74*(6), 61–78. doi:10.1098/rspb.2008.0355

Porter, M. E. (1997). Competitive strategy. *Measuring Business Excellence*, *1*(2), 12–17. doi:10.1108/eb025476

Rahmati, P. (2013). *An Approach for Enterprise Architecture and Business Model alignment*. Delft University of Technology.

Rappa, M. (2002). Business Models on the Web. Retrieved from http://digitalenterprise.org/models/models.html

Roberts, J. (2000). From Know-how to Show-how? Questioning the Role of Information and Communication Technologies in Knowledge Transfer. *Technology Analysis & Strategic Management*. doi:10.1080/713698499

Rochina-Barrachina, M. E., Mañez, J. A., & Sanchis-Llopis, J. A. (2010). Process innovations and firm productivity growth. *Small Business Economics*, *34*(2), 147–166. doi:10.1007/s11187-008-9110-5

Rogers, M. (2004). Networks, firm size and innovation. *Small Business Economics*. doi:10.1023/B:SBEJ.0000014451.99047.69

Rosen Jonathan E. Schroeder, Elizabeth F. Purinton., D. E. (1998). Marketing High Tech Products: Lessons in Customer Focus From the Marketplace. *Academy of Marketing Science Review*, *1998*, 1. Retrieved from http://search.proquest.com/docview/200912274?accountid=14495\nhttp://diana.uca.es:4550/resserv?genre=article&issn=15261794&title=Academy+of+Marketing+Science+Review&volume=1998&issue=&date=1998-01-01&atitle=Marketing+High+Tech+Products:+Lessons+in+Custome

Ross, J. W., Weill, P., & Robertson, D. C. (2007). Enterprise Architecture as Strategy. *Center for Infor Mation Systems Research, MIT …*, 1–10. Retrieved from http://semanticommunity.info/@api/deki/files/6830/=JeanneRoss01082007.pdf

Schafer, J. L., & Graham, J. W. (2002). Missing data: our view of the state of the art. *Psychological Methods*, *7*(2), 147–177. doi:10.1037/1082-989X.7.2.147

Schumpeter, J. A. (1934). *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle*. *Harvard economic studies* (Vol. 46). doi:10.2307/1812657

Seegers, J. (2009). Helpdesk IBM SPSS Statistics 20. Retrieved June 6, 2015, from http://helpdeskspssabs.femplaza.nl/codebook.htm

Sekaran, U. (2006). *Research method for business: A skill-building approach*. *Writing*. John Wiley & Sons, Ltd. doi:http://www.slideshare.net/basheerahmad/research-methods-for-business-entire-ebook-by-uma-sekaran

Shafer, S. M., Smith, H. J., & Linder, J. C. (2005). The power of business models. *Business Horizons*. doi:10.1016/j.bushor.2004.10.014

Sidorova, A., & Isik, O. (2010). Business process research: a cross-disciplinary review. *Business Process Management Journal*, *16*, 566–597. doi:10.1108/14637151011065928

Slack, N., Chambers, S., Johnston, R., & Betts, A. (2012). *Operations and Process Management*. *Operations Management*.

Smith, K. G., Mitchell, T. R., & Summer, C. E. (1985). Top Level Management Priorities in Different Stages of the Organizational Life Cycle. *The Academy of Management Journal*, *28*(4), 799–820. doi:10.2307/256238

Solaimani, S., & Bouwman, H. (2012). A framework for the alignment of business model and business processes: A generic model for trans-sector innovation. *Business Process Management Journal*. doi:10.1108/14637151211253783

Sorescu, A., Frambach, R. T., Singh, J., Rangaswamy, A., & Bridges, C. (2011). Innovations in retail business models. *Journal of Retailing*, *87*(SUPPL. 1). doi:10.1016/j.jretai.2011.04.005

Sosna, M., Trevinyo-Rodríguez, R. N., & Velamuri, S. R. (2010). Business Model Innovation through Trial-and-Error Learning. *Long Range Planning*. doi:10.1016/j.lrp.2010.02.003

Spencer, A. S., & Kirchhoff, B. A. (2006). Schumpeter and new technology based firms: Towards a framework for how NTBFs cause creative destruction. *International Entrepreneurship and Management Journal*, *2*, 145–156. doi:10.1007/s11365-006-8681-3

Srnka, K. J., & Koeszegi, S. T. (2007). From Words to Numbers: How to Transform Qualitative Data into Meaningful Quantitative Results. *Schmalenbach Business Review (SBR)*, *59*(1), 29–57. Retrieved from http://content.epnet.com/ContentServer.asp?T=P&P=AN&K=23965455&EbscoContent=dGJyMMTo50Sep644yOvqOLCmrlGeprdSsK24TbWWxWXS&ContentCustomer=dGJyMPGrsUizqbZMuePfgeyx+Eu3q64A&D=buh

Stahl, G., Kremershof, I., & Larsson, R. (2004). Working Paper Series Trust Dynamics in Mergers and Acquisitions : A Case Survey. *Working Paper*.

Steffens, P., Davidsson, P., & Fitzsimmons, J. (2009). Performance configurations over time: Implications for growth- and profit-oriented strategies. *Entrepreneurship: Theory and Practice*, *33*(1), 125–148. doi:10.1111/j.1540-6520.2008.00283.x

Tamm, T., Seddon, P. B., Shanks, G., & Reynolds, P. (2011). How does enterprise architecture add value to organisations? *Communications of the Association for Information Systems*, *28*, 141–168.

Teece, D. (1996). Firm organization, industrial structure, and technological innovation. *Journal of Economic Behavior and Organization*, *31*(2), 193–224. doi:10.1016/S0167-2681(96)00895-5

Teece, D. (2010). Business models, business strategy and innovation. *Long Range Planning*, *43*, 172–194. doi:10.1016/j.lrp.2009.07.003

Teece, D., & Pisano, G. (1994). The dynamic capabilities of firms: An introduction. *Industrial and Corporate Change*, *3*(3), 537–556. doi:10.1093/icc/3.3.537-a

Tether, B. S. (1998). Small and large firms: sources of unequal innovations? *Research Policy*. doi:10.1016/S0048-7333(98)00079-1

Thayn, K. S. (2010). *An Evaluation of Multiple Choice Test Questions Deliberately Designed to Include Multiple Correct Answers*. Brigham Young University. Retrieved from http://scholarsarchive.byu.edu/etd/2450/

Tidd, J. (2001). Innovation management in context: environment, organization and performance. *International Journal of Management Reviews*, *3*(3), 169–183. doi:10.1111/1468-2370.00062

Timmers, P. (1998). Business models for electronic markets. *Electronic Markets*, *16*, 1067–73. doi:10.1080/10196789800000016

Treacy, M., & Wiersema, F. (1993). Customer Intimacy and Other Value Disciplines Customer Intimacy and Other Value Disciplines. *Harvard Business Review*, *71*(9301), 84–93. doi:10.1225/93107

Tripsas, M. (2008). Customer preference discontinuities: A trigger for radical technological change. *Managerial and Decision Economics*, *29*(2-3), 79–97. doi:10.1002/mde.1389

Verhees, F. J. H. M., Meulenberg, M. T. G., & Pennings, J. M. E. (2010). Performance expectations of small firms considering radical product innovation. *Journal of Business Research*, *63*(7), 772–777. doi:10.1016/j.jbusres.2009.06.006

Verschuren, P., & Doorewaard, H. (2010). *Designing a Research Project*. The Hague: Eleven International Publishing.

Versteeg, G., & Bouwman, H. (2006). Business architecture: A new paradigm to relate business strategy to ICT. *Information Systems Frontiers*, *8*, 91–102. doi:10.1007/s10796-006-7973-z

Weber, R. P. (1990). *Basic Content Analysis*. *Journal of the American Statistical Association* (Vol. 82). doi:10.2307/2289192

Wegmann, a. (2006). SeamCAD: Object-Oriented Modeling Tool for Hierarchical Systems in Enterprise Architecture. *Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06)*, 179c–179c. doi:10.1109/HICSS.2006.428

Weill, P., & Vitale, M. (2002). What IT infrastructure capabilities are needed to implement e-business models. *MIS Quarterly Executive*, *1*, 17–34. Retrieved from http://misqe.org/ojs2/index.php/misqe/article/view/22

White, M., & Marsh, E. (2006). Content analysis: A flexible methodology. *Library Trends*, *55*(1), 22–45. doi:10.1353/lib.2006.0053

Wolff, J. A., & Pett, T. L. (2006). Small-firm performance: Modeling the role of product and process improvements. *Journal of Small Business Management*. doi:10.1111/j.1540-627X.2006.00167.x

Yin, R., & Heald, K. (1975). Using the case survey method to analyze policy studies. *Administrative Science Quarterly*, *20*, 371–381. Retrieved from http://www.jstor.org/stable/10.2307/2391997

Yip, G. S. (2004). Using Strategy to Change Your Business Model. *Business Strategy Review*, *15*, 17–24. doi:10.1111/j.0955-6419.2004.00308.x

Yoon, Y., & Uysal, M. (2005). An examination of the effects of motivation and satisfaction on destination loyalty: A structural model. *Tourism Management*, *26*(1), 45–56. doi:10.1016/j.tourman.2003.08.016

Zeng, S. X., Xie, X. M., & Tam, C. M. (2010). Relationship between cooperation networks and innovation performance of SMEs. *Technovation*, *30*(3), 181–194. doi:10.1016/j.technovation.2009.08.003

Zhang, N. L. (2004). Hierarchical Latent Class Models for Cluster Analysis. *Journal of Machine Learning Research*, *5*, 697–723. doi:10.1177/0149206305279054

Zhang, Y., & Wildemuth, B. M. (2009). Qualitative analysis of content. In *Applications of social research methods to questions in information and library science* (pp. 308–319).

Zins, C. (2007). Conceptual Approaches for Defining Data, Information, and Knowledge. *Journal of the American Society for Information Science and Technology*, *58*(4), 479–493. doi:10.1002/asi.20508

Zomerdijk, L. G., & Voss, C. A. (2010). Service Design for Experience-Centric Services. *Journal of Service Research*. doi:10.1177/1094670509351960

Zott, C. (2003). Dynamic capabilities and the emergence of intraindustry differential firm performance: Insights from a simulation study. *Strategic Management Journal*, *24*(2), 97–125. doi:10.1002/smj.288

Zott, C., & Amit, R. (2007). Business Model Design and the Performance of Entrepreneurial Firms. *Organization Science*, *18*, 181–199. doi:10.1287/orsc.1060.0232

Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: Implications for firm performance. *Strategic Management Journal*, *29*, 1–26. doi:10.1002/smj.642

Zott, C., Amit, R., & Massa, L. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management*. doi:10.1177/0149206311406265

Appendix

Appendix A - Case survey coding scheme

No	Theme / Variables	Questions	Remarks
A. Case quality characteristics			
1	Research design	How is the data collected for this case? (e.g. Desk research, interviews, ,etc)	Essential variables
2	Publication status	Is the case published? (e.g., unpublished, student paper, business outlet, thesis / dissertation, research journal, etc)	Essential variables
3	Time period	In what year was this case done, which period?	Essential variables
B. Firm / organization's characteristics			
4	Firm's age	What is the age of the firm reported in the case? (founded in)	ENVISION variables
5	Organization phase	What is the phase the organization currently in? (startup, emerging / rapid growth, mature, declining)	Supporting variables
6	Firm's size	What is the size of the firm reported in the case turnover and FTE (if available)??	Supporting variables
7	Industry sector	What is the industry sector of the firm reported in the case? Is it a B2B or B2C market? What industry is served?	ENVISION variables
8	Market area	What is the market area of the firm? (National / International)	ENVISION variables
9	Geographic location	From which country / region does the firm in the case originate from?	Supporting variables
10	Value offering	What is the firm's value offering focus reported in the case? (product / services)	ENVISION variables
11	Ownership structure	Who own the business (or the majority shares of the business)? (private or publicly traded stock?)	ENVISION variables
12	Family business	Is this a family business or not?	ENVISION variables
13	Female involvements	Does the firm have female(s) as one of the owners or in the management board?	ENVISION variables

14	Technology level	What is the technology level of the firm in case? (high tech or low tech). Low-tech firm do not rely on R&D and do not use innovation management to achieve a competitive advantage through technological innovation	ENVISION variables
15	Value network / partner reliance	Does the firm need to use capabilities and resources of several actors or companies to create or deliver its product / services? Can you draw the eco-system?	ENVISION variables
16	Entrepreneurial orientation	Does the firm have a clear entrepreneurial orientation? Entrepreneurial orientation is characterized by boldness and tolerance for risk that lead to new market entry	Essential variables
17	Market orientation	Does the firm have a clear market orientation? A market orientation essentially involves doing something new or different in response to market conditions	Essential variables
18	Product leadership orientation	Does the firm have a clear product leadership orientation? Product leadership means offering customers with leading-edge products and services that consistently enhance the customer's use or application of the product, which make competitor's goods obsolete.	Essential variables
19	Creative culture	Does the firm in case have a culture that promotes creativity or innovative ideas?	Essential variables
C. Factors to business model innovation			
20	Environmental dynamism	Are there any turbulence in the environment of the firm (changes in market, technology, regulation, etc)?	Essential variables

21	Innovativeness	Does the firm in case open to new ideas or not? And does it have the capacity to adopt or implement new ideas, processes, or products successfully?	Essential variables
D. Business Model Innovation practice			
22	Type of BMI	What is the type of BMI? Is it a totally new BM for the firm (no previous BM, common with startups) or a BM modifications (compared to previous BM)	Essential variables
23	BMI drivers	What was the drivers behind BMI? (external vs. internal)	Essential variables
24	BMI expected outcome	What are the expected outcome from doing BMI? (e.g. Financial, sustainability, strategic positioning / flexibility)	ENVISION variables
25	BMI phase	What is the phase of BMI in the case? Is it related to BM design / brainstorming, BM analysis / testing, BM redesign, BM planning, BM implementation, etc?	ENVISION variables
26	BMI stakeholders	How do the firm manage its BMI process? Were internal and external stakeholders involved? If yes, what are their roles in the process?	ENVISION variables

27	Changes in BM elements	What are the elements of the business model that was changed by BMI? and what are the reasons behind the changes? If it is a new BM by startup (there are no previous BM), please describe the elements of the BM that is innovative according to the case 'changes' in this section can mean 1. A change or addition of BM elements from existing BM to new BM, or 2. A new BM elements (in case of new firm)	Essential variables
28	BM ontology selection	What is the BM ontology being used to change the BM in the case? and what are the reasons of choosing this ontology?	Essential variables
29	BM tooling	Is there any BM tooling used? If yes, what is the tool and what is the reason of using it?	ENVISION variables
30	Fit with strategy making	Is there any attempt to fit the BM with strategy making process? If yes, how was it done? Is there any impact to the strategy and vice versa?	ENVISION variables
E. Alignment of BM with operational processes			
31	Changes in operational area	What are the domains of operational area that was changed? What are the reasons?	Essential variables
32	Fit with operational model	Is there any attempt to fit the BM with operational model If yes, how was it done? is there any impact to the operational model? The changes in operational model can be in terms of its dimension (standardization & integration) and on the operating aspect of BM (value chain, cost model, organization)	ENVISION variables

33	Fit with EA	Is there any attempt to fit the BM with enterprise architecture (EA)? If yes, how was it done? What is the impact to EA?	ENVISION variables
34	EA frameworks selection	What is the EA framework being used in the case to align changes in BM with BP? (e.g. Zachman framework, TOGAF, ArchiMate, etc) and what are the reasons of choosing this specific frameworks?	Essential variables
F. BMI outcomes			
35	Radicalness of new BM	Is it a new business model (radical) or is it just small changes that adapted into the existing BM (incremental)?	Supporting variables
36	Disruptiveness of new BM	Is it totally new to the world or is it just a copy from existing business model in the market? It can also be seen if the new BM changes how the people work	Supporting variables
37	BM focus (architecture of transaction exchange)	Is it focused more on novelty or efficiency? Novelty-centered business model design refers to new ways of conducting economic exchanges among various participants, while efficiency-centered BM aims at reducing transaction costs for all transaction participants	ENVISION variables
38	Strategic flexibility	Did BMI process leads to strategic flexibility? strategic flexibility can be defined as the ability to identify innovation opportunities, commit resources to new courses of action, or reverse unproductive resource deployment	ENVISION variables
39	Improvement of BM understanding	Did BMI process leads to better understanding of BM?	ENVISION variables
40	BM weakness assessment	Did BMI process leads to finding blank spots or loophole of BM?	ENVISION variables
41	Improvement of BM communicability	Did BMI process leads to better communicability of BM?	ENVISION variables
G. Business Performances			

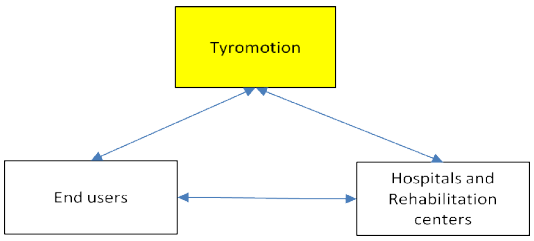
42	Performance metrics	What are the metrics or key performances indicator (KPI) used by the firm in the case to measure the success of BMI initiative?	ENVISION variables
43	Metric interpretations / achievements	Is the BMI initiative considered as successful according to the metric or KPI defined in the case? Why is that?	Supporting variables

Appendix B - Example of qualitative coding result

*put N/A if no information can be found in the case

No	Theme	Questions	case 26 (Tyromotion)
A. Case quality characteristics			
1	Research design / data collection	How is the data collected for this case? (e.g. Desk research, interviews, ,etc)	Interviews
2	Publication status / type	Is the case published? And what is the type of publication? (e.g., unpublished, student paper, business outlet, thesis / dissertation, research journal, etc)	ENVISION case study
3	Time period	In what year was this case done, which period?	2013 - 2015
B. Firm characteristics			
4	Firm's age	What is the age of the firm reported in the case? (founded in)	Founded in 2007
5	Organization phase	What is the phase the organization currently in? (startup, emerging / rapid growth, mature, declining)	startup
6	Firm's size	What is the size of the firm reported in the case turnover and FTE (if available)??	20 people, turnover was 2 million Euros in 2014
7	Industry sector	What is the industry sector of the firm reported in the case? Is it a B2B or B2C market? What industry is served?	Design and production of medical devices (manufacturing), focusing in B2B (hospitals, rehabilitation centers)
8	Market area	What is the market area of the firm? (National / International)	The market focus is Germany, Switzerland, Austria and US (international)

9	Geographic location	From which country / region does the firm in the case originate from?	Main office in Graz, Austria , branch offices in US and Germany
10	Value offering	What is the firm's value offering focus reported in the case? (product / services)	They are offering medical devices for rehabilitation training and in this case they are offering new mobile application to support the rehabilitation process (**product**)
11	Ownership structure	Who own the business (or the majority shares of the business)? (private or publicly traded stock?)	Private Limited Liability Company
12	Family business	Is this a family business or not?	It's not a family business
13	Female involvements	Does the firm have female(s) as one of the owners or in the management board?	No female involved
14	Technology level	What is the technology level of the firm in case? (high tech or low tech). Low-tech firm do not rely on R&D and do not use innovation management to achieve a competitive advantage through technological innovation	High-tech

15	Value network / partner reliance	Does the firm need to use capabilities and resources of several actors or companies to create or deliver its product / services? Can you draw the eco-system?	Yes, from the case description, Tyromotion will need partner to deliver its product, which is the rehabilitation centers which act as the distribution channel of the application. The hospitals and rehabilitation centers will also have a role to do promotion via vouchers to the end users. In turn end users will use the application and can pay to Tyromotion if they opt to use the premium services. Tyromotion will set up a backend services and marketing support for this application
		The ecosystem drawing the arrows in the drawing could mean the flows of tangible value (such as money or goods), intangible value (such as know-how) or information	

16	Entrepreneurial orientation	Does the firm have a clear entrepreneurial orientation? Entrepreneurial orientation is characterized by boldness and tolerance for risk that lead to new market entry	Yes, the information on the case stated that the entrepreneurs of the firm is committed and driven by innovation
17	Market orientation	Does the firm have a clear market orientation? A market orientation essentially involves doing something new or different in response to market conditions	No, Tyromotion is more technology-push oriented company
18	Product leadership orientation	Does the firm have a clear product leadership orientation? Product leadership means offering customers with leading-edge products and services that consistently enhance the customer's use or application of the product, which make competitor's goods obsolete.	To stay ahead of competition, they are constantly looking to increase the customer's value by enhancing their products and services
19	Creative culture	Does the firm in case have a culture that promotes creativity or innovative ideas?	Yes, the company values are focusing on R&D and customer oriented, hence we infer them to have a creative culture
C. Factors to business model innovation			

20	Environmental dynamism	Are there any turbulence in the environment of the firm (changes in market, technology, regulation, etc)?	The market dynamics is high, with limited competitors behaviour. The driving technologies in this market is the interfaces, automation and robotics
21	Innovativeness	Does the firm in case open to new ideas or not? And does it have the capacity to adopt or implement new ideas, processes, or products successfully?	Yes, they are focusing in R&D for their product development, hence they are constantly looking for new ideas.
D. Business Model Innovation Practice			
22	Type of BMI	What is the type of BMI? Is it a totally new BM for the firm (no previous BM, common with startups) or a BM modifications (compared to previous BM)	BM modifications (changes to previous BM)
23	BMI driver	What was the driver behind BMI? (external vs. internal)	**<u>Internal driver:</u>** - to stay ahead of competition and maintain their innovative image - they have a new iPad application (Finger Motion) that is potentially can change the firm's business model
24	BMI expected outcome	What are the expected outcome from doing BMI? (e.g. Financial, sustainability, strategic positioning / flexibility)	- A new BM that can accommodate the new product that can keep them stay ahead of competition. - increased customer loyalty - growing brand awareness

25	BMI phase	What is the phase of BMI in the case? Is it related to BM design / brainstorming, BM analysis / testing, BM redesign, BM planning, BM implementation, etc?	It's a BM redesign phase, since the company is modifying its existing BM but not implemented yet
26	BMI stakeholders	How do the firm manage its BMI process? Were internal and external stakeholders involved? If yes, what are their roles in the process?	No information on who leads the BMI within the firm. It is the author / researcher that are trying to map the BMI process
27	Changes in BM elements	What are the elements of the business model that was changed by BMI? and what are the reasons behind the changes? If it is a new BM by startup (there are no previous BM), please describe the elements of the BM that is innovative according to the case 'changes' in this section can mean 1. A change or addition of BM elements from existing BM to new BM, or 2. A new BM elements (in case of new firm)	**- changes in products** adding new mobile application for tablet PCs to assist with the rehabilitation **- changes in channel** rehabilitation centers become part of their distribution channels to promote the application and giving out vouchers to the patients **- changes in target market** new target market from conventional institutions (hospitals, therapy centers, rehabilitation-centers) into end users (patients and their relatives) **- change in revenue model** The new application will be using freemium model. The new revenue streams will come from the premium features of the application. **- change in branding or marketing activities** using vouchers that is given to the patients by rehabilitation centers to use the premium features of the app at lower price

28	BM ontology selection	What is the BM ontology being used to change the BM in the case? and what are the reasons of choosing this ontology?	The ontology used is CANVAS, but no reason of selecting this ontology
29	BM tooling	Is there any BM tooling used? If yes, what is the tool and what is the reason of using it?	N/A
30	Fit with strategy making	Is there any attempt to fit the BM with strategy making process? If yes, how was it done? Is there any impact to the strategy and vice versa?	The company is actively pursuing new innovation opportunities to stay ahead of their competitors. However the innovation that they did (iPad application) is an incremental innovation that close to their core competency and complements their main product / services. They decided to develop the application further after some success, which we infer that they have a Analyzer strategy. This strategy is impacting their BM, because they have to extend their current BM to accommodate with this new incremental changes.
E. Alignment of BM with operational processes			

31	Changes in operational area	What are the domains of operational area that was changed? What are the reasons?	**Value layer** - Product domain: the new product (value object) that is essential in the new BM is the iPad application - Organization domain: will need new backends and marketing support within Tyromotion **Process layer** - Process domain: new processes such as distributing vouchers to the rehabilitation centers and end-users - Process dependencies: the usage of the application by the end-users will depend on the marketing process done by the rehabilitation centers
32	Fit with operational model	Is there any attempt to fit the BM with operational model If yes, how was it done? is there any impact to the operational model? The changes in operational model can be in terms of its dimension (standardization & integration) and on the operating aspect of BM (value chain, cost model, organization)	**organization** aspect: - will need to set up new back ends for administration of rehabilitation centers that are participating - need to develop marketing assistance systems for the rehabilitation centers that are participating

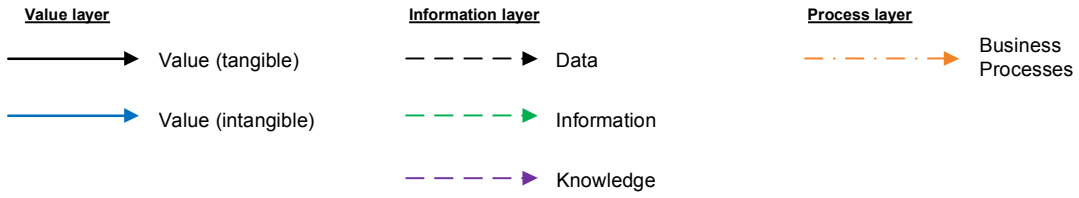
33	Fit with EA	Is there any attempt to fit the BM with enterprise architecture (EA)? If yes, how was it done? What is the impact to EA?	There are no attempt to fit new BM to EA
34	EA frameworks selection	What is the EA framework being used in the case to align changes in BM with BP? (e.g. Zachman framework, TOGAF, ArchiMate, etc) and what are the reasons of choosing this specific frameworks?	N/A
F. BMI outcomes			
35	Radicalness of new BM	Is it a new business model (radical) or is it just small changes that adapted into the existing BM (incremental)?	The changes in the business model is an incremental change. Even though there are multiple changes in the elements of the BM, the nature of the changes is just an addition on top of the existing process without affecting the existing process (BM extension)
36	Disruptiveness of new BM	Is it totally new to the world or is it just a copy from existing business model in the market? It can also be seen if the new BM changes how the people work	It's not disruptive, since it is a copy from existing businesses
37	BM focus (architecture of transaction exchange)	Is it focused more on novelty or efficiency? Novelty-centered business model design refers to new ways of conducting economic exchanges among various participants, while efficiency-centered BM aims at reducing transaction costs for all transaction participants	It is a novelty-focused BM, because the economic exchanges are done not with the usual stakeholders (institution) but also with the end-users

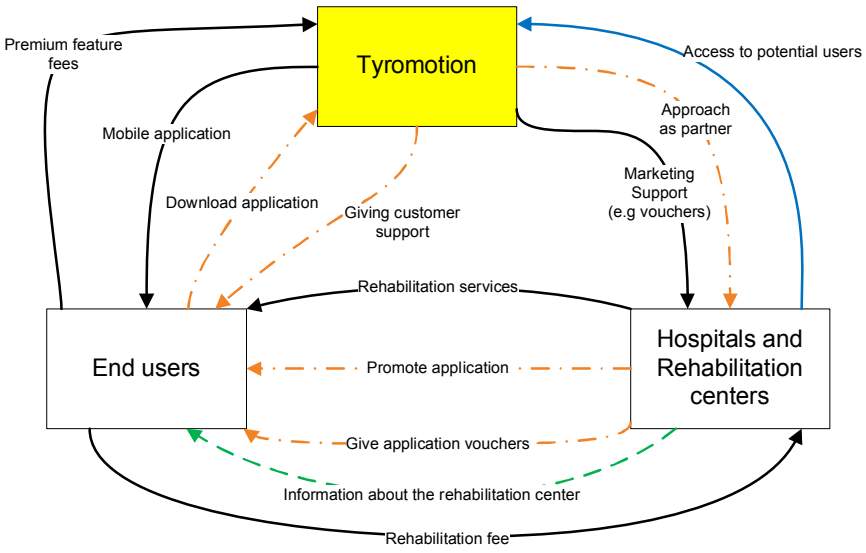
38	Strategic flexibility	Did BMI process leads to strategic flexibility? strategic flexibility can be defined as the ability to identify innovation opportunities, commit resources to new courses of action, or reverse unproductive resource deployment	N/A
39	Improvement of BM understanding	Did BMI process leads to better understanding of BM?	Yes, from the case decryption, the author is able to understand and identified the changes in the BM clearly
40	BM weakness assessment	Did BMI process leads to finding blank spots or loophole of BM?	N/A
41	Improvement of BM communicability	Did BMI process leads to better communicability of BM?	N/A
G. Business Performances			

42	Performance metrics	What are the metrics or key performances indicator (KPI) used by the firm in the case to measure the success of BMI initiative?	- number of downloads of the app - number of mentions in relevant literature - number of issued vouchers
43	Metric interpretations / achievements	Is the BMI initiative considered as successful according to the metric or KPI defined in the case? Why is that?	Too early to tell since application just launched in February 2015

Appendix C - Example of VIP framework

VIP Framework for CASE: 26. Tyromotion





Appendix D - Case name and owners

Case number	Case name	Institutions
1	eTasku Solutions	TU Delft (Netherlands)
2	Plantui Oy	TU Delft (Netherlands)
3	Taloset Oy	TU Delft (Netherlands)
4	Derigo	TU Delft (Netherlands)
5	Rival Games	TU Delft (Netherlands)
6	Deliverde	TU Delft (Netherlands)
7	Vaadin Oy	TU Delft (Netherlands)
8	Law Firm 1	TU Delft (Netherlands)
9	IT Service Provider 1	TU Delft (Netherlands)
10	Educational service provider 1	TU Delft (Netherlands)
11	Horticulture service provider	TU Delft (Netherlands)
12	Software company	TU Delft (Netherlands)
13	Educational service provider 2	TU Delft (Netherlands)
14	Optomed	Innovalor & TU Delft (Netherlands)
15	Neva Tours Oy	TU Delft (Netherlands)
16	Betribes	TU Delft (Netherlands)
17	internet service provider	TU Delft (Netherlands)
18	SmarterBetterCities	TU Delft (Netherlands)
19	ZwitserLeven	TU Delft (Netherlands)
20	Mita-Teknik A/S	TU Delft (Netherlands)
21	DoBots	TU Delft (Netherlands)
22	Dialogues Technology	TU Delft (Netherlands)

23	Pharma Training Company	University of Turku (Finland)
24	elderly care provider	TU Delft (Netherlands)
25	platform provider	TU Delft (Netherlands)
26	Tyromotion	EVOLARIS (Austria)
27	mobile & internet access provider	University of Turku (Finland)
28	TechStartLab	TU Delft (Netherlands)
29	SGNET for the first phase of the project	TU Delft (Netherlands)
30	ABC Ads	TU Delft (Netherlands)
31	SunnyBag	EVOLARIS (Austria)
32	UAB Laureti	KTU (Finland)

Appendix E - List of variables (output of categorization)

Original variables	Variable code	Variable description
Data collection	DC1	Desk research
	DC2	Interview
	DC3	Workshops
	DC4	Data triangulation
	DC5	Participatory observation
Publication Type	PT1	Student case (single observer
	PT2	Student case (multiple observers
	PT3	Master thesis
	PT4	PhD thesis (single observers
	PT5	Research journal
	PT6	Envision case study
	PT7	Project report
Time period	TP	Ratio scale: input the number (in months)
Firm age	FA	Ratio scale: input the number (in years)
Organization phase	OP1	Startup
	OP2	Emerging / rapid growth
	OP3	Mature
Firm size	FS1	< 10 employees (micro firms
	FS2	< 50 employees (small firms
	FS3	< 250 employees (medium firms
Industry area	IA1	Agricultural
	IA2	Entertainment
	IA3	ICT / high tech
	IA4	Manufacturing
	IA5	Medical / healthcare
	IA6	Other
Market segment	MS1	B2C
	MS2	B2B
	MS3	B2C and B2B
Market area	MA	Market area [(0) National; (1) International]
Geo location	GL1	Finland
	GL2	Netherlands
	GL3	Austria
	GL4	Germany
	GL5	Denmark
	GL6	Lithuania
	GL7	Switzerland
Value offering	VO1	Product
	VO2	Service
	VO3	Product and service
Ownership structure	OS1	Private company, no investors
	OS2	Private company, investors involved

	OS3	Private company, no information on investors
Family business	FB	Family business [(1) Yes; (0) No]
Female involvement	FI	Female involvements [(1) Yes; (0) No]
Technology level	TL	Technology level [(1) High tech; (0) Low tech]
Partner reliance	PR	Partner reliance [(1) Yes; (0) No]
Entrepreneurial orientation	EO	Entrepreneurial orientation [(1) Yes; (0) No]
Market orientation	MO	Market orientation [(1) Yes; (0) No]
Product leadership orientation	PL	Product leadership orientation [(1) Yes; (0) No]
Creative culture	CC	Creative culture [(1) Yes; (0) No]
Environmental dynamism	ED1	Market dynamics
	ED2	Technology dynamics
	ED3	Regulation dynamics
Innovativeness	IN1	Openness to new ideas exist
	IN2	Capacity to innovate exist
	IN3	Openness to new ideas & capacity to innovate
Type of BMI	TOB	Type of BMI [(1) New BM to the firm]; (0) BM modification]
BMI driver (source of driver)	BSD1	External drivers - market dynamics
	BSD2	External drivers - technology dynamics
	BSD3	External drivers - regulation dynamics
	BSD4	Internal drivers - high innovativeness
	BSD5	Internal drivers - low business performance
	BSD6	Internal drivers - high business performance
BMI driver (type of driver)	BTD	BMI driver (type of driver) [(1) Forced to do BMI; (0) Voluntary BMI]
BMI expected outcome	BEO1	Better customer service
	BEO2	Extension to product range
	BEO3	Enhancement to existing product
	BEO4	Lower cost
	BEO5	Financial improvement
	BEO6	Strategic positioning
	BEO7	Sustainability
	BEO8	Strategic flexibility
	BEO9	Extension on target market
BMI phase	BP1	BM design
	BP2	BM re-design
	BP3	BM planning
	BP4	BM testing
	BP5	BM implementation
BMI stakeholders	BS1	Internal stakeholder
	BS2	External stakeholder
	BS3	Internal and External stakeholder
Changes in BM elements	CB1	New goods / products
	CB2	New services
	CB3	Changes in production methods

	CB4	Changes in support activities
	CB5	Changes in channels, or complementing existing physical channels with digital (mobile
	CB6	Changing of pricing (model
	CB7	New or changed revenue models
	CB8	Change in promotion / branding activities
	CB9	Change in businesses practices (way of working
	CB10	Change in organizational network or eco-system of which the firm is part of
	CB11	Change in work organization
	CB12	Changes in target market
	CB13	Changes in technology used
	CB14	Changes in cost structure
BM ontology selection	BOS1	CANVAS
	BOS2	CSOFT
	BOS3	STOF
	BOS4	VISOR
BM ontology user	BOU1	Firm
	BOU2	Researchers / consultants
	BOU3	Both firm and researchers / consultants
BM tooling	BTL1	CANVAS software
	BTL2	CSOFT drawing
	BTL3	BM stress-testing
Fit with strategy making	FSM	Fit with strategy making [(1) New BM aligned with strategy making; (0) No alignment with strategy]
Changes in operational area	CO1	Product domain
	CO2	Organization domain
	CO3	Value dependencies
	CO4	Information domain
	CO5	Data domain
	CO6	Trust dependencies
	CO7	Process domain
	CO8	Application domain
	CO9	Technical infrastructure domain
	CO10	Process dependencies
Fit with operational model	FOM1	Changes in value chain
	FOM2	Changes in organization
	FOM3	Changes in cost model
Fit with EA	FEA	Fit with EA [(1) There is attempt to fit new BM with EA; (0) No attempt to fit new BM to EA]
EA frameworks selection	EAF1	ArchiMate
	EAF2	TOGAF
	EAF3	Carnagie Mellon

Radicalness of new BM	RBM1	Incremental (BM extension
	RBM2	Radical (BM creation
	RBM3	Radical (BM revision
Disruptiveness of new BM	DBM	Disruptiveness of new BM [(1) Disruptive; (0) Not disruptive]
BM focus	BMF	BM focus [(1) Novelty-focus; (0) Efficiency-focus]
Strategic flexibility	SF	Strategic flexibility [(1) BMI leads to strategic flexibility; (0) BMI does not lead to strategic flexibility]
Improvement in BM understanding	BMU	Improvement of BM understanding [(1) Yes ; (0) No]
Improvement in BM weakness assessment	BMW	Improvement of BM weakness assessment [(1) Yes ; (0) No]
Improvement of BM communicability	BMC	Improvement of BM communicability [(1) Yes ; (0) No]
Performance metrics	KPI1	Profit
	KPI2	Revenue
	KPI3	Costs
	KPI4	Cashflows
	KPI5	Sales volume
	KPI6	Price
	KPI7	EBIT
	KPI8	ROI
	KPI9	Cash balance
	KPI10	Revenue growth
	KPI11	Customer satisfaction
	KPI12	Value to customers
	KPI13	Customer service
	KPI14	Customer retention
	KPI15	Number of customers
	KPI16	Customer growth
	KPI17	Repeat order
	KPI18	Number of downloads
	KPI19	Marketing effectiveness
	KPI20	Conversion rate
	KPI21	Brand image
	KPI22	Operation efficiency
	KPI23	Product quality
	KPI24	Employee turnover
Metric interpretations / achievements	KPIA	BMI impact to business performance [(1) Yes, it improve business performance ; (0) No clear impact on business performance]

Appendix F - Descriptive analysis charts

Table F.1 - Association analysis between case quality variables and substantive variables

		Dependent Variables (DV)					
	Aggregated variables	External drivers (Interval)	Internal drivers (Interval)	Changes in BM elements (interval)	BM ontology selection (Binary	Changes in operational area (interval)	EA frameworks (binary)
Independent Variables (IV)	Data collection (interval)	Pearson Correlation: not normally distributed	Pearson Correlation: not normally distributed	Pearson correlation: not significant	Logistic regression: Not significant	Pearson correlation: not significant	Logistic regression: not significant
	Publication Type (Binary)	Point-biserial correlation: not normally distributed	Point-biserial correlation: not normally distributed	Point-biserial correlation: not normally distributed	Phi coefficient: not significant	Point-biserial correlation: not normally distributed	Phi coefficient: not significant
	Time period (Ratio)	Pearson Correlation: cannot test normality, due to invalid cases or data only contain Constanta	Pearson Correlation: cannot test normality, due to invalid cases or data only contain Constanta	Pearson correlation: not normally distributed	Logistic regression: Not significant	Pearson correlation: not normally distributed	Logistic regression: Not significant

Table F.2 - Chi Square test feasibility between the case quality variables and the substantive variables

		Dependent Variables (DV)					
		External drivers (multiple responses)	Internal drivers (multiple responses)	Changes in BM elements (multiple responses)	BM ontology selection (multiple responses)	Changes in operational area (multiple responses)	EA frameworks (multiple responses)
Independent Variables (IV)	Data collection (multiple responses)	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive
	Publication Type (multiple responses)	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive
	Time period (single response)	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive	Not feasible: categories are not mutual exclusive

Table F.3 - The impact of firm size and organization phase to the BMI drivers experienced

Firm Size[a]				BMI Drivers[a]						Total Responses	Total cases (N)
				external drivers - market dynamics	external drivers - technology dynamics	external drivers - regulation dynamics	internal drivers - high innovativeness	internal drivers - low business performance	internal drivers - high business performance		
Firm size: < 10 employees (micro)	Organization Phase[a]	Organization phase: startup	Count	2		1	1	4	0	8	5
			% within $OrganizationPhase	25.0%		12.5%	12.5%	50.0%	0.0%		
		Organization phase: emerging / rapid growth	Count	2		0	1	1	2	6	5
			% within $OrganizationPhase	33.3%		0.0%	16.7%	16.7%	33.3%		
	Total		Count	4		1	2	5	2	14	10
Firm size: < 50 employees (small)	Organization Phase[a]	Organization phase: startup	Count	0	0		2		0	2	2
			% within $OrganizationPhase	0.0%	0.0%		100.0%		0.0%		
		Organization phase: emerging / rapid growth	Count	1	1		0		2	4	3
			% within $OrganizationPhase	25.0%	25.0%		0.0%		50.0%		
		Organization phase: mature	Count	1	0		0		0	1	1
			% within $OrganizationPhase	100.0%	0.0%		0.0%		0.0%		
	Total		Count	2	1		2		2	7	6
Firm size: < 250 employees (medium)	Organization Phase[a]	Organization phase: emerging / rapid growth	Count	0	0		0	1	0	1	1
			% within $OrganizationPhase	0.0%	0.0%		0.0%	100.0%	0.0%		
		Organization phase: mature	Count	2	2		2	2	1	9	4
			% within $OrganizationPhase	22.2%	22.2%		22.2%	22.2%	11.1%		
	Total		Count	2	2		2	3	1	10	5
	TOTAL ALL			8	3	1	6	8	5	31	21

Table F.4 - BMI drivers impact to BM element changes

		External drivers		Internal drivers	
		Count	Column Responses %	Count	Column Responses %
Changes in BM Elements	New goods / products	1	1%	9	9%
	New services	16	18%	14	14%
	Changes in production methods	0	0%	3	3%
	Changes in support activities	3	3%	2	2%
	Changes in channels	7	8%	8	8%
	Changing of pricing (model)	4	5%	3	3%
	New or changed revenue models	9	10%	7	7%
	Change in promotion / branding	6	7%	6	6%
	Change in businesses practices	4	5%	8	8%
	Change in organizational network	12	14%	14	14%
	Change in work organization	0	0%	3	3%
	Changes in target market	11	13%	12	12%
	Changes in technology used	12	14%	10	10%
	Changes in cost structure	3	3%	0	0%
	Total Responses	88	100%	99	99%
	Total N	17		21	

Table F.5 - BMI drivers breakdown and impact to BM element changes

	external drivers - market dynamics		external drivers - technology dynamics		external drivers - regulation dynamics		internal drivers - high innovativeness		internal drivers - low business performance		internal drivers - high business performance	
	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %
New goods / products	3	4.7%	0	0.0%	0	0.0%	6	13.6%	4	11.1%	2	10.0%
New services	9	14.1%	4	25.0%	1	12.5%	5	11.4%	5	13.9%	2	10.0%
Changes in production methods	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	2.8%	2	10.0%
Changes in support activities	3	4.7%	0	0.0%	0	0.0%	1	2.3%	0	0.0%	1	5.0%
Changes in channels	5	7.8%	1	6.3%	1	12.5%	3	6.8%	3	8.3%	2	10.0%
Changing of pricing (model)	2	3.1%	1	6.3%	1	12.5%	3	6.8%	0	0.0%	0	0.0%
New or changed revenue models	7	10.9%	1	6.3%	1	12.5%	4	9.1%	3	8.3%	0	0.0%
Change in promotion / branding	4	6.3%	1	6.3%	1	12.5%	3	6.8%	1	2.8%	2	10.0%
Change in businesses practices	4	6.3%	0	0.0%	0	0.0%	2	4.5%	5	13.9%	1	5.0%
Change in organizational network	9	14.1%	2	12.5%	1	12.5%	7	15.9%	5	13.9%	2	10.0%
Change in work organization	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	5.6%	1	5.0%
Changes in target market	7	10.9%	3	18.8%	1	12.5%	5	11.4%	4	11.1%	3	15.0%
Changes in technology used	8	12.5%	3	18.8%	1	12.5%	5	11.4%	3	8.3%	2	10.0%
Changes in cost structure	3	4.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total (N)	12	100.0%	4	100.0%	1	100.0%	9	100.0%	8	100.0%	4	100.0%

Table F.6 - BMI drivers impact to BM ontology selection

	External drivers		Internal drivers	
	Count	Column Responses %	Count	Column Responses %
CANVAS	7	39%	9	35%
CSOFT	2	11%	4	15%
STOF	7	39%	8	31%
VISOR	2	11%	5	19%
Total responses	18	100%	26	100%
Total N	17		21	

Table F.7 - BMI drivers impact to operational changes

		External drivers		Internal drivers	
		Count	Column Responses %	Count	Column Responses %
Changes in Operational Area	Product domain	8	8%	12	10%
	Organization domain	8	8%	15	13%
	Value dependencies	13	12%	16	14%
	Information domain	13	12%	14	12%
	Data domain	7	7%	6	5%
	Trust dependencies	9	9%	8	7%
	Process domain	14	13%	17	15%
	Application domain	11	10%	10	9%
	Technical infrastructure domain	10	10%	6	5%
	Process dependencies	12	11%	12	10%
	Total responses	105	100%	116	100%
	Total (N)	16		21	

Table F.8 - BMI drivers breakdown and impact to operational changes

	external drivers - market dynamics		external drivers - technology dynamics		external drivers - regulation dynamics		internal drivers - high innovativeness		internal drivers - low business performance		internal drivers - high business performance	
	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %	Count	Column Responses %
Product domain	6	8.7%	1	3.7%	1	11.1%	7	13.7%	4	9.8%	1	4.2%
Organization domain	6	8.7%	2	7.4%	0	0.0%	4	7.8%	7	17.1%	4	16.7%
Value dependencies	8	11.6%	4	14.8%	1	11.1%	7	13.7%	5	12.2%	4	16.7%
Information domain	9	13.0%	3	11.1%	1	11.1%	6	11.8%	6	14.6%	2	8.3%
Data domain	5	7.2%	1	3.7%	1	11.1%	2	3.9%	3	7.3%	1	4.2%
Trust dependencies	5	7.2%	3	11.1%	1	11.1%	4	7.8%	2	4.9%	2	8.3%
Process domain	9	13.0%	4	14.8%	1	11.1%	6	11.8%	6	14.6%	5	20.8%
Application domain	7	10.1%	3	11.1%	1	11.1%	6	11.8%	2	4.9%	2	8.3%
Technical infrastructure domain	7	10.1%	2	7.4%	1	11.1%	3	5.9%	1	2.4%	2	8.3%
Process dependencies	7	10.1%	4	14.8%	1	11.1%	6	11.8%	5	12.2%	1	4.2%
Total	11	100.0%	4	100.0%	1	100.0%	8	100.0%	8	100.0%	5	100.0%

Appendix G - Statistical results

Table G.1 - BMI Source of drivers - Type of drivers

External drivers with BMI type of drivers

Logistic Regression

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	18.240[a]	.001	.001

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ExternalDrivers	-.134	1.376	.009	1	.923	.875
	Constant	-.426	1.753	.059	1	.808	.653

a. Variable(s) entered on step 1: ExternalDrivers.

Point-Biserial coefficient

Test of normality

Tests of Normality

BMI External Drivers		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BMI driver (type of driver)	Low level	.401	11	.000	.625	11	.000
	Moderate level	.385	3		.750	3	0.000

a. Lilliefors Significance Correction

Internal drivers to BMI type of drivers

Logistic Regression

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	25.008[a]	.091	.123

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	InternalDrivers	21.742	40192.991	.000	1	1.000	##########
	Constant	-22.281	40192.991	.000	1	1.000	.000

a. Variable(s) entered on step 1: InternalDrivers.

Point-Biserial coefficient

Tests of Normality[b]

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
BMI Internal Drivers		Statistic	df	Sig.	Statistic	df	Sig.
BMI driver (type of driver)	Low level	.403	19	.000	.616	19	.000

a. Lilliefors Significance Correction

b. BMI driver (type of driver) is constant when BMI Internal Drivers = Moderate level. It has been omitted.

Table G.2 - Firm size and organization phase association to BMI drivers

Association with external drivers

Tests of Normality[a]

		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
Organization Phase		Statistic	df	Sig.	Statistic	df	Sig.
BMI External Drivers	1.00	.470	13	.000	.533	13	.000

a. BMI External Drivers is constant when Organization Phase = .00. It has been omitted.

b. Lilliefors Significance Correction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Firm Size		Statistic	df	Sig.	Statistic	df	Sig.
BMI External Drivers	.00	.441	4		.630	4	.001
	1.00	.482	10	.000	.509	10	.000

a. Lilliefors Significance Correction

Association with internal drivers

Tests of Normality[a]

		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
Organization Phase		Statistic	df	Sig.	Statistic	df	Sig.
BMI Internal Drivers	1.00	.538	20	.000	.236	20	.000

a. There are no valid cases for BMI Internal Drivers when Organization Phase = .000. Statistics cannot be computed for this level.

b. Lilliefors Significance Correction

Tests of Normality[a]

Firm Size		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BMI Internal Drivers	1.00	.538	18	.000	.253	18	.000

a. BMI Internal Drivers is constant when Firm Size = .00. It has been omitted.

b. Lilliefors Significance Correction

Table G.3 - Geographic location association with BMI drivers

Geographic location with external drivers

Tests of Normality[a]

Geographic Location		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BMI External Drivers	1.00	.470	13	.000	.533	13	.000

a. BMI External Drivers is constant when Geographic Location = .00. It has been omitted.

b. Lilliefors Significance Correction

Geographic location with internal drivers

Tests of Normality[a]

Geographic Location		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BMI Internal Drivers	1.00	.538	20	.000	.236	20	.000

a. There are no valid cases for BMI Internal Drivers when Geographic Location = .000. Statistics cannot be computed for this level.

b. Lilliefors Significance Correction

Table G.4 - Cultural characteristic association to BMI drivers

Cultural characteristics to external drivers

Tests of Normality[a,c]

Cultural Characteristics		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BMI External Drivers	2.00	.492	6	.000	.496	6	.000
	3.00	.367	5	.026	.684	5	.006

a. BMI External Drivers is constant when Cultural Characteristics = 1.00. It has been omitted.

b. Lilliefors Significance Correction

c. BMI External Drivers is constant when Cultural Characteristics = 4.00. It has been omitted.

Cultural characteristics to internal drivers

Tests of Normality[a,c,d]

Cultural Characteristics		Kolmogorov-Smirnov[b]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BMI Internal Drivers	2.00	.492	6	.000	.496	6	.000

a. BMI Internal Drivers is constant when Cultural Characteristics = 1.00. It has been omitted.

b. Lilliefors Significance Correction

c. BMI Internal Drivers is constant when Cultural Characteristics = 3.00. It has been omitted.

d. BMI Internal Drivers is constant when Cultural Characteristics = 4.00. It has been omitted.

Table G.5 - BMI driver association to BM ontology selection

Logistic regression

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	5.004[a]	.100	.179

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	InternalDrivers	.000	56841.448	.000	1	1.000	1.000
	ExternalDrivers	-19.817	40192.969	.000	1	1.000	.000
	Constant	18.430	40192.977	.000	1	1.000	########

a. Variable(s) entered on step 1: InternalDrivers, ExternalDrivers.

Point biserial coefficient

External driver to BM ontology selection

Tests of Normality[b]

BMI External Drivers		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BM Ontology Selection (amount selected)	Low level	.473	5	.001	.552	5	.000

a. Lilliefors Significance Correction

b. BM Ontology Selection (amount selected) is constant when BMI External Drivers = Moderate level. It has been omitted.

Internal driver to BM ontology selection

Tests of Normality[b]

BMI Internal Drivers		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BM Ontology Selection (amount selected)	Low level	.492	6	.000	.496	6	.000

a. Lilliefors Significance Correction

b. BM Ontology Selection (amount selected) is constant when BMI Internal Drivers = Moderate level. It has been omitted.

Table G.6 - Changes in BM elements to BM ontology selection

Logistic Regression

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	25.596[a]	.010	.017

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	BMChanges	.155	.296	.273	1	.601	1.167
	Constant	-2.283	1.652	1.910	1	.167	.102

a. Variable(s) entered on step 1: BMChanges.

Point-Biserial Coefficient

Tests of Normality[a,b,d]

Changes in BM elements (amount of changes)		Kolmogorov-Smirnov[c]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
BM Ontology Selection (amount selected)	4.00	.473	5	.001	.552	5	.000
	5.00	.307	4		.729	4	.024
	6.00	.492	6	.000	.496	6	.000
	7.00	.441	4		.630	4	.001

a. BM Ontology Selection (amount selected) is constant when Changes in BM elements (amount of changes) = 2.00. It has been omitted.
b. BM Ontology Selection (amount selected) is constant when Changes in BM elements (amount of changes) = 3.00. It has been omitted.
c. Lilliefors Significance Correction
d. BM Ontology Selection (amount selected) is constant when Changes in BM elements (amount of changes) = 8.00. It has been omitted.

Table G.7 - Changes in BM elements to changes in operational area

Tests of Normality

Changes in BM elements (amount of changes)		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Changes in Operational areas (amount of changes)	2.00	.260	2				
	3.00	.260	4		.827	4	.161
	4.00	.237	5	.200*	.961	5	.814
	5.00	.155	4		.998	4	.995
	6.00	.213	5	.200*	.939	5	.656
	7.00	.441	4		.630	4	.001
	8.00	.260	2				

Table G.8 - BM ontology selection with EA frameworks selection

Symmetric Measures (N=27)

		Value	Approx. Sig.
Nominal by Nominal	Phi	.317	.099
	Cramer's V	.317	.099
N of Valid Cases		27	

Table G.9 - BM ontology user to BM ontology selection

		Value	Approx. Sig.
Nominal by Nominal	Phi	.227	.238
	Cramer's V	.227	.238
N of Valid Cases		27	

Table G.10 - Disruptiveness to business performance

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.000[a]	1	.005		
Continuity Correction[b]	1.469	1	.225		
Likelihood Ratio	6.028	1	.014		
Fisher's Exact Test				.125	.125
Linear-by-Linear Association	7.000	1	.008		
N of Valid Cases	8				

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .13.
b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-1.000	.005
	Cramer's V	1.000	.005
N of Valid Cases		8	

Appendix H - Coding Manual
Version 1.0

General rules:

1. Use the definition and rules in this coding manual to assign the code or answers in the coding scheme
2. If you have doubts regarding a concept or you are not sure that the information found on the case fits the definition and rules made in this coding manual, don't take guesses and put it as 'No Information'.
3. The definitions and rules in this manual is adjusted for European regions. Feel free to adapt the definitions according to your own regions.

I. Qualitative coding scheme

General coding rules for qualitative coding scheme:

1. Enter the case number and name of the case on the top of the column
2. All of the column in this coding scheme are to be filled qualitatively, hence put down all of the possible answers according to the definition / rules specified below
3. Some of the answers have pre-defined concepts and definitions made in this manual.
4. There may be more than one answers to each questions, if so, write down all of the answers (for example, one case may use several research design or BM ontologies). However, be aware that there may be some questions that are specifically defined in this manual to only have one answer.
5. Be concise as possible in answering the questions (without reducing the valuable information)

A. Case Quality Characteristics

1. Research design

- This question would like to assess the research design used by the author of the case in creating the case study.
- There could be multiple research designs involved in the case, write them all
- Example of research design: desk research, interviews, participatory observation, etc

2. Publication status / type

- Fill in the column according to the publication status / type of the case
- This question would like assess the 'publication level' of the cases. In our logic, cases published in a research journal will have higher level of quality than unpublished work or student cases, since it already passed a strict criteria to be published.
- If one firm was studied in several cases, then put it as multiple observers (for example, if firm A was studied in 3 student cases, then put it as "student cases [multiple observers]")
- Example: unpublished, student cases, Master thesis, research journals, etc

3. Time period

- The time period would be the year when the case was done, not the duration.
- Preferably, write down the time periods of the case (start - finish),
- However, if the time period is not available, put down the time when it is started
- Example: June 2000 - July 2001

B. Firm's characteristics

4. Firm's Age

- Put the firm age as the month & year the company was founded
- If there is no month available, it would be sufficient to put down the year
- Example: founded in July 2012

5. Organization phase

- The organization phase coding rules will derive the definitions and characteristics of organization phases from the work of Jawahar & McLaughlin (2001).
- There would be four organization phase: startup, emerging / rapid growth, mature, decline.
- A case should only have one type of organization phase, don't put more than one phase.
- Write down one of these phases if it fits with the definition and characteristics below

Phase	Characteristics of the phases
Startup	- The period in where the dominant concerns would be the development and implementation of a business plan, getting initial financing, and entering the marketplace
	- Critical needs for survival are start-up funds, cash flow, and customer acceptance (determining movement to next stage).
	- primary suppliers of critical start-up funds, and customers the primary source of revenues would be shareholders and creditors
	- Organization and network aspects (the employees and suppliers) are critical for avoiding failure in startup phase
Emerging / Rapid Growth	- The firm has achieved some degree of success
	- Survival concerns has largely been addressed, and the firm is actively seeking expansion opportunities.
	- Sales activity steadily increases with some problems such as stabilizing production and product (and/or service) reliability. The demand usually exceeds supply during rapid growth
	- Significant new investment would be likely and the number of employees, customers, and geographic contact are expanded.
	- The firm find their environment to be non-threatening and unconstrained
	- They fine-tune themselves and tend to develop a bureaucratic structure
Mature	- Flat period that follows the rapid growth period, where the rate of growth is slowing in this phase. The stock prices are likely to decline because of this.
	- Managers within the company regards themselves as successful, respected leaders and role models.
	- Characterized by the overconfidence of success, have uncertainty of the search for a new direction that could lead to another rapid growth
	- Often possessed strong cash flows, but with no attractive investment opportunities.
	- Resource allocation decisions is gain-oriented, and a risk-averse strategy is likely to be pursued.

Decline / Transition	- The demand for the firm's products and/or services will be reduced, encouraging management to consider survival strategies such as mergers, downsizing, layoffs, reducing diversity of operations
	- Will attempt a new market or rebuild market share by giving more attention to customer aspects
	- Technical efficiency was crucial concern of the management
	- Firms will also try to improve growth by developing second-generation or completely new products

6. Firm size

- To define firm size, we are going to use the definition from European Union (2003) as follows:
    - *Micro firms* are defined as firms with employee less than 10 persons and annual turnover that does not exceed EUR 2 million.
    - *Small firms* are defined as firms with employee less than 50 persons and annual turnover that does not exceed EUR 10 million.
    - *Medium firms* are defined as firms with employee less than 250 persons and annual turnover that does not exceed EUR 50 million and/or the annual balance sheet does not exceed EUR 43 million.
- The most important part is to put down the number of employees, but preferable to have it complete with the annual turnover as well

7. Industry sector

- There are two important information to be put in this section, which are the industry area and market segment
- Industry area would be the area of specialization of the firm, which we derived (and made some modifications) from EU's NACE (http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/2010/bcs_nace_2_classification_en.pdf) such as ICT and high-tech, manufacturing, etc.
- Infer the industry area from the case description (you can also look at the their value offering to get some idea).
- Market segment would be business to customer (B2C) or business to business (B2B). Put B2C when firms are selling their products / services to end consumers, and B2B if it is to other firms / businesses.
- However it is also possible for the firm to have both market segments. In this case put both "B2C and B2B" as the coding.

8. Market area

- Market area would be the countries (or region of a country) where the firm sell their products or services to, hence write these down.
- Also put down whether they sell it only in national market (National) or also for international market (International).
- For example: if the Finnish firm sell it only in Finland then write down 'Finland (national)' or if it also sell to Netherlands and Germany then write down 'Finland (International)'.

9. Geographic location

- Write down the country where the headquarter / main office of the firm is located
- No need to take account of branch offices
- For example, if the firm is located in Amsterdam then code 'Netherlands'

10. Value offering

- There would be only two types of value offering: 'products' or 'services'.
- We are going to use the definition from Kotler (1984) to define product and service value offering:
    - *Product-based* value offering would be defined as “Anything that can be offered to a market for attention, acquisition, use, or consumption, that might satisfy a want or need”.
    - *Service-based* value offering would be defined as “A service is an act of performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Its production may or may not be tied to a physical product”.
- Therefore, code it as "product" when it can be fully owned by the customers and "service" when the customers don't own it.
- If the case have both "product" and "service" value offering then code them both as "product and service"

11. Ownership structure

- First, write down the legal structure of the company, is it "private" or "public" company.
    - Several types of legal structure such as "sole proprietorship" and "Limited Liability Company (LLC)" would be included under "private" type
    - "Public" will only be coded when it is explicitly as public company or there are some mention of IPO that have been done
- Second, determine whether there are investors involved or not (if available)
- Third, write down the share composition between the management and investor (if available)
- Example: privately-owned, founders have 70% shares and investors have 30% shares

12. Family business

- Code as "family business" if it is stated in the case that the company is founded by a family or if members of the family are the majority shareholder of the company and actively engaged in the top management
- Also write down the name of the family members (if available)
- If no family name are being mentioned or the firm is founded by several people with different family names, then code it as "not family business"

13. Female involvements

- Code as "female involved" if its mentioned in the case that there are females involved as (one of) the founder(s) of the firm or if the females are involved in the top management of the company
- Write down the names of the female founders / top management (if possible)

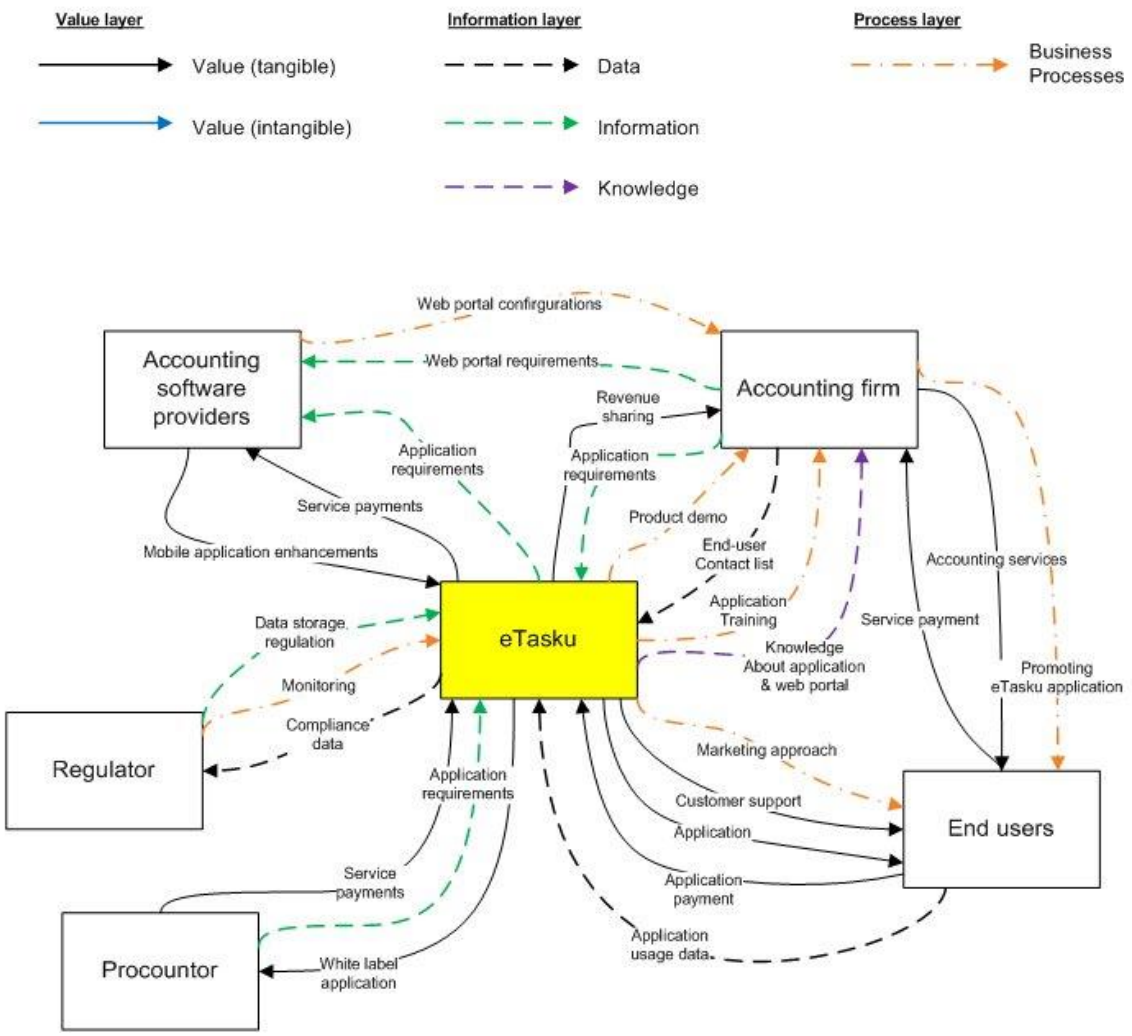
14. Technology level

- There would be only two type of technology level of a firm (and one answer for this question): "low-tech" or "high-tech"
- We are going to derive the rules to decide whether its "low-tech" or "high-tech" from the work of Holm et al (2013):
    - "Low -tech" firm do not rely on R&D and do not use innovation management to achieve a competitive advantage through technological innovation.
    - "High-tech" firm will have rely on R&D (most probably an extensive one) and will follow produce (technological) innovations as a result of deliberate innovation management

15. Value network / partner reliance

- First, determine whether the firm rely on its value network to deliver its value offering
- Second, list down all the partners of the firm in the value network and its role
- Third, draw the ecosystem of the value network according to VIP framework principles derived from the work of Solaimani and Bouwman (2012) and operational domain by Jonkers et al (2004) as follows:
    - Write down actors in the value network in rectangles (or other defined form)
    - Write down the relations between actors with arrows as follows:
        - *Value (tangible)*, would be the main value objects that are tangible (such as goods, service or money)
        - *Value (intangible)*, would be the value objects that are intangible and most likely to be a side effect of a business (such as reputation or access to a platform)
        - *Data*, would be the raw data as a result of a transaction or process (such as end user contact list or application usage data)
        - *Information*, would be an answer to questions such as who, when, what, how many (such as application requirements)
        - *Knowledge*, would be the know-how that enables transformation of an information into action (such as knowledge about application or portal)
        - *Business process*, would consist of business activities (such as doing application training or making configurations to the web portal)
    - The arrows origin is the actor that provide / initiate the relationship, while the end of the arrows would be the actors that receive the relationship from other actors
    - Write down the arrows in different colors and different forms to distinguish them easily in the drawings
    - Write down the name or short description of the arrows

- Example of the VIP framework drawing:



16. Entrepreneurial orientation

- To define entrepreneurial orientation, we will derive it from the work of Hult et al (2004) and Sosna et al (2010) as follows,
    - Entrepreneurial orientation is characterized by boldness and tolerance for risk that lead to new market entry
    - Entrepreneurial orientation reflected by the strategies and actions that the firm may do in order to realize corporate goals
    - It can also be seen as entrepreneur's traits which determined how the company will behave and the choices it made

17. Market orientation

- To define market orientation, we will derive it from the work of Hult et al (2004)
    - A market orientation essentially involves doing something new or different in response to market conditions
    - The firm will likely to devise and adapt products, services, and processes that continue to meet the needs of the evolving market
    - Being oriented toward markets provides ideas for change and improvement

18. Product leadership orientation

- To define market orientation, we will derive it from the work of Treacy & Wiersema (1992) and Kaplan and Norton (2000)
    - Product leadership means offering customers with leading-edge products and services that consistently enhance the customer's use or application of the product, which make competitor's goods obsolete.
    - Companies that pursue product leadership will strive to produce a continuous stream of state-of-the-art products and services
    - This type of firms concentrate on the functionality, features, and overall performance of its products and services

19. Creative culture

- To define market orientation, we will derive it from the work of Hult et al (2004) and Hurley and Hult (1998) as follows,
    - Culture can be seen as constellations of behaviours, practices, and routines form behavioural syndromes in the organization
    - A pro-innovation culture facilitates information sharing and use
    - Creative culture also encourage creativity and more likely to embrace structural change and significant resource configurations

C. Factors and drivers to business model innovation

20. Environmental dynamics

- Environmental dynamics represent the external factors of the firm
- There are three type of environmental dynamics derived from several scholars:
    - *market dynamics*, the rapid changes in customer's preferences, constants entry and exit of competitors from the market or rapid streams of new products offering (Hult et al., 2004).
    - *technology dynamics*, would be the changes or development of technology, which are more than just the development in computers or internet, but there is a tendency to focus on the rapid development of ICT and internet technology (Barba-Sánchez et al., 2007).
    - *regulatory dynamics*, the changes in government or regulatory policies which can promote changes on the firm level such as product, business practices and organizational structure (Markard & Truffer, 2006).
- There could be multiple environmental dynamics faced by a firm, if so write them all
- Give a short descriptions of each of the environmental dynamics faced by the firms

21. Innovativeness

- Innovativeness can be perceived as the firm's propensity to innovate or propensity to adopt innovation (Damanpour, 1991; J. E. Ettlie et al., 1984).
- There are two dimension of innovativeness
    - *Openness to new ideas*, or the firm's capability to introduce or accept new ideas (Barba-Sánchez et al., 2007). The new ideas could come externally of from the internal of the firm (such as the entrepreneur or CEO himself).
    - *Capacity to innovate*, or the capacity to engage in innovation or to introduce new product, process or idea in the organization (Damanpour, 1991; Hult et al., 2004). The capacity to innovate can also be called "absorptive capacity", that is measured

by number of innovation that a firm can develop and implement successfully (W. M. Cohen & Levinthal, 1990)

- Write down the short descriptions for each of the two dimension of innovativeness (if available and fit the definition)

D. Business model innovation practice

22. Type of BMI

- There would be two type of BMI:
    - *New BM to the firm*, which is a totally new BM with no previous BM or it can also be seen as no changes yet to the initial BM since the firm is founded. It is often founded in the startup stage.
    - *BM modifications*, would be the BMI that made any changes to the previous BM. Will be found more on an established firms rather than startup, but it is also possible in startup.
- There can only be one answer to this question (either 'new BM' or 'BM modifications')

23. BMI drivers

- BMI drivers would be the firm's external and internal factors that prompt the firm to do BMI practice
- Write down whether the drivers came from external or internal factors of the firm
- Write down short descriptions of the drivers
- There can be multiple drivers experience by the firms that encourage them to do BMI (voluntarily or forcefully)
- Example:

    External drivers:

    - the firm need to change the BM in order to anticipate the new entrants that offer lower price

    Internal drivers:

    - the firm have a new BM to deliver their new / innovative products to the market

24. BMI expected outcome

- This would be the expected outcome / results of the BMI practice
- The expected outcome could be in a form of lower costs or improvement to the firm's customer services (Neely et al, 2001)
- There could be multiple answers of BMI expected outcome

25. BMI phase

- There could be several BMI phases defined in this research (with only one answer) which are:
    - *BM design*, happen when creating a new business model from scratch (no initial BM) or creating a new startups. In the design phase, firms usually still brainstorming ideas of the possible BM elements and can be made into formal scheme using BM ontologies.

- *BM planning*, a detailed proposal to create a new business model, and making necessary arrangements to do so. Example of the arrangements could be the preparation of human resource to execute the business model.
- *BM testing*, a phase where the firm is testing the BM with all the relevant assumptions regarding customers until it is thoroughly validated and ready to be fully scaled and implemented (Osterwalder & Pigneur, 2011).
- *BM implementation*, related to all of the activities that translate the business model "blueprint" into a more concrete elements such as business structure (e.g. human resources), business processes (e.g. work organization), and systems & infrastructures (e.g. ICT infrastructures, buildings, etc) (Osterwalder et al., 2005)
- *BM re-design*, have the same principles with BM design however it exists when the firm already have an existing business model. This is usually the case with an established business either SMEs or larger firms.

26. BMI stakeholders

- This question would like to assessment the involvement of stakeholders in the BMI practice
- There can be two type of BMI stakeholders: external and internal stakeholders
- External stakeholders are the actors outside the firms and are not involved in day by day practices of the firms such as researchers or consultants
- Internal stakeholders are the actors within the firms that are directly involved in daily business of the firms such as CEO, management team or managers
- Both external and internal stakeholders can be involved in the BMI practice at the same time in one case
- The minimum involvement needed to be included as the code / answers to this question would be in giving ideas to change the firm's BM

27. Changes in BM elements

- To identify the changes in the BM elements, this research mapped the BM ontology with BMI and innovations definition, resulting in 16 generic BM elements
- There can be multiple changes in the BM elements
- Write down the BM elements that are changed and provide short descriptions on the changes

No	BM elements	Descriptions
1	New goods / products	Any changes or addition in the existing products or a totally new product to the firm
2	New services	Any changes or addition in the existing services or a totally new services to the firm. It can also be applied when firms convert their product-based offering into a service base offering
3	Logistics	Any changes or addition in how the firms handle their logistics. For example by implementing new warehousing practice.
4	Changes in production methods	Any changes or addition in how firm produce their value offerings that improving their producing capacity
5	Changes in support activities	Any changes or addition in the activities that support the main business process of the firms. Example: add CRM process for handling customer complaint or attracting funding from VCs to support expansion plan

6	Alternative design of product	Any changes or addition to the design of the product, which aimed to the aesthetic part of the product physically
7	Changes in channels,	Any changes or addition to the existing sales or customer relationship channels. It can also be seen as complementing existing physical channels with digital (mobile) ones. For example: adding distributors as one of the sales channel instead of going directly to stores.
8	Changing of pricing (model)	Any changes or addition to the pricing scheme of their products / services (such as freemium model or pay-as-you-go model)
9	New or changed revenue models	Any changes or addition to how the firm earn their revenue, such as utilizing subscription-based model or bait and hook model (razor and blade)
10	Change in promotion / branding activities	Any changes or addition in firm's activities to promote their products or services. For example: using Google AdWords or social media to promote their products
11	Change in businesses practices	Any changes or addition in the existing firm's way of working. This could be seen as introducing new approach to complement how the employee work such as introducing flexi-work or work from home. It can also introduce technology to the work environment that changed the business process of the employees
12	Change in organizational network	Any changes or addition to the eco-system of which the firm is part of. It can mean that the firm could add new relationship with new actors or it can also cut ties with existing actors in the network. The new actors will most likely bring new value objects that are essential to the firm's new BM.
13	Change in work organization	Any changes or addition of how firm's organize the work of the employees. This could come in a form of new employees or new roles for the existing employees.
14	Changes in target market	Any changes or addition in the firm's customer segments. It can also involve targeting new customers from international markets or different industries.
15	Changes in technology used	Any changes or addition in the firm's core technology to create value (such as adopting cloud computing technology or new sensor technologies in their products)
16	Changes in cost structure	Any changes or addition to the costs that incurred to operate the business model. The changes in cost structure can impact fixed and variable costs. For example: creating a new line of clothing will prompt the firm to add more machine that will increase the fixed costs.

28. BM ontology selection

- BM ontologies are the framework that used to guide the changes in the BM elements
- There are several BM ontologies from the theory such as Canvas, VISOR, STOF, CSOFT, Ballon approach and e3 Value. However, there could be any other BM ontologies being used which can also be written down, but only if the case mentioned it specifically as a BM ontology
- Only code the BM ontologies if it is explicitly mentioned in the case
- There can be multiple BM ontologies used in each case, write them all
- Write down the reasons of selecting these specific BM ontologies
- Also write down the users of the BM ontologies, whether it is the firm itself (internal stakeholder), researchers / consultants (external stakeholder) or both.

29. BM tooling

- BM tooling is supposed to be used as a tool to guide the BM design
- The BM tool could come in a form of software (such as computer-aided BM ontologies or even Microsoft Excel) or in paper-based form (such as using cards or mapping board)
- There could be multiple BM tool being used in the case, write them all
- Write down the reasons for using the specific BM tools
- Write down the users of the BM tools

30. Fit with strategy making

- A firm can have three different competitive strategies, which are the cost leadership, differentiation or focus (Porter, 1997).
    - *Cost leadership* is the most common strategy to be used to pursue the lowest price possible to be offered to the customer, which enabled by the efficiency in scale.
    - *Differentiation* will involve creating a distinct functions and features of the product (usually with a high quality level) that will set them apart from their competitors.
    - *Focus* is an extension of differentiation strategy where it is focused on a specific customer segment in the market.
- Write down the strategies of the firm only if it is mentioned specifically by the case
- There can only be one strategy used by the firm at one time
- Write down how the firms align the strategy with the BM (example: by trial and error, brainstorming, etc).

E. Alignment of BM with operational domain

31. Changes in operational area

- The changes in the operational area are identified by mapping the VIP framework (Solaimani & Bouwman, 2012) and EA frameworks domain (Jonkers et al., 2004) which resulted in BM-BP alignment framework with 10 operational domains in 3 layers (table below)
- Write down the operational domains that have been changed
- Write down the short descriptions of the changes
- There could be multiple changes in the operational domains

Value layer	
Product domain	changes in the value object (products or services) that being offered by stakeholders in the network
Organization domain	changes in the business actors (employees, business unit) and the roles
Value dependencies	describing how the actors need value object of other actors
Information layer	
Information domain	changes in the information and knowledge needed alongside its structure
Data domain	changes in the raw data as a result of a transaction or process
Trust dependencies	describing the level of relationship between actors, determining the probability to share information
Process layer	
Process domain	changes in the business processes that consist of business activities
Application domain	changes in the software needed to support the business
Technical infrastructure domain	changes in the infrastructures such as hardware needed to support applications
Process dependencies	describing the need of execution of processes before another one can be executed

32. Fit with operating model

- The operating model can be seen as the operationalization of business model (Heikkilä et al., 2010) that provide the design on how the business model will be achieved (Slack et al., 2012) and describing the necessary level of standardization and integration needed to achieve it (Ross et al., 2007).
- This research is going to derived the components of operating model from Lindgardt et al (2009) which are
    - *Value chain*, answering questions such as how the firms are configured to deliver on customer demand? what do the firms do in-house and which one are outsourced?
    - *Cost model*, how do we configure our assets and costs to deliver on our value proposition profitably?
    - *Organization*, how do we deploy and develop our people to sustain and enhance our competitive advantage?
- Write down the changes in each of the components of the operating model (if available) and provide short explanation (for example: a new BM that have changes in the business practice elements can change the organization element such as addition of new employees or new roles)
- Write down any attempt to fit the new BM with the existing operating model and vice versa (for example, by having alignment meeting by top management)

33. Fit with enterprise architecture (EA)

- EA can be seen as the organizing logic of IT infrastructures and operational processes that translates the operating model 's requirements for standardization and integration (Ross et al., 2007).
- In short, BM are more focused on the value created by the business, while EA will help explaining how the business will realize this proposed value (Janssen et al., 2005).
- Write down any attempt to fit the new BM with the existing EA and vice versa (for example, by using alignment tools)

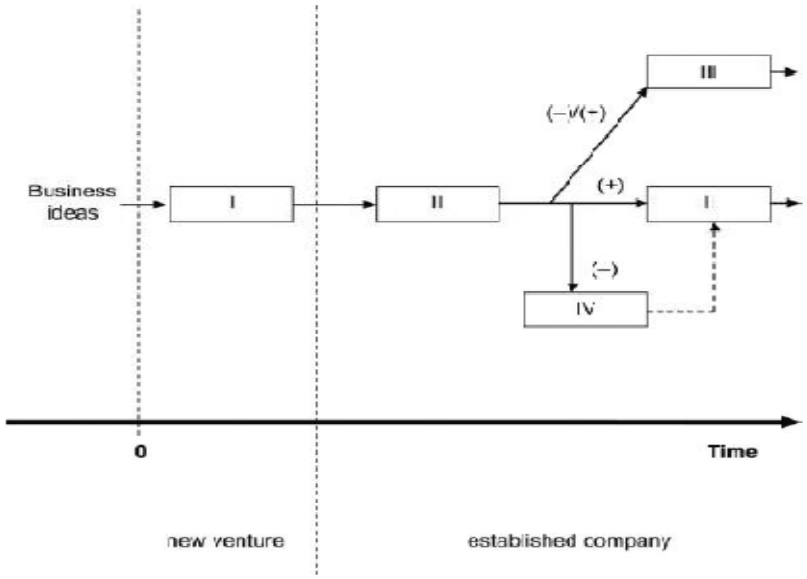
34. EA frameworks selection

- EA frameworks are the framework that used to guide the changes in operational aspect of the company (such as business process and IT infrastructure)
- There are several EA frameworks from the theory such as ArchiMate, Zachman Framework and TOGAF. However, there could be any other EA frameworks being used which can also be written down, but only if the case mentioned it specifically as an EA framework.
- Only code the EA framework if it is explicitly mentioned in the case
- There can be multiple EA frameworks used in each case, write them all
- Write down the reasons of selecting these specific EA frameworks
- Also write down the users of the EA frameworks, whether it is the firm itself (internal stakeholder), researchers / consultants (external stakeholder) or both.

F. BMI outcomes

35. Radicalness of new BM

- In the incremental BMI, the new process is only added on top of the existing process of the business model
- BMI would be categorized radical when it involve a large magnitude changes (Hartmann et al., 2013) and change the core logic of the firm (Cavalcante et al., 2011).



- This research will be using the four types of business model change by Cavalcante et al (2011) to determine the radicalness of the BMI (figure above).
    - *Business model creation* (I) will involve realization from ideas to actual business. The main changes in business model creation will relate to the change from vision to the implementation of initial processes to run the business (Cavalcante et al., 2011). It is a radical BMI.
    - *Business model extension* (II) involve expanding core activities of the firm or adding a new on to the existing business model. . At this stage, usually firm already have a core repeated and standardized processes which may be extended by involving a wider area of offering or product / service lines (Cavalcante et al., 2011). It is an incremental BMI.
    - *Business model revision* (III) involves the modification of existing element of the business model and replace it with totally new process / activities. The firm will embark on another path to do their business, which implying that the existing working practices of the firm are subject to changes (Cavalcante et al., 2011). It is a radical BMI.
    - *Business model termination* (IV) means eliminating or removing the existing process from the business model. By removing existing process, it can range from closing a business units / division or closing the whole structure of the firm. It is a radical BMI
- There can only be one type of BMI radicalness, so no multiple answers
- Provide a short description for the answer (why it is code as certain type of radicalness)

36. Disruptiveness of new BM

- Even though the new business model is radical to the firm, it doesn't mean that it is a novel one among the industry / market.
- Therefore, to identify the level of novelty of the BMI this research are going to use the classification made by OECD (2005), which are *new to the firm*, *new to the market / industry* and *new to the world*. The lowest rank on the novelty point would be *new to the firm* and the highest would be *new to the world* (Barjak, Bill, et al., 2014).
    - *new to the firm* category would include the changes in business model that are involving BM creation, BM revision or BM termination (Cavalcante et al., 2011), but not necessarily new among the competitors in the market / industry.
    - The *new to the market / industry* or higher type of novelty aim to see whether the BMI is new among competitors and the firm can be categorized as an innovation leader (Barjak, Bill, et al., 2014).
- In other words, BMI can only be categorized as disruptive (*new to the market / industry* or higher) only if the BMI is *new to the firm* (radical) but also novel amongst the competitors or never seen before in the industry.

No	BMI level of innovation	Type of BM changes (Cavalcante et al, 2011)	Novelty among competitors in market / industry	Classification by OECD (2005)
1	Incremental innovation	BM extension	No	
2	Radical innovation	BM creation, BM revision, BM termination	No	new to the firm
3	Disruptive innovation	BM creation, BM revision, BM termination	Yes	new to the market / industry or new to the world

37. BM focus (architecture of transaction exchange)

- The notion of business model design should not only considering the internal changes, but also the focus of the architecture of the transaction exchanges between the focal firms and its external stakeholders in the value network such as suppliers and customers (Zott & Amit, 2007).
- Zott and Amit (2007) proposed two types of focus in the new business model design,
    - *Novelty-focused* business model will emphasize on the **new ways** of conducting economic exchanges among the players in the network. example of novel business model is Dell that introduces new build-to-order business model that replaced the traditional build-and-stock model (Zott & Amit, 2007).
    - *Efficiency-focused* business model will be emphasizing on **imitating rather than innovating**, or in other words, doing things like established business do but **in a more efficient way** (Zott, 2003). Examples of efficiency-focused business model can be seen from Amazon, where it promotes transaction transparency (Zott & Amit, 2007).

- Even though these two types of BM design have different focus, they are not mutually exclusive, which mean that both of them can exists in a firm.
- Write down the focus of the BM and its reason

38. Strategic flexibility

- Organizations have a goal to achieve *strategic flexibility*, which can be defined as the ability to recognize opportunities to do innovation, reverse unproductive deployment of resources and allocate these resources to new course of actions (Sanchez, 1995; Shimizu & Hitt, 2004).
- Therefore the firm can have strategic flexibility as a result of BMI practice when they can:
    - Identify new innovation opportunities
    - Identify unproductive allocation of resources (such as taking too much time or cost without significant result) and reverse its deployment
    - Re-allocate the resources into a new and more productive activities
- Write down whether the firms have strategic flexibility or not
- Write down a short description on why they have strategic flexibility (if applicable)
- Example: by having a brainstorming process using Canvas, the firm identified that their sales are not going well because they are using the wrong channel to promote their products. Therefore, they identified alternative channels that can be used to improve their sales (new channels such as social media, etc).

39. Improvement of BM understanding

- The objective of this question is to assess the impact of BMI to the firm/author's understanding regarding business model
- Write down if the firms/authors become more familiar with their own business model by inferring from the case descriptions
- Write down a short reason on why you think they have a better understanding on the business model
- Example: "Yes, the author is able to describe the BMI process using VISOR model and explained the changes on the BM elements in an elaborated manner. Hence, we infer them to have a better understanding of the BM after the analyzing the BMI process."

40. BM weakness assessment

- The objective of this question is to assess whether the firms / authors are able to spot weaknesses or blank spots in the existing business model in the case
- Write down if the firms/authors are able to identify the weaknesses or blank spots in the existing business model
- Write down a short description on the weakness of the business model that they found
- Example: " Yes, the management found conflicting views of the BM with existing operating model and ways to deliver values to new customer segments"

41. Improvement of BM communicability

- The objective of this question is to assess whether the BMI practice can results in improving the communication of changes in the BM to the stakeholders
- Write down if the firms/authors are able to improve the communicability of the BM as a result of BMI
- Write down a short description on why the BM communicability have been improved
- Example: "Yes, during brainstorming sessions, the management found difficulties in describing future BM in coherent way, especially when clarifying the problem in conceptual level. By using CSOFT during the BMI process, they are able to communicate the BM more clearly, especially on the customer segments aspects."

G. Business performances

42. Business performance metrics

- Several scholars argued that innovation have a positive effect and should results in a better business performance (Aragón-Correa et al., 2007; Kemp et al., 2003).
- Write down the business performance metrics that are used by the firms to measure the impact of BMI practice to their performance
- There could be multiple business performance metrics used by the firms
    - Financial metrics, such as revenue, profit margin, sales growth, etc
    - Non-financial metrics, such as churn rate, number of user growth, etc

43. Metric achievements

- The objective of this question is to assess whether the BMI practice can help the firms to achieve their business performance metrics / KPI
- Write down whether business performance metrics of the firms are achieved or not as the impact of BMI
- Write down a short description about the achievement of the business performance metrics (the reason it was achieved, or the description of the achievement itself)
- Example: " The BMI is considered success in terms of revenue with significant increase from € 1.2 million in 2008 (before BMI) into € 7 million in 2014 (after BMI)"

II. Quantitative coding manual

This research is going to follow the guidelines to transform qualitative material into quantitative data from Srnka and Koeszegi (2007), which are (1) material sourcing, (2) transcription, (3) unitization, (4) categorization and (5) coding (quantitatively). The first step is should have been done in the case sampling process, while the second step (transcription process) is not needed, because the cases are already in written form.

The third step (unitization) are already done in the qualitative coding. The unit of analysis in our content analysis would be the themes / variables of the qualitative coding scheme. The example is the 'BMI driver' theme in the qualitative coding scheme. This theme is derived from the business model innovation concepts that is aligned with the research objective or research questions of this study. The texts that are coded into or assigned with this theme will be related to the drivers of the BMI (whether its external or internal) and become the input for the following quantitative coding (*codeable units*).

The next step after unitization would be the categorization. Categories can be seen as patterns that are expressed in the texts or derived from a thorough analysis of the texts (Hsieh & Shannon, 2005). This is the part where conversion process from qualitative data into quantitative data will happen.

A. Categories generation

There can be two ways of generating categories:

1. The categories can be **derived from the theories** and these categories can be modified along the progress of analysis when new categories formed inductively (Miles & Huberman, 1984).
2. In the case where theories are not available, the author will **generate the categories inductively** from the qualitative data (Y. Zhang & Wildemuth, 2009). To do this, we are going to follow one of the scholar's argument:
    - A category is a group of content that shares a commonality (Krippendorff, 2004)
    - Krippendorff (2004) emphasize that categories must be exhaustive and mutually exclusive.

Therefore to make the categories, follow these steps:

- Group the answers from the qualitative part according to their commonalities, in which the groups should differ from one and the other
- For the theme that can be derived from theories (such BM ontology) the categories can be set according to it (such as Canvas, STOF, VISOR , etc).
- In the case where the categories cannot be derived from the theories, derive it inductively according to common sense and commonality. The examples would be for the texts of 'market area' theme or 'geographic location' theme, which can only be inductively generated from the data.
- There are several qualitative answers that could broken down into a more specific variables due to the rich information contained. In this research, these variables are the "industry sector" that is broken down into "industry area" and "market segment" variables and the "BMI driver" variable that is broken down into "source of driver" and "type of driver" variables.

Example of grouping into categories:

Case No.	Grouping to commonalities	Sub-category
29	Desk researches	Desk research only
17	Discussion with the company (interview)	Interview only
1	interview	
3	Interview	
22	Interview	
32	Interview	
26	Interviews	
6	semi-structure interview	
27	Meetings and Brainstorming sessions with Mgmt team	Interview & workshops
16	Discussion with the company (interview), workshops	
20	Interviews, design workshop	
28	Interview (via email and phone calls), desk researches	Interview & desk researches
11	interview, desk research	
21	Interview, desk research	
4	interview, desk research (also with internet research)	
5	interview, desk research (also with internet research)	
7	interview, desk research (also with internet research)	
31	Interviews and desk research	
30	Interviews, desk researches	
2	interview, desk research (also with internet research), promotional literature	

From the above example, we can see that the categories for "Data Collection" variable are generated inductively based on the commonalities of the answers. The resulted answer categories from the above example will be:

- Desk research only
- Interview only
- Interview and workshops
- Interview and desk researchers

B. Quantitative coding process

The quantitative coding will done by counting the responses for each categories. From the example above, we can see the responses of each categories:

- Desk research only = 1 response
- Interview only = 7 responses
- Interview and workshops = 3 responses
- Interview and desk researchers = 9 responses

We can see that the categories can contain multiple responses (such as interview and workshop). This may be simple in the example with only two categories with multiple responses, but it would be harder to do categorization when all of the answers are unique and can pose different combination of answers (such as the "changes in BM elements" variable with 16 type of responses that can be combined with each other).

To handle the multiple responses, this manual recommend to do *dichotomization*. This is done by converting all nominal variables (with more than 2 answer categories) into binaries (nominal with only 2 answer categories). The reasons are because: (1) it will be easier to make the categorization; (2) SPSS use multiple dichotomy (binaries) to handle multiple response variables. We use SPSS as the statistical software as we assumed that researchers are able to use it and its visual interface making it easier to work with.

With the example above, the categories will become three dichotomous variable:

- Desk research (yes / no)
- Interview (yes / no)
- Workshops (yes / no)

With the dichotomous variable, the coding would be simpler. If the case only have one answer, such as case 1 in example above, then you can just put 'yes' on "interview" and 'no' for other type of categories. If the case have multiple answers (such as case 20, with interview and workshop), you can put 'yes' for both "interview" and "workshops" and putting 'no' for "desk researches".

To input the quantitative data, this manual recommend to do the work in Microsoft Excel. To input the quantitative data into excel:

- Convert 'Yes' answers into '1'
- Convert 'No' answers into '0'
- Convert 'No information' answers into '999' (IMPORTANT: the '999' code should be put into all of the categories for the variables that have missing information / no information).

Example:

let's assume a hypothetical research with 5 cases as its sample. These cases have "data collection" and "publication type" variables, where both variables contain multiple answers. From the categories generation, the "Data Collection" variable have five type of responses, while the "Publication Type" have eight type of responses.

To make it easier to be inputted into statistical software (such as SPSS), we recommend to assign 'short code' for each of the categories, such as DC1 (for desk collection categories number 1). The categories for each variable would become as follows.

Data collection

DC1 Desk research
DC2 Interview
DC3 Workshops
DC4 Data triangulation
DC5 Participatory observation

Publication type

PT1 Student case (single observer)
PT2 Student case (multiple observers)
PT3 Master thesis
PT4 PhD thesis (single observers)
PT5 Research journal
PT6 Envision case study
PT7 Project report

Afterwards, put the code and the data into excel. The quantitative coding in excel would be like the figure below,

	Data collection					Publication Type							
Case	DC1	DC2	DC3	DC4	DC5	PT1	PT2	PT3	PT4	PT5	PT6	PT7	PT8
1	0	1	0	0	0	0	1	0	0	0	0	0	0
2	1	1	0	0	0	1	0	0	0	0	0	0	0
3	0	1	0	0	0	0	1	0	0	0	0	0	0
4	1	1	0	0	0	0	1	0	0	0	0	0	0
5	999	999	999	999	999	1	0	0	0	0	0	0	0

From above we can see several things. Case number 2 have multiple responses for the "Data Collection" variable (DC1 and DC2), and only 1 response of "Publication Type" variable (PT1). On the other hand, case number 5 don't have enough information to answer the "Data Collection" variable and only 1 response for "Publication Type" (PT1).

This data would be ready to be transferred to SPSS (or other statistical software) to do further statistical analysis.

c. Working with SPSS

To start working with SPSS, follow these steps:

1. Create all the variables defined in the Microsoft Excel in the SPSS by going into the 'Variable View' tab on the bottom of the screen.

2. Set the properties of the variables correctly such as its labels, missing values definition, scale / measurements, etc. The variable's properties for this research can be seen on the Appendix I.

3. Copy the quantitative data from Microsoft Excel to SPSS on the "Data View" tab

4. Analyze the quantitative data according to the research objective and research questions as necessary

Appendix I - SPSS Variable properties

No	Variables	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	DC1	Numeric	8	0	Data collection: desk research	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
2	DC2	Numeric	8	0	Data collection: interview	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
3	DC3	Numeric	8	0	Data collection: workshops	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
4	DC4	Numeric	8	0	Data collection: data triangulation	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
5	DC5	Numeric	8	0	Data collection: participatory observation	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
6	PT1	Numeric	8	0	Publication type: student case (single observer)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
7	PT2	Numeric	8	0	Publication type: student case (multiple observer)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
8	PT3	Numeric	8	0	Publication type: Master thesis	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
9	PT4	Numeric	8	0	Publication type: PhD thesis	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
10	PT5	Numeric	8	0	Publication type: research journal	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
11	PT6	Numeric	8	0	Publication type: ENVISION case study	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
12	PT7	Numeric	8	0	Publication type: project report	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
13	TP	Numeric	8	2	Time period (years)	{999.00, No information}	999	8	Right	Scale	Input
14	FA	Numeric	8	2	Firm's age (years)	{999.00, No information}	999	8	Right	Scale	Input
15	OP1	Numeric	8	0	Organization phase: startup	{0, No}, {1, Yes},	999	8	Right	Nominal	Input

						{999, No Information}					
16	OP2	Numeric	8	0	Organization phase: emerging / rapid growth	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
17	OP3	Numeric	8	0	Organization phase: mature	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
18	FS1	Numeric	8	0	Firm size: < 10 employees (micro)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
19	FS2	Numeric	8	0	Firm size: < 50 employees (small)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
20	FS3	Numeric	8	0	Firm size: < 250 employees (medium)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
21	IA1	Numeric	8	0	Industry area: agricultural	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
22	IA2	Numeric	8	0	Industry area: entertainment	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
23	IA3	Numeric	8	0	Industry area: ICT / High tech	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
24	IA4	Numeric	8	0	Industry area: manufacturing	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
25	IA5	Numeric	8	0	Industry area: medical / healthcare	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
26	IA6	Numeric	8	0	Industry area: other	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
27	MS1	Numeric	8	0	Market segment: B2C	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
28	MS2	Numeric	8	0	Market segment: B2B	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
29	MS3	Numeric	8	0	Market segment: B2C and B2B	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input

30	MA	Numeric	8	0	Market area	{0, National}, {1, International}, {999, No Information}	999	8	Right	Nominal	Input
31	GL1	Numeric	8	0	Geographic location: Finland	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
32	GL2	Numeric	8	0	Geographic location: Netherlands	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
33	GL3	Numeric	8	0	Geographic location: Austria	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
34	GL4	Numeric	8	0	Geographic location: Germany	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
35	GL5	Numeric	8	0	Geographic location: Denmark	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
36	GL6	Numeric	8	0	Geographic location: Lithuania	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
37	GL7	Numeric	8	0	Geographic location: Switzerland	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
38	VO1	Numeric	8	0	Value offering: product	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
39	VO2	Numeric	8	0	Value offering: service	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
40	VO3	Numeric	8	0	Value offering: product and service	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
41	OS1	Numeric	8	0	Ownership structure: private company, no investors	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
42	OS2	Numeric	8	0	Ownership structure: private company, investors involved	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
43	OS3	Numeric	8	0	Ownership structure: private company, no information on investors	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
44	FB	Numeric	8	0	Family business	{0, No}, {1, Yes}, {999, No	999	8	Right	Nominal	Input

						Information}					
45	FI	Numeric	8	0	Female involvement	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
46	TL	Numeric	8	0	Technology level	{0, Low-tech}, {1, High-tech}, {999, No Information}	999	8	Right	Nominal	Input
47	PR	Numeric	8	0	Partner reliance	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
48	EO	Numeric	8	0	Entrepreneurial orientation	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
49	MO	Numeric	8	0	Market orientation	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
50	PL	Numeric	8	0	Product leadership orientation	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
51	CC	Numeric	8	0	Creative culture	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
52	ED1	Numeric	8	0	Environmental dynamism: market dynamics	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
53	ED2	Numeric	8	0	Environmental dynamism: technology dynamics	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
54	ED3	Numeric	8	0	Environmental dynamism: regulation dynamics	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
55	IN1	Numeric	8	0	Innovativeness: Openness to new ideas	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
56	IN2	Numeric	8	0	Innovativeness: Capacity to innovate	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
57	IN3	Numeric	8	0	Innovativeness: Openness to new idea & capacity to innovate	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
58	TOB	Numeric	8	0	Type of BMI	{0, BM Modification}, {1, New BM},	999	8	Right	Nominal	Input

						{999, No Information}					
59	BSD1	Numeric	8	0	Source of driver: external drivers - market dynamics	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
60	BSD2	Numeric	8	0	Source of driver: external drivers - technology dynamics	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
61	BSD3	Numeric	8	0	Source of driver: external drivers - regulation dynamics	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
62	BSD4	Numeric	8	0	Source of driver: internal drivers - high innovativeness	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
63	BSD5	Numeric	8	0	Source of driver: internal drivers - low business performance	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
64	BSD6	Numeric	8	0	Source of driver: internal drivers - high business performance	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
65	BTD	Numeric	8	0	BMI driver (type of driver)	{0, Voluntary BMI}, {1, Forced to do BMI}, {999, No Information}	999	8	Right	Nominal	Input
66	BEO1	Numeric	8	0	BMI expected outcome: Better customer service	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
67	BEO2	Numeric	8	0	BMI expected outcome: Extension to product range	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
68	BEO3	Numeric	8	0	BMI expected outcome: Enhancement to existing product	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
69	BEO4	Numeric	8	0	BMI expected outcome: Lower cost	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
70	BEO5	Numeric	8	0	BMI expected outcome: Financial improvement	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
71	BEO6	Numeric	8	0	BMI expected outcome: Strategic positioning	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
72	BEO7	Numeric	8	0	BMI expected outcome: Sustainability	{0, No}, {1, Yes}, {999, No	999	8	Right	Nominal	Input

						Information}					
73	BEO8	Numeric	8	0	BMI expected outcome: Strategic flexibility	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
74	BEO9	Numeric	8	0	BMI expected outcome: Extension on target market	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
75	BP1	Numeric	8	0	BMI phase: BM design	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
76	BP2	Numeric	8	0	BMI phase: BM re-design	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
77	BP3	Numeric	8	0	BMI phase: BM planning	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
78	BP4	Numeric	8	0	BMI phase: BM testing	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
79	BP5	Numeric	8	0	BMI phase: BM implementation	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
80	BS1	Numeric	8	0	BMI stakeholders: internal	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
81	BS2	Numeric	8	0	BMI stakeholders: external	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
82	BS3	Numeric	8	0	BMI stakeholders: internal and external	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
83	CB1	Numeric	8	0	Changes in BM: New goods / products	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
84	CB2	Numeric	8	0	Changes in BM: New services	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
85	CB3	Numeric	8	0	Changes in BM: Changes in production methods	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
86	CB4	Numeric	8	0	Changes in BM: Changes in support activities	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
87	CB5	Numeric	8	0	Changes in BM: Changes in channels	{0, No}, {1, Yes},	999	8	Right	Nominal	Input

						{999, No Information}					
88	CB6	Numeric	8	0	Changes in BM: Changing of pricing (model)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
89	CB7	Numeric	8	0	Changes in BM: New or changed revenue models	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
90	CB8	Numeric	8	0	Changes in BM: Change in promotion / branding	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
91	CB9	Numeric	8	0	Changes in BM: Change in businesses practices	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
92	CB10	Numeric	8	0	Changes in BM: Change in organizational network	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
93	CB11	Numeric	8	0	Changes in BM: Change in work organization	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
94	CB12	Numeric	8	0	Changes in BM: Changes in target market	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
95	CB13	Numeric	8	0	Changes in BM: Changes in technology used	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
96	CB14	Numeric	8	0	Changes in BM: Changes in cost structure	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
97	BOS1	Numeric	8	0	BM Ontology: CANVAS	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
98	BOS2	Numeric	8	0	BM Ontology: CSOFT	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
99	BOS3	Numeric	8	0	BM Ontology: STOF	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
100	BOS4	Numeric	8	0	BM Ontology: VISOR	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
101	BOU1	Numeric	8	0	BM Ontology User: Firm	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input

102	BOU2	Numeric	8	0	BM Ontology User: Researcher / consultants	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
103	BOU3	Numeric	8	0	BM Ontology User: Both firm and researcher / consultants	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
104	BTL1	Numeric	8	0	BM Tooling: CANVAS software	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
105	BTL2	Numeric	8	0	BM Tooling: CSOFT drawing	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
106	BTL3	Numeric	8	0	BM Tooling: BM stress-testing	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
107	FSM	Numeric	8	0	Fit with strategy making	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
108	CO1	Numeric	8	0	Changes in operations: Product domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
109	CO2	Numeric	8	0	Changes in operations: Organization domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
110	CO3	Numeric	8	0	Changes in operations: Value dependencies	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
111	CO4	Numeric	8	0	Changes in operations: Information domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
112	CO5	Numeric	8	0	Changes in operations: Data domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
113	CO6	Numeric	8	0	Changes in operations: Trust dependencies	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
114	CO7	Numeric	8	0	Changes in operations: Process domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
115	CO8	Numeric	8	0	Changes in operations: Application domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
116	CO9	Numeric	8	0	Changes in operations: Technical infrastructure domain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input

117	CO10	Numeric	8	0	Changes in operations: Process dependencies	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
118	FOM1	Numeric	8	0	Fit with operational model: Changes in value chain	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
119	FOM2	Numeric	8	0	Fit with operational model: Changes in organization	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
120	FOM3	Numeric	8	0	Fit with operational model: Changes in cost model	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
121	FEA	Numeric	8	0	Fit with EA	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
122	EAF1	Numeric	8	0	EA frameworks: ArchiMAte	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
123	EAF2	Numeric	8	0	EA frameworks: TOGAF	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
124	EAF3	Numeric	8	0	EA frameworks: Carnagie Mellon	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
125	RBM1	Numeric	8	0	Radicalness of new BM: Incremental (BM extension)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
126	RBM2	Numeric	8	0	Radicalness of new BM: Radical (BM creation)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
127	RBM3	Numeric	8	0	Radicalness of new BM: Radical (BM revision)	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
128	DBM	Numeric	8	0	Disruptiveness of new BM	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
129	BMF	Numeric	8	0	BM focus	{0, Efficiency-focus}, {1, Novelty-focus}, {999, No Information}	999	8	Right	Nominal	Input
130	SF	Numeric	8	0	Strategic flexibility	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input

131	BMU	Numeric	8	0	Improvement in BM understanding	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
132	BMW	Numeric	8	0	Improvement in BM weakness assessment	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
133	BMC	Numeric	8	0	Improvement of BM communicability	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
134	KPI1	Numeric	8	0	Performance metrics: Profit	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
135	KPI2	Numeric	8	0	Performance metrics: Revenue	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
136	KPI3	Numeric	8	0	Performance metrics: Costs	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
137	KPI4	Numeric	8	0	Performance metrics: Cashflows	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
138	KPI5	Numeric	8	0	Performance metrics: Sales volume	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
139	KPI6	Numeric	8	0	Performance metrics: Price	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
140	KPI7	Numeric	8	0	Performance metrics: EBIT	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
141	KPI8	Numeric	8	0	Performance metrics: ROI	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
142	KPI9	Numeric	8	0	Performance metrics: Cash balance	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
143	KPI10	Numeric	8	0	Performance metrics: Revenue growth	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
144	KPI11	Numeric	8	0	Performance metrics: Customer satisfaction	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
145	KPI12	Numeric	8	0	Performance metrics: Value to customers	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input

146	KPI13	Numeric	8	0	Performance metrics: Customer service	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
147	KPI14	Numeric	8	0	Performance metrics: Customer retention	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
148	KPI15	Numeric	8	0	Performance metrics: Number of customers	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
149	KPI16	Numeric	8	0	Performance metrics: Customer growth	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
150	KPI17	Numeric	8	0	Performance metrics: Repeat order	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
151	KPI18	Numeric	8	0	Performance metrics: Number of downloads	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
152	KPI19	Numeric	8	0	Performance metrics: Marketing effectiveness	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
153	KPI20	Numeric	8	0	Performance metrics: Conversion rate	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
154	KPI21	Numeric	8	0	Performance metrics: Brand image	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
155	KPI22	Numeric	8	0	Performance metrics: Operation efficiency	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
156	KPI23	Numeric	8	0	Performance metrics: Product quality	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
157	KPI24	Numeric	8	0	Performance metrics: Employee turnover	{0, No}, {1, Yes}, {999, No Information}	999	8	Right	Nominal	Input
158	KPIA	Numeric	8	0	Metric interpretations / achievements	{0, BMI doesn't improve performance}, {1, BMI improved performance}, {999, No Information}	999	8	Right	Nominal	Input