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Industrial Engineering and Management

Global Management of Innovation and Technology

MASTER'S THESIS

**CIRCULAR BUSINESS MODEL INNOVATION – A PROCESS FRAMEWORK AND A
TOOL TOWARDS MORE CIRCULAR ECONOMY**

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ABSTRACT

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<p>Circular economy can play a vital role to solve the material scarcity, environmental and social problems but it needs new business models. However, the existing methods for business model innovation are not competent in that perspectives. Thus, the purpose of the research is to improve circular business model innovation method and process. In this thesis, critical literature review and case study are used as the research strategy. A process framework and a tool for circular business model innovation are developed after collecting and analyzing secondary data. Again, collection of primary data from two cases result in two business models and a list of barriers for transition towards circular economy.</p> <p>The Business Combo Model, which is developed and introduced in this study, is comparatively more effective tool for innovating circular business models. It integrates system thinking, sustainability impacts and competitor analysis with other basic components of business model. It allows practitioners to visualize and understand the whole system easily and let them to innovate better business models. In addition, the study introduces 5 I framework which presents the systematic way for circular business model innovation process. Again, a list of barriers which managers may face in the process of circular business model innovation is also included. Moreover, this is the first study regarding circular economy in Bangladesh. Companies may take this study as a guide to think creatively to establish their business in a new paradigm.</p>	

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ABBREVIATION

BCC	Business Cycle Canvas
BCM	Business Combo Model
BM	Business Model
BMC	Business Model Canvas
BMI	Business Model Innovation
CBM	Circular Business Model
CBMC	Circular Business Model Canvas
CBMI	Circular Business Model Innovation
CE	Circular Economy
MCBM	Moonfish Circular Business Model
MDF	Medium Density Fiber
PIF	Play- it- forward
ReSOLVE	Regenerate, Share, Optimize, Loop, Virtualize and Exchange
SCBM	Sustainable Circular Business Model
SME	Small and Medium-sized Enterprise
VMT	Value Mapping Tool

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1. INTRODUCTION

The first chapter starts with theoretical background. That leads to research gap, research objective and research questions. Structure of the thesis is also included in this chapter after discussing theoretical framework.

1.1. Background

The existing systems of production, consumption, finance, and governance are the causes of rising ecological footprint, destruction of planetary boundaries and growing pressure on biodiversity (WWF, 2016). Though in the past twenty years many countries achieve environmental improvement, the worldwide existing forms of production, consumption and trade persist unsustainability. The resource efficiency and security are becoming critical to upcoming economic competitiveness and flexibility (Preston, 2012). Sustainability is intended at addressing the environmental and socio-economic issues for this generation and the upcoming ones. In this situation, circular economy (CE) is very useful as it prescribes converting waste into resources, and bridging production and consumption activities (Witjes et al., 2016). To quicken the shift towards a circular economy, the European Union has launched a striving circular economy package, which will contribute to "closing the loop" in product lifecycles by more recycling and reusing for environmental and economic benefits (European Commission, 2016). On the other hand, circular economy requires technological innovation, new business models, and stakeholder collaboration (Witjes et al., 2016). In organizations, new ideas and technologies are introduced through business models (Chesbrough, 2010). The current transactional business models show the linear economic system of using natural resources to create a product and ending as waste after use. In contrast, circular economy need different business models (Renswoude et al., 2015) for rethinking how to maximize the value of products and materials that leads to reduce the consumption of natural resources and create positive social and environmental effect (Kraaijenhagen et al., 2016). For the vast benefits of financial, social, and environmental, many giant companies such as Google, Unilever, Renault, and so on are shifting to a circular economy

along with other smaller companies. For this reason, designing circular business models are required to stimulate and foster the implementation of circular economy (Lewandowski, 2016).

1.2. Research Problem

Though many studies either highlight the necessity of sustainability or explain sustainable business model, it is not clear how managers can innovate their business model towards better sustainability as it has not been addressed satisfactorily yet (Foss et al., 2017). In addition, current linear business models are not fit in circular economy due to different products or services, different (relationships with) customers, different production processes, and different revenue models which sometimes include other types of values than financial profit (Mentink, 2014). Again, existing business models for the circular economy have inadequate transferability and there is no complete framework supporting every kind of company in designing a circular business model (Lewandowski, 2016). Thus, a more clear and systematic use of the BMI concept is needed to further this research field (Foss et al., 2017).

1.3. Research Questions and Objectives

To overcome the gaps, the objective of the research is to develop a better tool for circular business model innovation and a process framework for supporting this tool. Thus, the main research question is:

How can business model innovation tool and its process framework be improved in the context of circular economy?

To answer the main research question, it is necessary to answer some other questions which are included as a sub questions. These are as follows:

1. Why circular economy is important? (Sub Question 1)
2. To what extent circular business model innovation is needed? (Sub Question 2)
3. What is the gap of existing circular business model innovation? (Sub Question 3)

1.4.Theoretical Framework

The theoretical framework of this thesis is described by the topic and its central concepts. These concepts are Circular Economy and Business Model Innovation and their relationships leads to the next concept – Circular Business Model. Figure 1. shows the theoretical framework of this thesis.

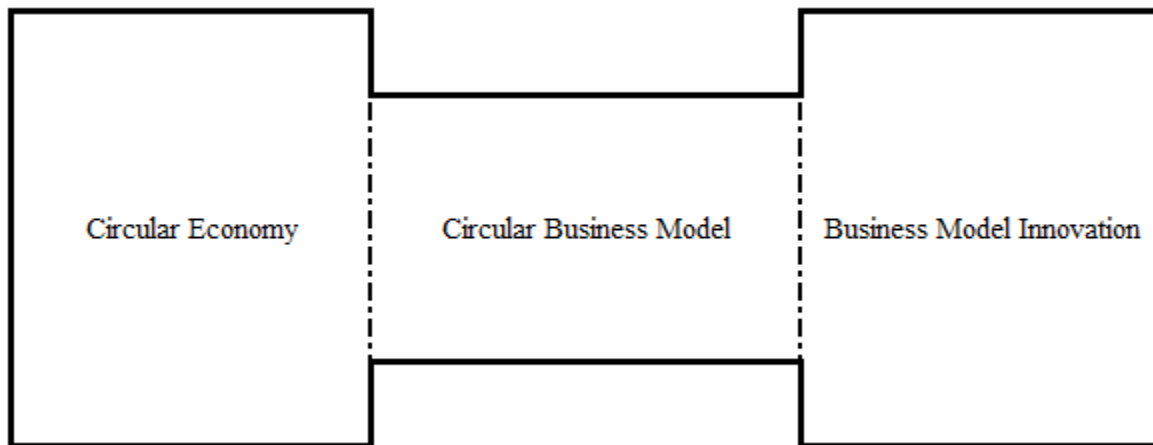


Figure 1. Theoretical framework

To make the discussion of these concepts richer, it is important to find the definition of each concept and the various topics regarding them which are mainly extract from the existing literatures. The first concept, Circular Economy is defined as industrial economy that is restorative by intention aiming to enable effective flows of materials, energy, labor and information so that natural and social capital can be rebuilt (EMF, 2016). In this study, the problem regarding the concept is treated as a topic. Thus, transition towards circular economy is a topic which needs changing in existing business models (Sempels, 2014).

On the other hand, the second concept, Business Model Innovation is considered that is new to a company but not necessarily new to an industry (Bock et al., 2012; Johnson et al., 2008; Osterwalder et al., 2005), whereas others think it should be new to an industry (Santos et al., 2009). Again, some researchers argue that BMI can be done by changing a single component of the firm's BM (Amit et al., 2012; Bock et al., 2012; Santos et al., 2009; Schneider et al., 2013) while other

suggest “one or more” components (Frankenberger et al., 2013; Sorescu et al., 2011) or “two or more” components (Lindgardt et al., 2009). Even some researchers claim completely new combination of all BM components and the architecture linking them are required for BMI (Velamuri et al., 2013; Yunus et al., 2010). Foss et al. (2017) define business model innovation as “designed, novel, nontrivial changes to the key elements of a firm’s business model and/or the architecture linking these elements.” However, it is still not clear how managers can innovate their business model towards better sustainability as it has not been addressed satisfactorily yet (Foss et al., 2017). This is the problem regarding the concept business model innovation which is considered as a topic as well in this study.

Finally, the third concepts, Circular Business Model is defined as “the rationale of how an organization creates, delivers, and captures value with and within closed material loops” (Mentink, 2014). Circular business model innovations require collaboration, communication, and coordination within complex networks of stakeholders (Antikainen et al., 2013) which is also a topic of this study.

1.5. Structure of the Thesis

The background, research gap, research questions and objectives are given in this chapter. The theoretical framework is also explained in this chapter. The rest of the thesis is structured as follows. Figure 2 illustrates the structure of the thesis.

In the second chapter, the research design and methodology are explained.

Chapter three presents the concept of CE and its importance towards sustainability (sub question 1). Business model and business model innovation are also discussed in this chapter. In the end of this chapter, the necessity of circular business model innovation (sub question 2) is described.



Figure 2. Structure of the thesis

Existing different circular business model innovation tools are described and evaluated in the chapter four (sub question 3).

Chapter five discusses some existing process frameworks for circular business model innovation (sub question 3).

In the sixth chapter, to overcome the gaps of existing circular business models, a new tool and a new process framework for circular business model innovation are introduced (main question).

In the seventh chapter, case studies are described and a list of barriers for transition towards circular economy is identified.

Chapter eight concludes the thesis by answering all sub-questions and the main question. It also shows the limitations of this study and suggests the further research opportunities.

2. RESEARCH DESIGN AND METHODOLOGY

This chapter presents the method and the procedure used in this thesis.

2.1. Research Design

Collis et al. (2014) argue that research can be classified by: purpose of the research, process of the research, logic of the research, and outcome of the research.

This thesis is an exploratory study by the purpose of the study and finds out “what is happening; to seek new insights; to ask questions and to assess phenomena in a new light” (Robson, 2002). Saunders et al. (2016) state that there are three main ways of conducting exploratory study. These are: searching the literature; interviewing ‘experts’ in the subject; conducting focus group interviews.

In this thesis, qualitative method is used for collecting and analyzing data. Thus, both primary and secondary data are non-numerical (Saunders et al., 2016). The primary data are collected through semi- structured interview and the secondary data are collected from published articles in scientific journals, reports, online search, and books.

This study follows inductive approach where theory is developed after analyzing the collected data (Saunders et al., 2016). In this study, a process framework and a tool for circular business model innovation are developed after collecting and analyzing secondary data which is inductive approach. Again, collection of primary data from two cases (from four respondents) result in two different business models and a list of barriers for transition towards CE which also indicate inductive process.

The study is a basic research by the nature of outcome. Basic research is viewed as the most academic form of research and the main intention is to contribute to knowledge, normally, for the general good, rather than to resolve a certain problem for a company (Collis et al., 2014).

In this thesis, critical literature review and case study are used as the strategy. The case study strategy is helpful for gaining in depth knowledge of the research context and the processes being passed (Morris et al., 1991). It has extensive ability to produce answers to the question ‘why?’, ‘what?’ and ‘how?’ and the data collection technique may include, interviews, observation, documentary analysis and questionnaires (Saunders et al., 2016). Again, Yin (2003) claims multiple case studies may be better than a single case study. In this study, two cases are analyzed for gaining in depth knowledge on circular business model innovation.

2.2. Research Methodology

To answer the sub questions 1-3 the literature and documentation has been analyzed and summarized. Literature and documentation has been searched in academic search engines, different websites. Again, snowball sampling which means going through reference lists of key documentation, is used due to lack of enough literature regarding the topic. After finding the gaps of existing tools and process frameworks of circular business model (sub- question 3), a new tool and a new process framework are developed to improve the circular business model innovation (main question). Figure 3 shows the details of research methodology.

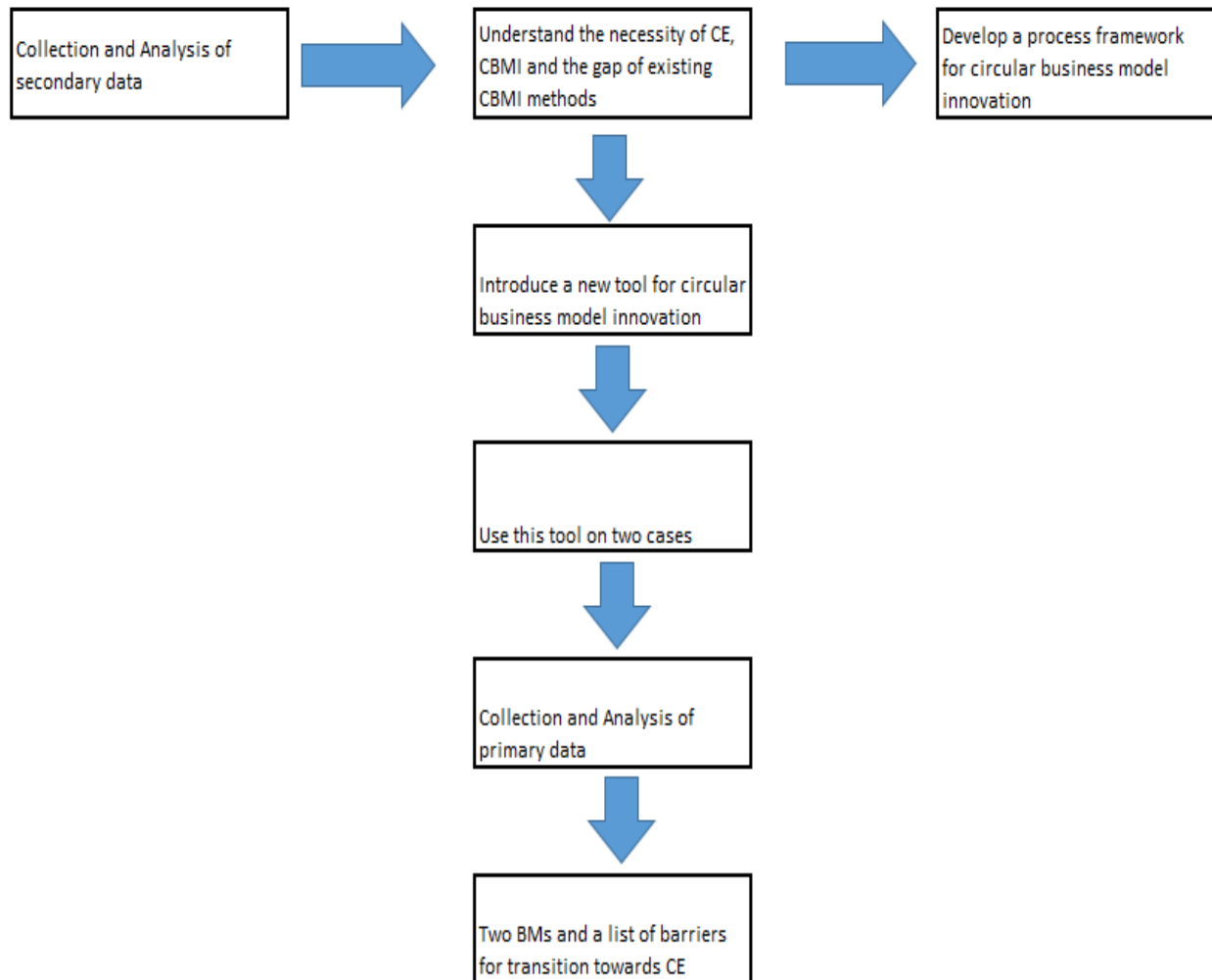


Figure 3. Research Methodology

The case studies are conducted with the help of four respondents from two different organizations. It results in two different business models by using the new BMI tool. A list of barriers is also obtained through the semi-structured interviews. In semi-structured interviews, the researcher will have a list of themes and questions to be covered which may differ from interview to interview (Saunders et al., 2016). Researcher may remove any question or change the order if necessary.

3. LITERATURE REVIEW

In this chapter, the existing literature has been discussed to find out the threats of linear economy against sustainability which indicate the urgency of transition towards CE. Then, business model and business model innovation are also described with their importance. The chapter is concluded after explaining the circular business model innovation and its necessity.

3.1.Sustainability and the Existing Linear Economy

The most well-known definition of sustainability is “development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (Brundtland, 1987). Sustainability mainly consists of three components: the natural environment, society, and economic performance (Carter et al., 2008). The “Take-Make-Waste” paradigm which is based on a linear economic model lead sustainability to dead-end (Antikainen et al., 2016). The existing systems of production, consumption, finance, and governance are the causes of growing ecological footprint, destruction of planetary boundaries and growing pressure on biodiversity (WWF, 2016). Though in the past twenty years many countries achieve environmental improvement, the existing dominant worldwide forms of production, consumption and trade persist unsustainability. The resource efficiency and security are becoming critical to upcoming economic competitiveness and flexibility (Preston, 2012). To sustain, governments set target to double the output using half of current resources with generating one-fifth of current CO₂ by 2050 (EPSRC, 2013). Sustainable economy needs a material circulation system that minimizes consumption and maximizes societal and environmental benefits (Jackson, 2009). The system gives priority to deliver functionality than product ownership and built on collaboration and sharing, rather than aggressive competition (Bocken et al., 2014). In this situation, the existing linear economy model is regarded as obsolete and accelerate the transition to a circular economy (Antikainen et al., 2016).

3.2.Circular Economy

To deal with current problems such as growing resource scarcity, volatile price markets, societal unrest, and emerging environmental problems, the circular economy is needed. Though circular economy mainly focus on transforming waste into resources and on bridging production and consumption activities (Witjes et al., 2016), various schools of thought including cradle-to-cradle, blue economy, regenerative design, sustainable development, performance economy and industrial ecology are used to build the circular economy theory (Renswoude et al., 2015).

The most quoted definition of circular economy by EMF is “an industrial economy that is restorative by intention aiming to enable effective flows of materials, energy, labor and information so that natural and social capital can be rebuilt” (EMF, 2016). The definition of circular economy rests on three principles:

- Preserve and enhance natural capital
- Optimize resource yields
- Foster system effectiveness

The three principles of the circular economy can translate into six business actions: Regenerate, Share, Optimize, Loop, Virtualize, and Exchange – together, the ReSOLVE framework (EMF, 2016).

3.3.Business Model

In organizations, new ideas and technologies are introduced through business models (Chesbrough, 2010). A business model is a detail of how a company does business (Beattie et al., 2013; Teece, 2010; Witjes et al., 2016) by creating, delivering, and capturing value (Osterwalder et al., 2010). A company may have more business models with hierarchy (Burkhart et al., 2012) at

different organizational levels (Demill et al., 2009), if it has different value propositions (Witjes et al., 2016). The purpose of the business model is to describe how strategy is put into practice (Hobson et al., 2016). However, there is still debate on the common components of the BM (Frankenberger et al., 2013).

Foss et al. (2017) argue that the idea of BMs is not new but only from the mid-1990s entrepreneurship and strategy researchers applied it to describe completely the organization's key business processes and how they are connected (Zott et al., 2011). The development of the BM literature has been generally categorized into three streams of research (Lambert et al., 2013; Zott et al., 2011). First, the BM is used as a source for enterprise classification (Amit et al., 2001; Magretta, 2002). Second, the BM is considered as a vital factor for firm performance. Some business models are seen to beat others (Weill et al., 2005; Zott et al., 2007, 2010) when effective business models are found as standard to redevelop (Chesbrough, 2010; Teece, 2010; Doz et al., 2010; Winter et al., 2001). Third, the business model is regarded as a potential for innovation (Zott et al., 2011). Mitchell et al. (2003) at first argued that managers can persistently innovate their BMs and from then studies regarding business model innovation have increased.

Disruptive business models are needed to cope with current trends and make transition to the circular economy model (Boons et al., 2013). According to Stubbs et al. (2008), Porter et al. (2011), Yunus et al. (2010), and FORA (2010), business model redesign could be used to improve sustainable performance (environmental, social and economic) radically. Business model innovation offers a more holistic perspective than existing approaches to sustainability, as it is related to all three dimensions of sustainability (i.e. social, environmental, and economic) within business planning (Bocken et al., 2013). Business models “have the potential to bridge the gap between radical and systemic sustainable innovation and firm strategies” (Boons et al., 2013).

3.4. Business Model Innovation

Foss et al. (2017) provide a comprehensive systematic review of 150 peer-reviewed scholarly articles on business model innovation published over the last 15 years, include a critical assessment of these research efforts, and conclude by suggestions for future research. In this section, their efforts are basically summarized.

Business model innovation is a fast-rising significant phenomenon which complements process, product, and organizational innovation (Zott et al., 2011) but there are still debates on definition of business model innovation. Some researchers describe BMIs that are new to a company but not necessarily new to an industry (Bock et al., 2012; Johnson et al., 2008; Osterwalder et al., 2005), whereas others think it should be new to an industry (Santos et al., 2009). Again, some researchers argue that BMI can be done by changing a single component of the firm's BM (Amit et al., 2012; Bock et al., 2012; Santos et al., 2009; Schneider et al., 2013) while other suggest "one or more" components (Frankenberger et al., 2013; Sorescu et al., 2011) or "two or more" components (e.g., Lindgardt et al., 2009). Even some researchers claim that completely new combination of all BM components and the architecture linking them are required for BMI (Velamuri et al., 2013; Yunus et al., 2010). Foss et al. (2017) define business model innovation as "designed, novel, nontrivial changes to the key elements of a firm's business model and/or the architecture linking these elements."

Though recognized organizations get optimistic performance after innovating their business models (Cucculelli et al., 2015), it is more difficult to bring BMI in a well-known company. On the other hand, new start-ups may have the flexibility required to involve in BMI. The literature recognizes that BMI improves competitive advantage, profitability, innovativeness, or other aspects of organizational performance (Aspara et al., 2010; Bock et al., 2012; Denicolai et al., 2014; Giesen et al., 2007; Wei et al., 2014; Zott et al., 2007). As business models describe what the customer needs and how the company can establish best way to create, deliver, and capture

value (Teece, 2010), BMI is strongly connected to the awareness of entrepreneurial vision, imagination, and judgment (Foss et al., 2016).

For greater sustainability, such as social, and environmental, business model innovation has gained momentum over the past years. Many studies suggest that BMI is needed to get sustainability goals (Bocken, 2015; Bocken et al., 2014). BMI may support the exchange of underutilized resources among individuals which is renowned as sharing economy or collaborative consumption (for example: Airbnb, Zipcar, Rent the Runway). Again, the need to enable comprehensive development (Spiess-Knafl et al., 2015; Yunus et al., 2010) or target low-income customers (Anderson et al., 2008; Sanchez et al., 2010) may result in momentous business model innovations. Though many studies either highlight the necessity for sustainability or explain sustainable business model, it is not clear how managers can innovate their business models towards better sustainability as it has not been addressed satisfactorily yet. Thus, a more clear and systematic use of the BMI concept is needed to further this research field (Foss et al., 2017).

3.5. Circular Business Model Innovation

The transition to a circular economy needs innovative business models which either replace existing ones or grab new opportunities (EMF, 2016) and is considered as one of the main difficulties for successful implementation of circular economy (Kok et al., 2013). Mentink (2014) defines a circular business model as “the rationale of how an organization creates, delivers, and captures value with and within closed material loops”. There is no 100% circular business model for physical and practical reasons (Accenture, 2014) but it can be a part of a system of business models that together close a material loop (Mentink, 2014). Thus, circular business model innovations require collaboration, communication, and coordination within complex networks of stakeholders (Antikainen et al., 2013). Implementing a circular business model almost always has direct or indirect consequences to one or more than one of the business model pillars and dealing with these variations a firm needs to involve in a business model innovation process (Sempels, 2014).

Sustainable business model archetypes (Bocken et al., 2014) are introduced for strengthening the business model for sustainability. The archetypes are: Maximize material and energy efficiency; Create value from 'waste'; Substitute with renewables and natural processes; Deliver functionality rather than ownership; Adopt a stewardship role; Encourage sufficiency; Re-purpose the business for society/ environment; and Develop scale-up solutions. Appendix 2 shows the figure of sustainable business model archetypes.

On the other hand, Renswoude et al. (2015) find out six ways of circular value creation: Short cycle, Long cycle, Cascades, Pure circles, Dematerialized services, and Produce on demand. Based on these ways they categorized nineteen existing circular business models. These circular business models are covered most of the sustainable business model archetypes and support that circular business model can enhance sustainability.

4. EXISTING TOOLS FOR CIRCULAR BUSINESS MODEL INNOVATION

Most of the existing circular business model innovation tools are generated from business model canvas which is mainly focused on linear economy. In this chapter, existing circular business model innovation tools will be analyzed along with business model canvas. Evaluation of these business model innovation tools is also presented in this chapter.

4.1. Business Model Canvas

The most renowned tool for business model generation is the business model canvas. It is a generic and easy-to-use tool, which has been applied in different industries (Osterwalder et al., 2010). Though business model canvas is mainly for linear business, most of the circular business models are generated based on it. It has nine building blocks which are shown in figure 4.

Customer Segment: It presents the specific group of people or organizations, an enterprise wants to grasp and assist. As customer is the main source to gain financial profit, it is better to create customer segment for satisfying customer. A business model may have one or more than one customer groups which will help an organization to realize specific customer needs in depth.

Value Proposition: It represents the offers from an enterprise to specific customer segments for satisfying their needs or solving their problems. It is the purpose why customers choose this enterprise over others. A value could be quantitative such as price, speed of service and so on or qualitative such as design, customer experience and so on.

Channels: It explain the way an enterprise grasp and connect with its specific customer segments. Channels could be direct or indirect ones. It could be owned channels or partner's channels. There

are five different stages which can be covered by one or more than one channel. These are as follows: Raising customer awareness regarding the enterprise's offers, evaluation of enterprise's offers by customers, purchasing of enterprise's products or services, delivering the purchased offers, and maintaining after sales services.

Customer relationship: It defines the nature of relationship an enterprise has with its customer segments. There are many ways to make relationship with customer such as personal assistance, self- service, automated services, co- creation and so on.

Revenue Streams: It describes how an enterprise can get revenues from customer segments. It could be asset sale, usage fee, licensing, and so on. It can be divided into two types: 1. Transaction revenues where customer pay one time and 2. Recurring revenues where customer pay more than once.

Key Resources: It indicates the important resources which are needed to generate a value proposition, to spread markets, to sustain relationships with Customer Segments, and to receive revenues. It can be physical, financial, intellectual, or human. Enterprise may own the key resources or can manage from others.

Key Activities: It describes the vital actions an enterprise must take to run fruitfully such as production, problem solving and networking.

Key Partnerships: It designates the network of suppliers and partners for optimizing the business models, reducing risks, or obtaining necessary resources. It can be strategic alliances between competitors or non- competitors, joint ventures, and buyer- supplier relationships.

Cost structure: It illustrates the most significant costs experienced by an enterprise when functioning under a certain business model. A business model could be either cost-driven or value-driven.

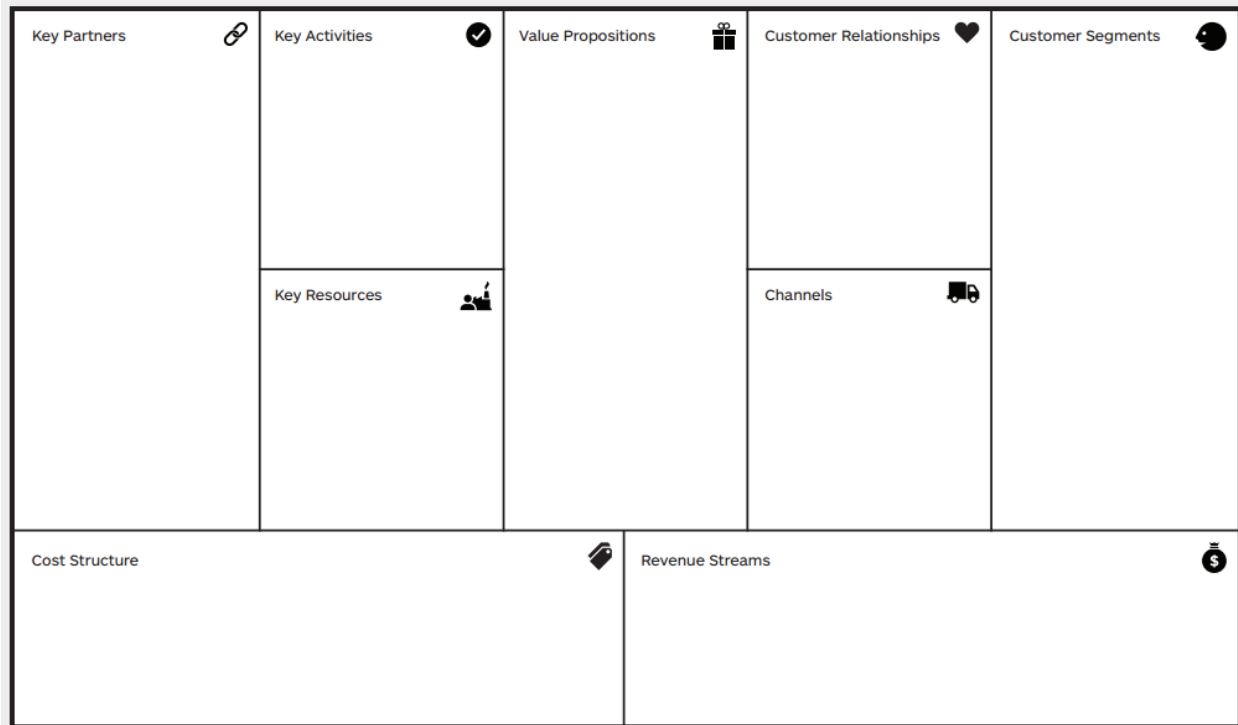


Figure 4. Business model canvas (Osterwalder et al., 2010).

4.2. Business Cycle Canvas

Mentink (2014) proposes the business cycle canvas based on business model canvas, which focuses on the circularity of the material. The business cycle canvas adds the roles of stakeholders (Antikainen et al., 2016). It also assists for systemic thinking of the supply chain and collaboration with partners. It has four components (who, what, how and why) rather than the nine building blocks of business model canvas. Figure 5 shows the transformation of business cycle canvas from the business model canvas.

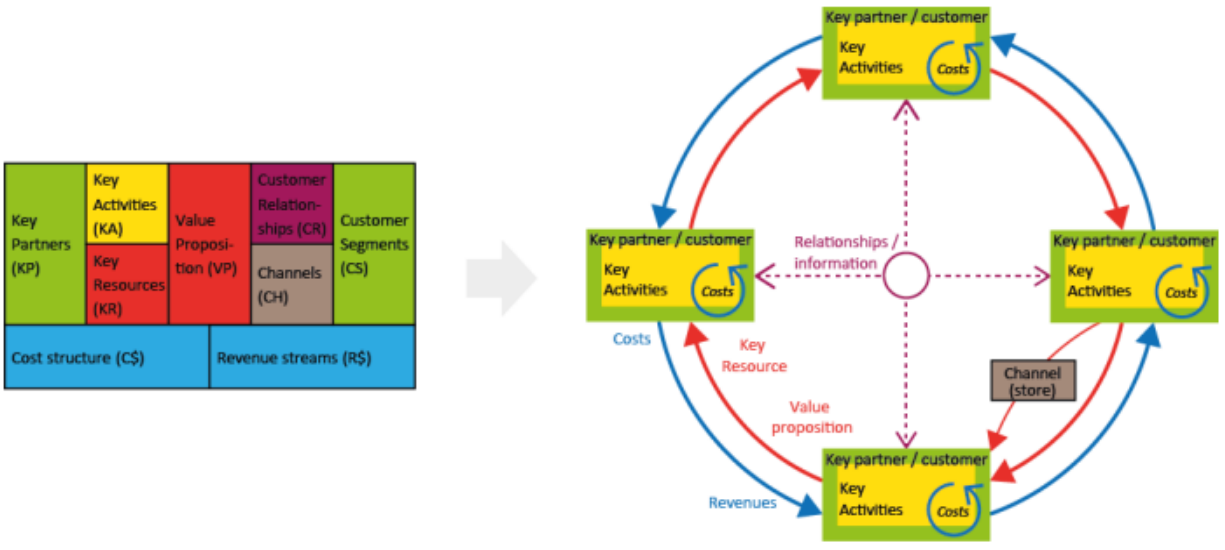


Figure 5. Business cycle canvas (Mentink, 2014).

What: It illustrates both value proposition and key resources which can be either material or information and represented by the arrow(s). Red arrow represents material and purple arrow represents information. According to Mentink (2014) one's value proposition is regarded as another's key resources.

Who: It describes both customers/ customer segments and suppliers/ key partners as Mentink (2014) designed business cycle canvas in a way that customers will be suppliers of the next step of supply chain. This component is represented by green box.

How: It describes the key activities and represented as a yellow box inside the green box.

Why: It describes both incoming value and outgoing value. Here, value means not only financial revenues but also social and ecological revenues. It is represented as blue arrow and depending on the direction of the arrow it determines either incoming value or outgoing value.

Business cycle canvas connects BMs with various types of flows which creates systems. These systems may have different shapes, while the BMC has the same outline of the canvas. Figure 6 shows some different shapes of business cycle canvas.

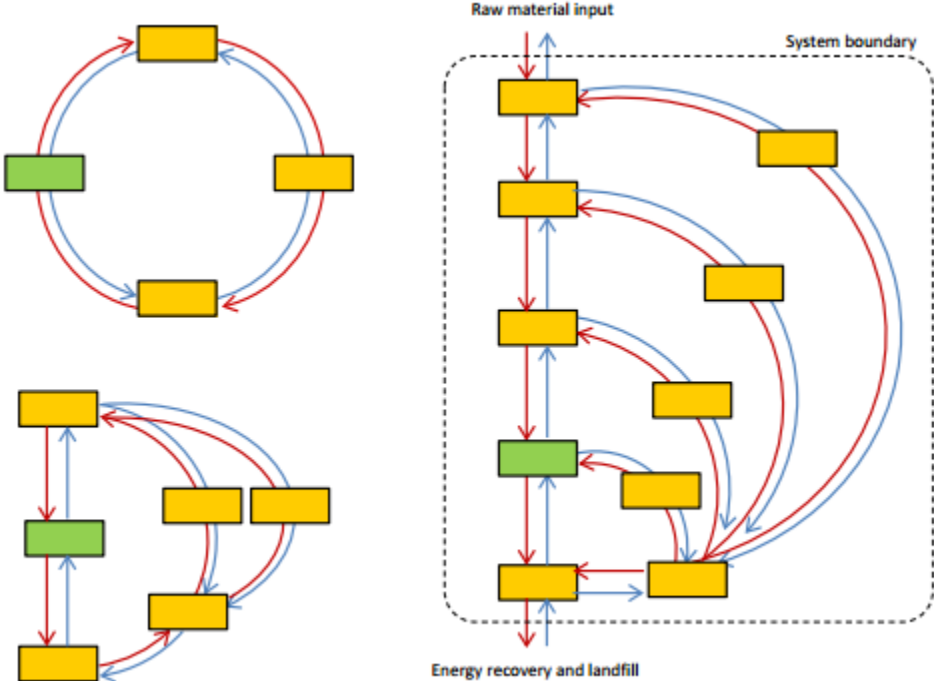


Figure 6. Some different shapes of business cycle canvas (Mentink, 2014).

4.3.Circular Business Model Canvas

Lewandowski (2016) presents circular business model canvas by applying circular economy principle to the components of business model canvas. In this model, ReSOLVE framework is used as circular economy principles and two new elements are added in the business model. The two new elements are as follows: Take-Back System and Adoption Factor. Figure 7 shows the circular business model canvas.

Take-Back System: It describes a system for material circulation. For reusing or remanufacturing, collection of the after used materials from the customer is necessary. Take-back system facilitates reverse logistics for this purpose.

Adoption Factor: It presents the internal and external capabilities of a company for transition towards circular economy. It helps to think and act early in CBMI process.

Lewandowski (2016) also finds out three main challenges to transform a linear business model to a circular one. The first fit is between the value proposition and customer segments while the second fit is between the cost structure and revenue streams. The third fit is between the changes towards more circular business model and adaptation factors.

However, the new element: take- back system can be replaced by the arrows of Mentink's (2014) business cycle canvas. It is more visible and convenient in BCC as it shows the source and destination of the materials and how the materials circulate. On the other hand, adoption factor can be merged in the key resources building block. In circular business model canvas, system thinking and competition are also absent.

Partners <ul style="list-style-type: none"> Cooperative networks Types of collaboration 	Activities <ul style="list-style-type: none"> Optimising performance Product Design Lobbying Remanufacturing, recycling Technology exchange 	Value Proposition <ul style="list-style-type: none"> PSS Circular Product Virtual service Incentives for customers in Take-Back System 	Customer Relations <ul style="list-style-type: none"> Produce on order Customer vote (design) Social-marketing strategies and relationships with community partners in Recycling 2.0 	Customer Segments <ul style="list-style-type: none"> Customer types
	Key Resources <ul style="list-style-type: none"> Better-performing materials Regeneration and restoring of natural capital Virtualization of materials Retrieved Resources (products, components, materials) 		Channels <ul style="list-style-type: none"> Virtualization 	
Cost Structure <ul style="list-style-type: none"> Evaluation criteria Value of incentives for customers Guidelines to account the costs of material flow 		Revenue Streams <ul style="list-style-type: none"> Input-based Availability-based Usage-based Performance-based Value of retrieved resources 		
Adoption Factors <ul style="list-style-type: none"> Organizational capabilities PEST factors 				

Figure 7. Circular business model canvas (Lewandowski, 2016)

4.4. Other Circular Business Models

Sempels (2014) has created the sustainable business canvas by adapting and extending the BMC to 10 elements. In his canvas, the most important changes to the original are the perspective of organizational effectiveness and efficiency, positive and negative externalities, and drivers of productivity. Though it presents a good summary of necessary suggestions for companies which are searching a performance or service model, it lacks aspects of collaboration and system thinking (Mentink, 2014). Again, there is nothing for competition aspects (Widmer, 2016).

Antikainen et al. (2016) suggest a framework for sustainable circular business model innovation which includes the business ecosystem level, analysis of sustainability costs and benefits, iterative cycles of sustainability, and circularity evaluation to the business model canvas. In contrast, the framework for sustainable circular business model innovation lacks proper arrangements for collaboration and system thinking, and almost completely competition aspects.

Value mapping tool (Bocken et al., 2013) introduces three new arrangements of value and four major stakeholder groups to help generating sustainable business model. The new forms of value are as follows: value missed (under-utilized resources), value destroyed (negative impact of social and environment), and value captured. It suggests to capture value from value missed by new activities, new relationships, and new network configuration. Again, value can be captured through reducing or eliminating value destroyed. This tool is based on network, instead of firm centric. The major stakeholder groups are environment, society, customer, and network actors.

The play-it-forward tool, proposed by Dewulf (2010), is also based on business model canvas. The tool mainly focuses on sustainable development in the early stages of innovation process by adding the building blocks for a triple bottom line. Though it emphasizes on sustainable development, CE concepts are poorly discussed here (Mentink, 2014). There is no facility for circular loop, collaboration, system thinking and competition.

Moonfish Circular Business Model is based on Business Model Canvas and the Ellen MacArthur Foundation's Circular Economy System Diagram. In this tool the customer is expressed as a user, channels are represented as touchpoints and value proposition is distributed to both the user and to the firm. In moonfish circular BM, different lifecycles of circular products are depicted well but it has less focus on collaboration, system thinking, sustainability perspective and competition aspects (Widmer, 2016). In Appendix 3, figures of some circular business model innovation methods are illustrated.

4.5.Evaluation of Existing Circular Business Models

It is very critical to evaluate CBMs as still there are debates on the elements of BMs (Frankenberger et al., 2013). In this study, some important features for CBM are identified from other literatures (Osterwalder et al., 2010; Mentink, 2014; Antikainen et al., 2016; Widmer, 2016) and other tools of CBMI are assessed based on these features.

In general, by the definition of business model (Osterwalder et al., 2010), it should describe three features: Value Creation, Value Deliver and Value Capture. Mentink (2014) also conducted workshops for BMs evaluation and he considered these features as “business rationale”.

In contrast, for circular economy, it should have some extra features such as System Thinking (Mentink, 2014), Collaboration (Mentink, 2014), and Sustainability Impacts (Antikainen et al., 2016). Some other features may enhance a business model such as competitor list and their position in the market. Widmer (2016) considers competition as a feature of BM.

Based on these features (business rationale, system thinking, collaboration, sustainability impacts and competition), existing circular business models are evaluated and Table 1 shows the collective evaluation of existing CBMI tools.

Business Model Canvas (BMC): According to Mentink (2014), the BMC does not facilitate systemic thinking. He also identified lack of opportunity for coordination of collaboration with partners (Mentink, 2014). It lacks sustainability impacts and stakeholder involvement (Antikainen et al., 2016; Bocken et al., 2013). Competition aspects are also absent in this model (Widmer, 2016).

Business Cycle Canvas (BCC): To focus on more circularity, Mentink (2014) takes other components of business model with less importance. He presents key resources as a raw material and describes supplier's value proposition as a key resource for a firm but in organization, key resources could also be human, machines and so on. In business cycle canvas, the building block channels and customer relationships are also cut off from this tool (Mentink, 2014) which are important for a company, specially, for start-ups. Again, it's cost structure and revenue stream elements are also weak as Mentink (2014) describes only raw material cost. In addition, there is no room for competition (Widmer, 2016). As Mentink (2014) states that BCC does not focus essentially on sustainability, the sustainability impacts feature is also missing from BCC.

Moreover, Mentink (2014) found that the improvement in the quality of BCC is questionable after conducting workshops. The results of the workshops show in the perspectives of "business rationale", BMC is more than two times better than BCC. In addition, the results of the workshops suggest to use both BMC and BCC for better improvements.

Other Circular Business Model Innovation Tools: There is no CBMI tool which includes competition feature. According to Mentink (2014), connecting other actors in BM create system and this is the most vital gap of existing CBMI tools. Thus, most of the existing CBMI tool either poorly think on system (such as SBMC, SCBM, CBMC and MCBM) or miss that important feature entirely (such as VMT and PIF). In addition, Mentink (2014) argues that collaboration is poorly interpreted in SBMC and completely missing in PIF. Again, stakeholder involvement and collaboration are also poorly interpreted in CBMC and completely missing in MCMB. Sustainability impacts are completely missing in CBMC and MCBM and poorly interpreted in SBMC and VMT.

Table 1. Evaluation of Existing Circular Business Model Innovation Tools

BMs	Business Rationale	System Thinking	Collaboration	Sustainability Impacts	Competition
BMC	X				
BCC	Poor	X	X		
SBMC	X	Poor	Poor	Poor	
SCBM	X	Poor	X	X	
CBMC	X	Poor	Poor		
VMT	Poor		X	Poor	
PIF	X			X	
MCBM	Poor	Poor			

From table 1 it is visible that competition feature is missing in every business models. Moreover, very important features for circular economy such as collaboration and system thinking are also absent or poorly interpreted in most of the business models. Competition, collaboration, and system thinking are discussed below.

Collaboration

Though circular economy aims at converting waste into resources and on connecting manufacturing and consumption actions, there is lack of research focusing on these aspects (Witjes et al., 2016). Collaboration is about creating and sustaining supply chain relationships to generate competitive advantages. Actions are planned and implemented together in a collaborative supply chain to improve communications and information flows, improve supply chain efficiency and visibility, and minimize costs. Collaborative planning, forecasting and replenishment (CPFR) is a well-known approach which raises collaborative supply chain relationships (Reefke et al., 2017). A company might get benefits such as rise of valuable ideas (Milliken et al., 1996), flexibility of the labor force (Troy et al., 2008), and improved product performance (Olson et al., 2001) by collaboration, as it produces knowledge and problem solving approaches (Lozano, 2007).

Business models can be changed and improved by the help of collaboration (De Luca et al., 2007; Swink et al., 2007; Troy et al., 2008) but it needs exchange of information (Troy et al., 2008) and coordination (Cuijpers et al., 2011). Though collaboration enhances financial and human resources, access to markets and knowledge, creativity, making processes more efficient, and reduce conflict and lead time (Fadeeva, 2004), it has integral difficulties (Lozano, 2007; Chilosi, 2003; Troy et al., 2008) and costs (Cuijpers et al., 2011; Genefke, 2000). Collaboration may even cause project failures (Mishra et al., 2009; Swink et al., 2007). In general, collaboration increase consistency within groups (Luukkonen et al., 2010) which depends on the closeness within the groups (Bansal et al., 2000; Glavic et al., 2007). This closeness is the combination between the physical and the socio-cultural understanding (Borgatti, 2003) and is a requirement for a successful collaboration (Dietrich et al., 2010; Hannon, 2012; Walker et al., 2012).

System Thinking

Mentink (2014) mentions that system thinking is the most vital gap among current circular business model innovation methods. Systems thinking is the consideration of the relation between the organization's behavior and other processes (Renswoude, K et al., 2015). For this purpose, circular business models need interaction between all involved stakeholders, including both the core-business network and other stakeholders. (Antikainen et al., 2016). Zott et al. (2010) present the business model as a network and show its better usefulness than firm-centric perspective. It is also necessary in system thinking to consider societal and ecological effects beyond the value chain (Renswoude, K et al., 2015).

Competitors Analysis

Porter (1980) claims substitute products, customers, and suppliers along with possible and current competitors determine strategic choices. Based on this, Hedman et al. (2003) propose a generic business model that includes competitors. Widmer (2016) also considers competition as a factor for evaluating other business models, especially, circular business models.

5. EXISTING PROCESS FRAMEWORKS FOR CIRCULAR BUSINESS MODEL INNOVATION

To implement CBMI in a company, it needs not only a CBMI tool but also a proper guideline or process framework. There are only couple of process frameworks exist which are developed for CBMI such as Circular Business Model Transition Framework (Mouazan, 2016), The CBMI framework (Mentink, 2014), Circular Business Model Scan (Renswoude, K. et al., 2015) and state six steps towards CBM (Joustra et al., 2013). In this chapter, these process frameworks are analyzed along with some other general process framework for BMI such as the 4 I Framework (Frankenberger et al., 2013) and Business Model Generation (Osterwalder et al., 2010).

5.1.The 4 I Framework

Frankenberger et al. (2013) develop the 4 I framework for BMI where they enhance by adding a comprehensive list of challenges. In 4 I framework, there are mainly four stages to innovate a BM. These are as follows: Initiation- analyzing the ecosystem, Ideation- generating new ideas, Integration- building a new business model and Implementation. Figure 8 shows the 4 I framework. In initiation stage, the framework suggests to think about the players' needs of the business system and the relevant change drivers. In integration stage, it suggests mainly generating ideas to develop a new BM in the next stage – Integration. In the last stage, implementation should be done by disabling obstacles and getting experience through trial and error. Forth and back iteration is used in this framework for capturing systematic BMI fully (Frankenberger et al., 2013).

As the 4 I framework is for general guideline of BMI. It misses specific information regarding CE such as the needs of CE, change drivers and barriers of CE, and so on. This framework also lacks preparation stage (Mentink, 2014).

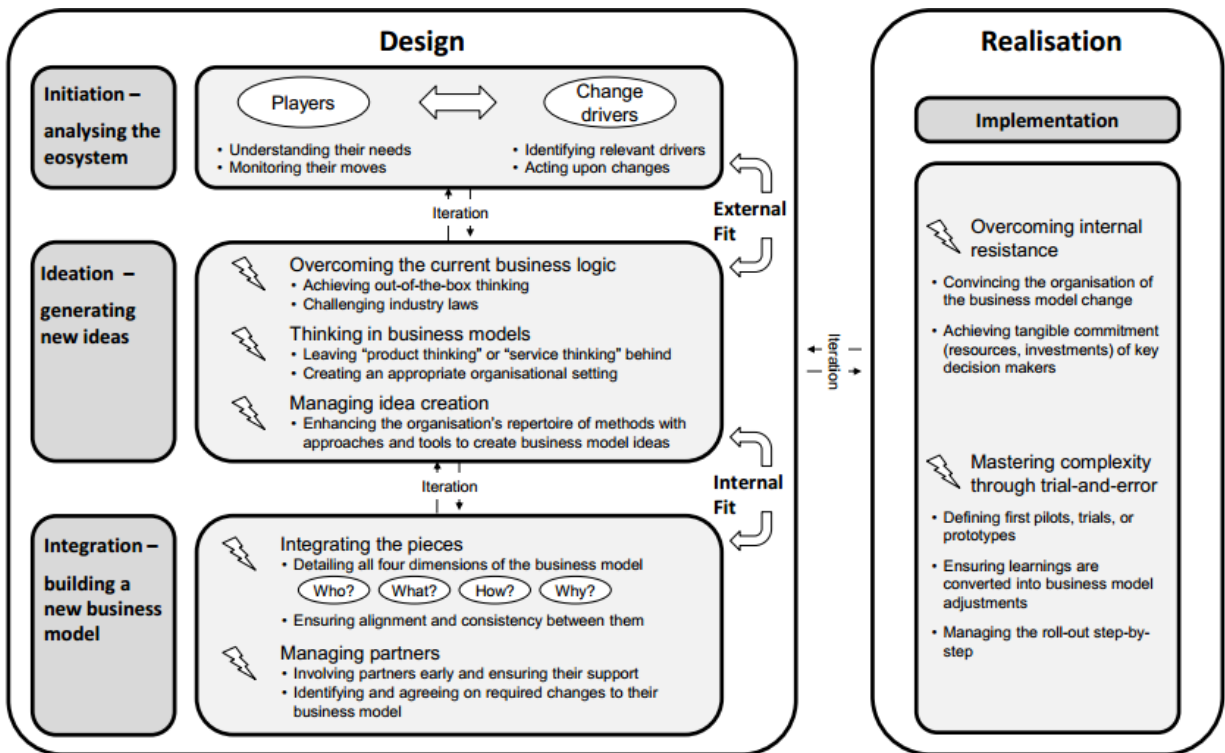


Figure 8. The 4 I framework for BMI (Frankenberger et al., 2013)

5.2. The CBMI Framework

Mentink (2014) develops the CBMI framework by adapting the 4 I framework and includes the preparation stage where the balancing of innovation team and understanding of CE concepts are stated. It has five stages for CBMI. The first stage is preparation that leads to the next stage initiation, where it suggests to think in system, and analyze players and change drivers (CE). After that the framework suggests to generate ideas in ideation stage for developing CBMs in integration stage. In integration stage, it also suggests to collaborate with partners and in the final stage, implementation should be done by overcoming obstacles and organizing pilot projects or prototypes. Figure 9 shows the CBMI framework.

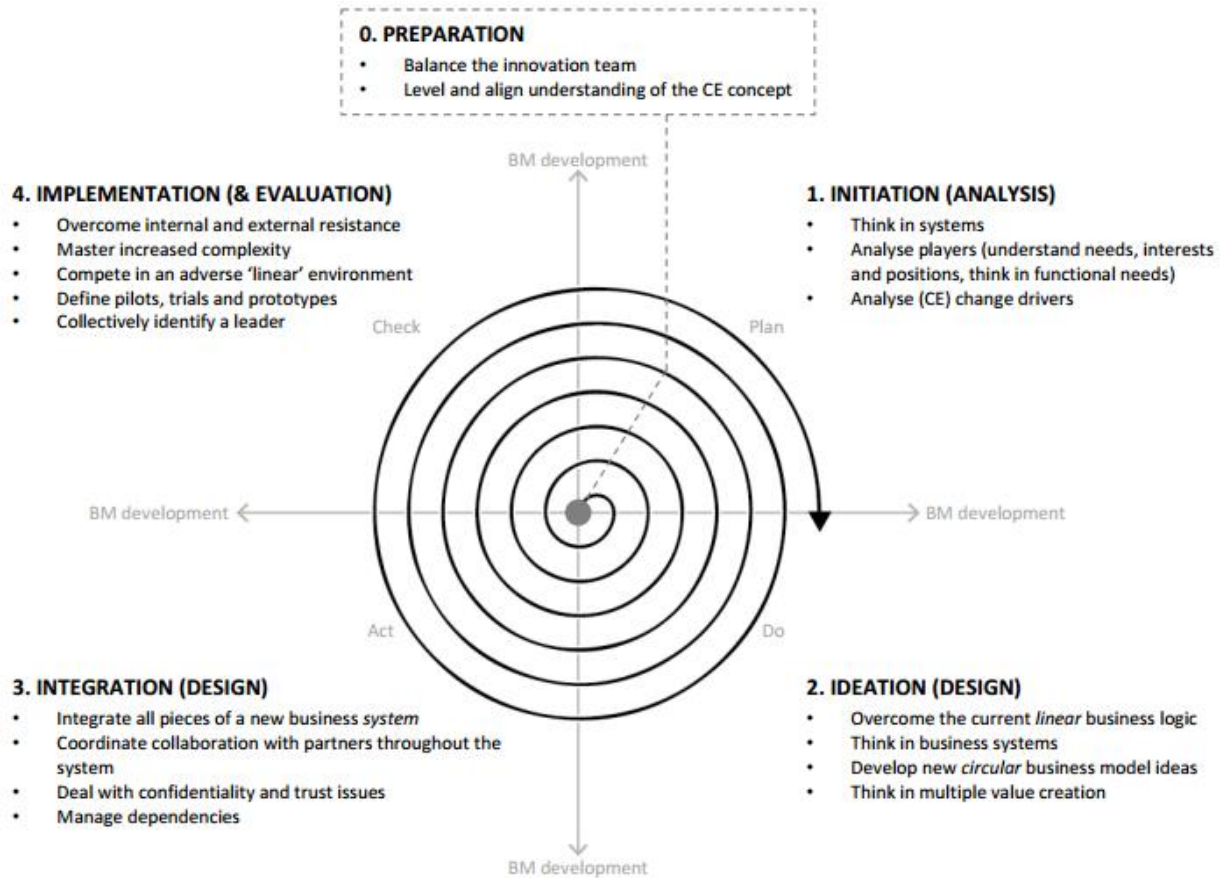


Figure 9. The CBMI framework (Mentink, 2014)

Though the CBMI framework suggests preparation stage before initiate the CBMI process, it uses loop iteration instead of forth and back iteration which is necessary for capturing the full systematic BMI (Frankenberger et al., 2013).

5.3. Circular Business Model Scan

Renswoude, K et al. (2015) present circular business model scan with an extensive list of questions for transition to CBM. Circular business model scan divide organization into six stages along the value chain for mapping and reviewing the current business activities. These are: Value Proposition, Design, Supply, Manufacturing, Use and Next Life. The value proposition and design stage are out of the circle as circular business model scan considers full circularity of raw materials.

Figure 10 shows the circular business model scan which will be a roadmap for CBMs after analyzing along with market analysis, vision, and stakeholder perspectives.

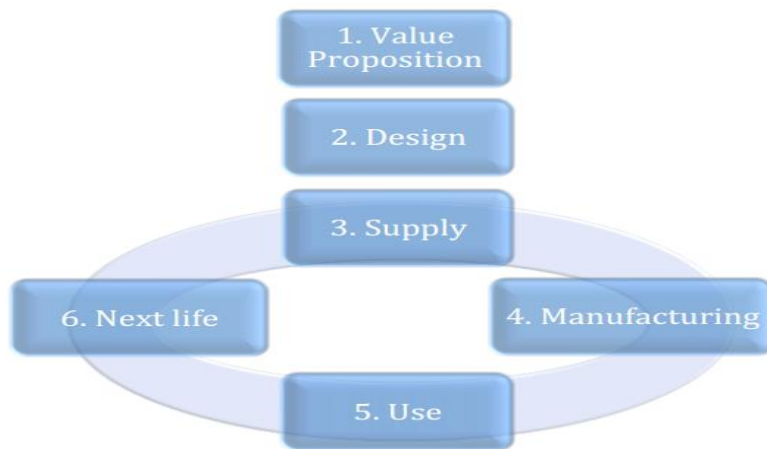


Figure 10. Circular Business Model Scan (Renswoude, K et al., 2015)

5.4. Circular Business Model Transition Framework

Mouazan (2016) develops a framework for transition to CBM with the information of drivers of change, barriers, and success factors. He divides the drivers of change into two parts: external and internal. There are five steps for transition to CBM. In first step, the untapped resources are identified that leads to develop CBM in second step. In the next step value chain is restructured and after that the BM is experimented which provide extended value proposition in the final step. In this framework, the outcome is shown as positive social impacts, improved customer satisfaction and profit making but environmental effect is missing here. Figure 11 shows the circular business model transition framework. Though this framework provides a list of barriers, success factors and drivers for change, the preparation step (Mentink, 2014) is absent here for transition to CBM.

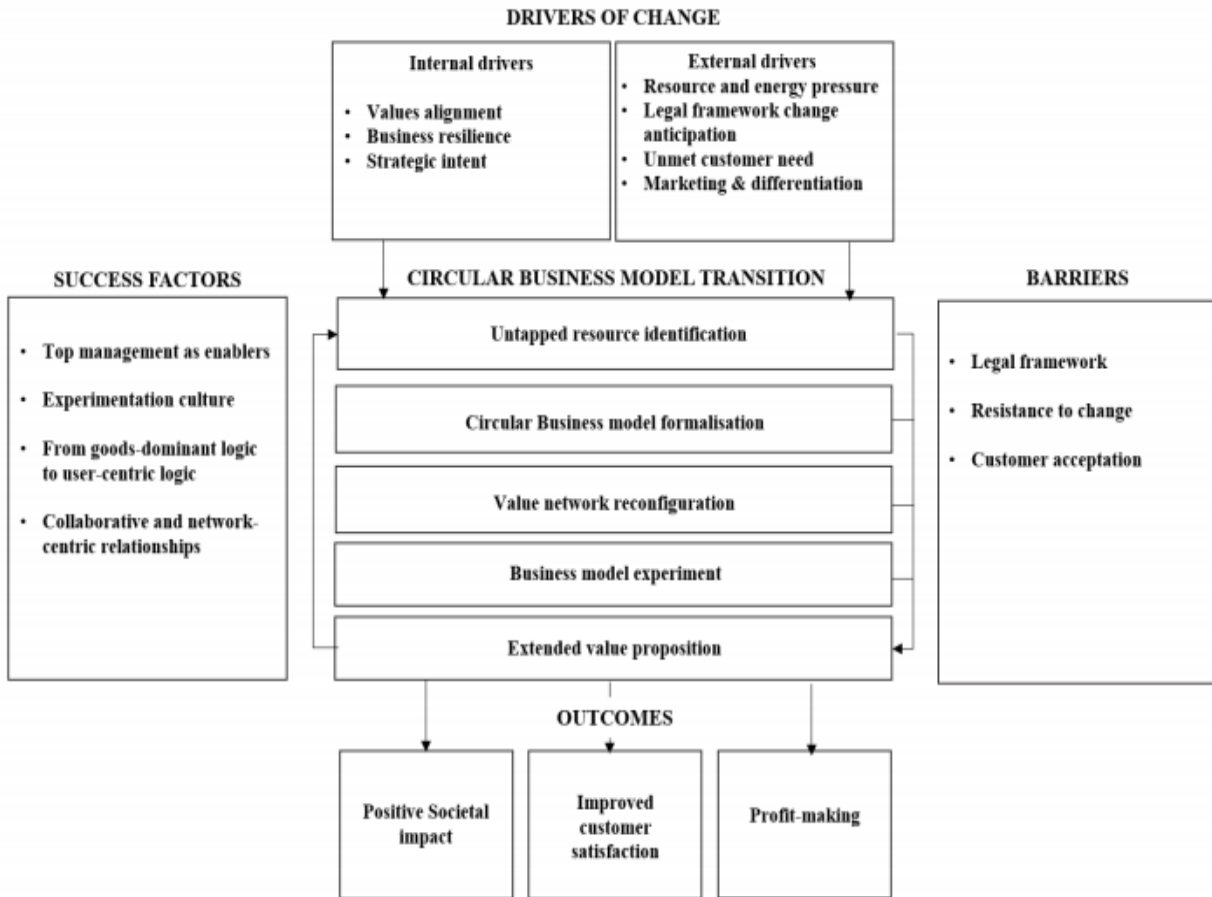


Figure 11. Circular Business Model Transition Framework (Mouazan, 2016)

5.5. Other Process Frameworks for CBMI

Osterwalder et al. (2010) suggest five phases in business model generation. These are as follows: mobilize, understand, design, implement, and manage. Though it has the preparation stage (mobilize), it lacks integration stage (Mentink, 2014).

Joustra et al. (2013) state six steps towards CBM. They suggest to increase the CE awareness in the very first step and find out the skill needed for transition towards CE. In the second step, they suggest to think about the readiness of the company and find out the stakeholders and the way to involve them. Then, thinking about the product (re-) design in the third step where it is necessary

to search the factors which influence on the product lifecycle. After that thinking of service (re-) design come in the fourth step where it suggests to analyze customer as well. In the fifth step: business model calculation, company should analyze cost, return on investment and the requirement of partnership. Finally, cross checking of the ambition should be done in sixth step. The problem of this framework is: it suggests to analyze customer at fourth stage but it is important to analyze them in the first stage.

6. A NEW TOOL AND A NEW PROCESS FRAMEWORK FOR CIRCULAR BUSINESS MODEL INNOVATION

In chapter four, the gaps of existing CBMI tool are identified and the gaps of existing process frameworks are identified in chapter five. To remove the problems of current circular business model innovation tools and frameworks, a new business model innovation tool named Business Combo Model and a new process framework called 5 I Framework are developed and introduced in this chapter.

6.1.The Business Combo Model

The Business Combo Model is developed and introduced in this study by combining other existing BMI tools such as BMC (Osterwalder et al., 2010), BCC (Mentink, 2014) and SCBM (Antikainen et al., 2016). Thus, the name “Business Combo Model” is given to this tool. The combination of components from other tools makes it more compatible to cope with existing problems regarding CBMI. From chapter four, it is understood that there is no CBMI tool which covers all the necessary requirements of CBMI. For example, BMC (Osterwalder et al., 2010) is very good in “business rationale” but system thinking and collaboration are missing in this tool (Mentink, 2014). Again, it lacks in sustainability impacts (Antikainen et al., 2016) and competition (Widmer, 2016). On the other hand, BCC is excellent in system thinking and collaboration but it is not focused on sustainability impact (Mentink, 2014). Again, it is not the best in business rationale (Mentink, 2014) and there is no room for competition (Widmer, 2016). From BCC testing workshop, Mentink (2014) also found it would be better improvement by combining BMC and BCC. However, both BMC and BCC lack sustainability impacts and in that case SCBM (Antikainen et al., 2016) can help. Thus, the business combo model (BCM) combines the components of these tools in a way to get all the requirements of CBMI.

In BCM, there are eleven elements. These are: Customer Segments, Value Propositions, Channels, Customer Relationships, Key Resources, Key Activities, Cost Structure, Key Stakeholders,

Sustainability Impacts, Key Competitors, and Supply Chain Network. Among them first seven components are taken from BMC (Osterwalder et al., 2010) for better business rationale. Key Stakeholders and Sustainability Impacts are adapted from SCBM (Antikainen et al., 2016) for facilitating sustainability impacts in CBM. Key competitors are introduced for enhancing CBM by understanding the current and future rivals (Widmer, 2016). Finally, Supply Chain Network component is adapted from BCC (Mentink, 2014) for better collaboration and system thinking. Figure 12 shows a BCM and the components of BCM are described as follows.

Customer Segments: Like BMC, a customer segment represents the group of customers, a company wants to serve. A group of customers may have similar needs or it requires similar channel to reach and communicate with them or it requires similar relationships or it has similar profitability. A company may have one or more than one customer segment(s). For better understanding of customer needs and to get good customer experience, customer segment is necessary.

Value Propositions: It describes the services or products, a company wants to provide to its customer segments and in BCM, it represented by the green arrow(s) going out from the company to a customer segment.

Channels: It describes the technique how a company can reach and communicate with its customers. Channels could be direct or indirect ones. It could be owned channels or partner's channels. There are five different stages which can be covered by one or more than one channels: Raising customer awareness regarding the enterprise's offers, evaluation of enterprise's offers by customers, purchasing of enterprise's products or services, delivering the purchased offers, and maintaining after sales services.

Customer Relationships: It indicates the types of relationships between a company and its customers. There are many ways to make relationship with customer such as personal assistance, self- service, automated services, co- creation and so on.

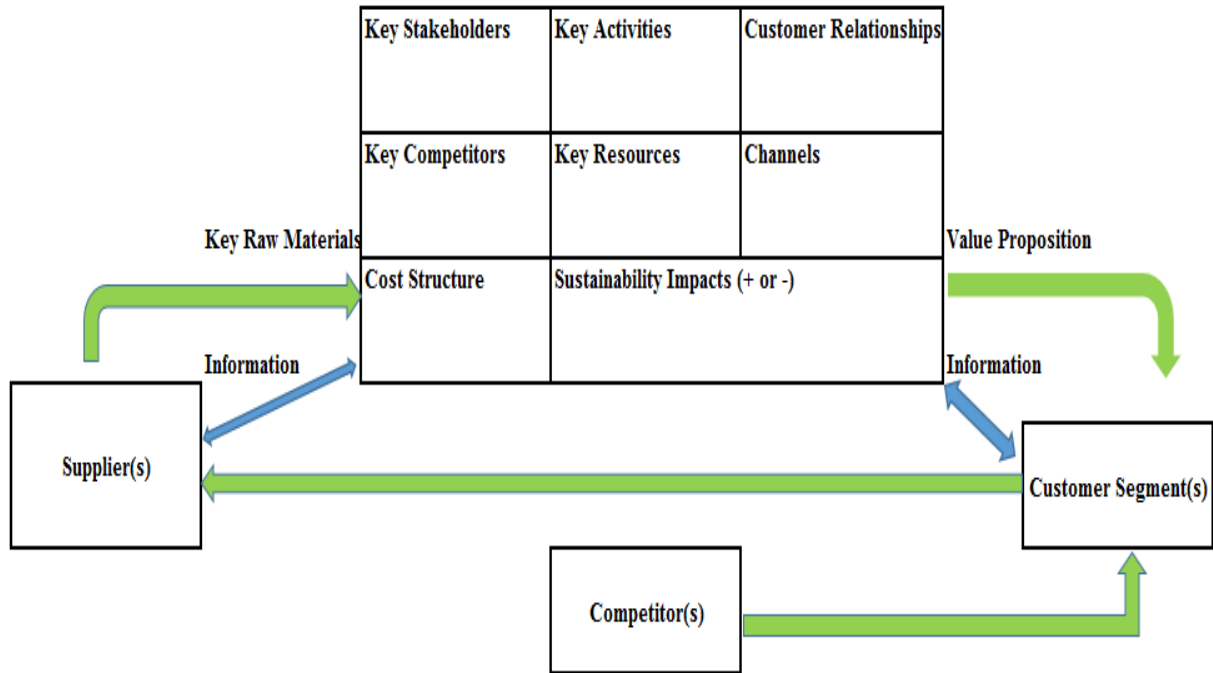


Figure 12. Business Combo Model

Sustainability Impacts: It shows the both positive or negative outcome related to sustainability. This element is divided into three parts: Economical, Social, and Environmental. If the outcome is good, it will be introduced in that part started with a “+” sign. In contrary, if it brings negative impacts, it will be started with a “-” sign.

Key Resources: It describes not only the key raw materials but also other necessary resources such as man, machine, method and so on to run the business successfully. Enterprise may own the

key resources or can manage from others. Key raw materials which are targeted to get back through closed loop are also represented by the green arrow(s) come in to the company.

Key Activities: It indicates the activities which are required to generate a value proposition, to spread into markets, to sustain relationships with customers, and to receive revenues. In BCM, ReSOLVE framework is involved in key activities element. It means company's activities which are related to ReSOLVE will be stated here.

Key Stakeholders: It describes all the important stakeholders and their relationships instead of only suppliers. It also includes the collaborative competitors. These relationships are required for optimizing the business models, reducing risks, or obtaining necessary resources.

Cost Structure: It informs not only the raw material cost but also the other significant costs experienced by an enterprise during functioning the business.

Key Competitors: It describes the most current or prominent rivals in the same business industry. Some of them might be visible in the supply chain network element of the BCM, if their existence found in the supply chain network anyway.

Supply Chain Network: It illustrates the supply chain network of the company which may close the loop for the key raw materials. It helps to collaborate with players and optimize the supply chain. By connecting all the players of the business system, it enhances system thinking and visualizes the whole system easily. In this element, material flows are indicated by green arrows while blue arrows present information. Similar to BCC, BMC could have different shapes depending on the business and its supply chain network. For example, in monopoly business there

will be no key competitor element. Again, there could be other players in the supply chain such as recycler. Some different configurations of the BCM is shown in figure 13.

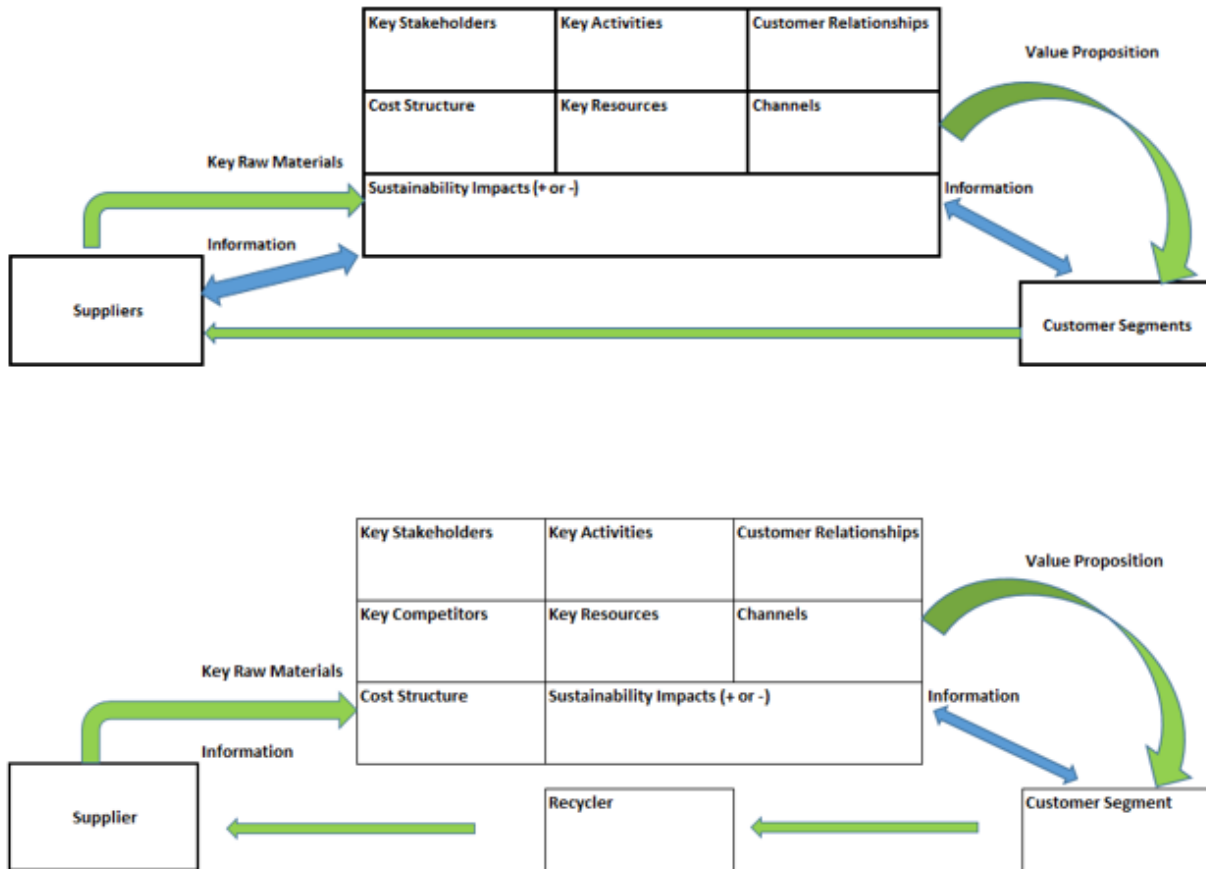


Figure 13. Some different configurations of BCM

6.2.Originality

Though Business Combo Model (BCM) is developed by adapting Business Model Canvas (BMC), Business Cycle Canvas (BCC), and Sustainable Circular Business Model (SCBM), it is more compatible in CE contexts. Business Model Canvas (Osterwalder et al., 2010) is the most popular and better in business rationale (Mentink, 2014). It has nine building blocks. BCM takes seven components from BMC but Revenue Stream and Key Partner are not taken as BCM adapted

Sustainability Impacts (where financial benefits are also included) and Key Stakeholders (where key partners are also included) from SCBM (Antikainen et al., 2016). Thus, it can be said that BCM has both business rationale and sustainability impacts features. Again, BCC (Mentink, 2014) is good in system thinking and collaboration by connecting all the players of supply chain. BCM includes system thinking and collaboration features by adapting the supply chain network from BCC (Mentink, 2014). In addition, key competitors are added for better understanding of the current and future rivals. The evaluation and comparison of BCM with other existing CBMI tools are shown in Table 2.

Table 2. Evaluation and comparison of BCM with other tools of CBMI

BMs	Business Rationale	System Thinking	Collaboration	Sustainability Impacts	Competition
BMC	X				
BCC	Poor	X	X		
SBMC	X	Poor	Poor	Poor	
SCBM	X	Poor	X	X	
CBMC	X	Poor	Poor		
VMT	Poor		X	Poor	
PIF	X			X	
MCBM	Poor	Poor			
BCM	X	X	X	X	X

BCM can be used in both linear and circular business model innovation. In chapter 7, two cases are analyzed and two BMs are generated using BCM, where one case is more linear type and the other case is more circular type.

6.3.The 5 I Framework

In this section, a new framework developed which basically adapted from the 4 I framework (Frankenberger et al., 2013) and the CBMI framework (Mentink, 2014). This framework has five stages with forth and back iteration. These are: Identification, Initiation, Ideation, Integration, and Implementation. Figure 14 show the 5 I framework.

In identification stage, it is necessary to identify the scope of business by understanding CE, customer need, and customer experience. It is also mandatory to identify the barriers, drivers, and success factors. A list of barriers which are identified in the case studies of this thesis are shown in section 7.3.

In initiation stage, a company should analyze its stakeholders, competitors, and position in the market. It should also think in system. In this stage, a team of internal and external expertise (open innovation) should be formed.

The team should start generating new business model ideas in ideation stage where they may finally choose one or more than one business model ideas. In this stage, the BCM tool can be used to generate more relevant business model ideas.

In integration stage, the individual business model ideas would be merged and company should work for coordinating the collaboration with its partners. Thus, the new business model(s) will be generated in this stage.

Finally, in the implementation stage, company should organize pilot projects or prototyping or simulation modeling and try to overcome the internal and external obstacles. After that they can run their business using CE concepts towards more sustainability.

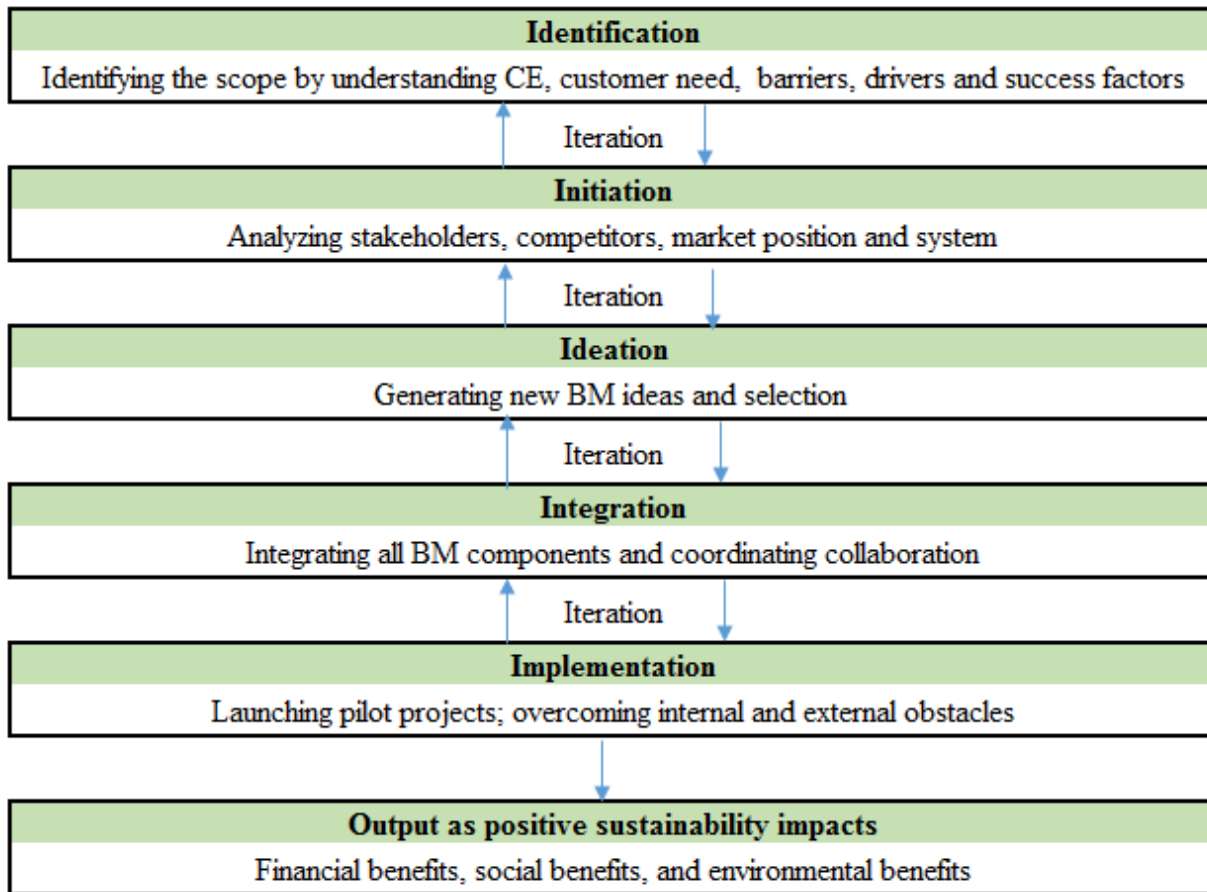


Figure 14. The 5 I Framework

Due to lack of time this framework could not be tested in real company but it is adapted from 4 I framework. As the 4 I framework is developed after analyzing 14 companies, it can be stated that the 5 I framework can be used in companies for CBMI.

7. CASE STUDIES

This chapter contains the analysis of two cases. The results of the case studies are presented in the discussion chapter. Both cases are in Bangladesh. The questionnaires are given in Appendix 1. Here, Dhaka Wood Complex are considered as a case 1 and Nadia Furniture Limited are considered as case 2. Table 3 presents the overview of case studies. The data collection methodology is explained in section 2.2. In Bangladesh, it is difficult to find any company which practices CE concept as it is not well-known as in Europe. After using some key words such as “Circular Economy + Bangladesh”, “Circular Business Model + Bangladesh” and “Closed loop + Bangladesh” on web search nothing is found which is related to circular economy in Bangladesh. However, there are some companies which do business in a way that is related to CE. Thus, this is the first study regarding circular economy in Bangladesh.

Table 3. Overview of case studies.

Case Number	Name of the Company	Industry	Size	BM	Number of Respondent
Case 1	Dhaka Wood Complex	Furniture Manufacturing	SME	Circular	Two
Case 2	Nadia Furniture Limited	Furniture Manufacturing	Large	Linear	Two

7.1. Case 1 - Dhaka Wood Complex

Dhaka Wood Complex is a furniture manufacturing company which sells both new and used furniture. At first, its business was only based on new furniture selling but later the company has started to sell second-hand furniture as well. The company is a small medium size enterprise type. The company was forced to think about another way to do business due to excessive competition

and presence of large companies. The company has a showroom and a small production house but it has plan to open two more showrooms with a bigger production plant. The new way to do business have changed their business dramatically. Instead of regular rich customers, the company has focused on low and medium income people who can not afford to buy new luxury furniture. Again, in some special occasions such as international trade fair, Eid (the biggest religious festival in Bangladesh) and so on, some other companies buy furniture from them. For the new furniture, the company offers customized furniture along with their own designed furniture. For the second-hand furniture, it buys with a cheaper price and then sells it after repairing. It also offers repairing service. Customer can repair their furniture by paying for it. To make new furniture, the company buys woods from the local market. It considers machines, skilled workers, and wood as key resources. As it is not a big company and has limited machineries, it has to depend on some other companies for special works which need some machines (wood lathe), it does not have.

7.1.1. Business Combo Model of Dhaka Wood Complex

In this section, BCM tool is applied to generate BM of Dhaka Wood Complex. The components of this model are found from the interview of two respondents of the company. The customers of this company is segmented into four groups. One is middle class who buy new furniture but comparatively cheaper than other brand furniture. Second group is low income customer who buy second-hand furniture. Third group represents the companies which buy in some occasion due to sudden high demand. This group is also representing their collaborative competitor. The fourth group of customers mainly receive service (repairing). The company offers mainly three types of value proposition: new furniture, second-hand furniture and repairing service. It raises awareness to customers about their products and service through advertisements and they have home delivery facility. These can be considered as their channel component of the BM. The company has personal assistance as the customer relationship element of the BM. It considers machines, skilled workers, and raw material (wood) as key resources. Repairing and reusing, sharing and optimization of resources can be considered as its key activities. Entrepreneurs (two person), employees, suppliers, and collaborative competitors (with whom the company shares machines and get some orders

occasionally) are the key stakeholders of the company. Though there are existence of large companies, other small and medium size enterprises are the main competitors of this company. Machinery and energy cost, raw material cost and salary of employees define the main cost structure of the company. The BCM of Dhaka Wood Complex is shown in figure 15. Though the case exchanges information with its all stakeholders and customer segments, for reducing complexity it is not shown in the figure.

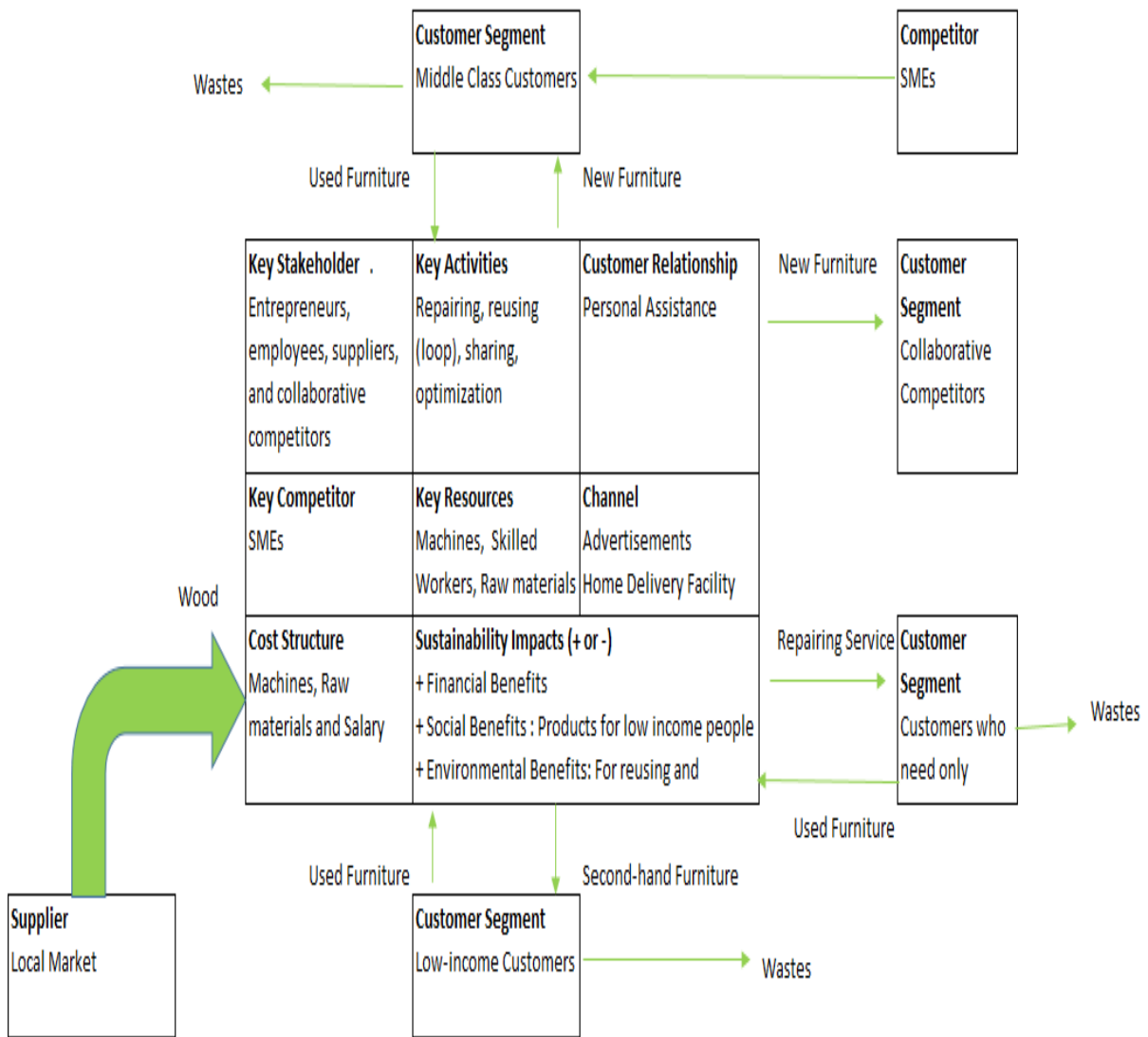


Figure 15. BCM of Dhaka Wood Complex

The output of the company positively impacts sustainability. It gains financial benefits and it helps society by selling products and service for low income people. In addition, it impacts environment positively by reusing and repairing. The respondents of the company state it would be helpful if government gives some benefits to them who reuse materials. In addition, they think new technology is necessary to improve longevity of the raw materials and products.

7.2. Case 2 – Nadia Furniture Limited

Nadia Furniture Limited is one of the large furniture manufacturing company in Bangladesh. It has 21 showrooms and another showroom will open soon. Among those showrooms, five are owned by the company and rest of the showrooms are owned by dealers. They have collaborative relationship with their dealers. Dealers can sell the products of the company and can use the brand name. Dealers buy the furniture in a cheaper price but sell it with a regular price. Wood and MDF (Medium Density Fiber) board are the main raw material of the company. The company buys woods from local market and from Canada (Oak wood), and MDF boards from local market and Malaysia. It has also collaborative relationship with its some competitors for buying raw materials from abroad. Comparatively rich people are its customers. It focuses on reducing wastes and sometimes it redesigns of its products to reduce the wastes. It gives priority on customer experience and offers after sales service as well.

7.2.1. Business Combo Model of Nadia Furniture Limited

In this section, the components of BCM is understood from the interview of two respondents of Nadia Furniture Limited. As there is no room for circularity in its BM, it is not a CBM. The high-income people are the customer of this company. Again, the dealers are also their customer. Dealers buy the furniture from them at a cheaper price and sell in a regular price to other customers. The company offers high quality furniture as a value proposition. It reaches to customers through various types of advertisements, and they have home delivery facility and after sales service as well which are considered as their channel component of the BM. The company has personal assistance as the customer relationship element of the BM. It considers machines, skilled workers,

and raw materials (wood and MDF board) as key resources. Optimization of resources and sharing are its key activities. Owner, employees, suppliers, and collaborative competitors (with whom it buys raw materials from abroad) are the key stakeholders of the company. Large companies along with other medium size companies are the key competitors of this company. Machinery and energy cost, raw material cost and salary of employees hold the main cost structure of the company. The BCM of Nadia Furniture Limited is shown in figure 16. Though the case exchanges information with its all stakeholders and customer segments, for reducing complexity it is not shown in the figure.

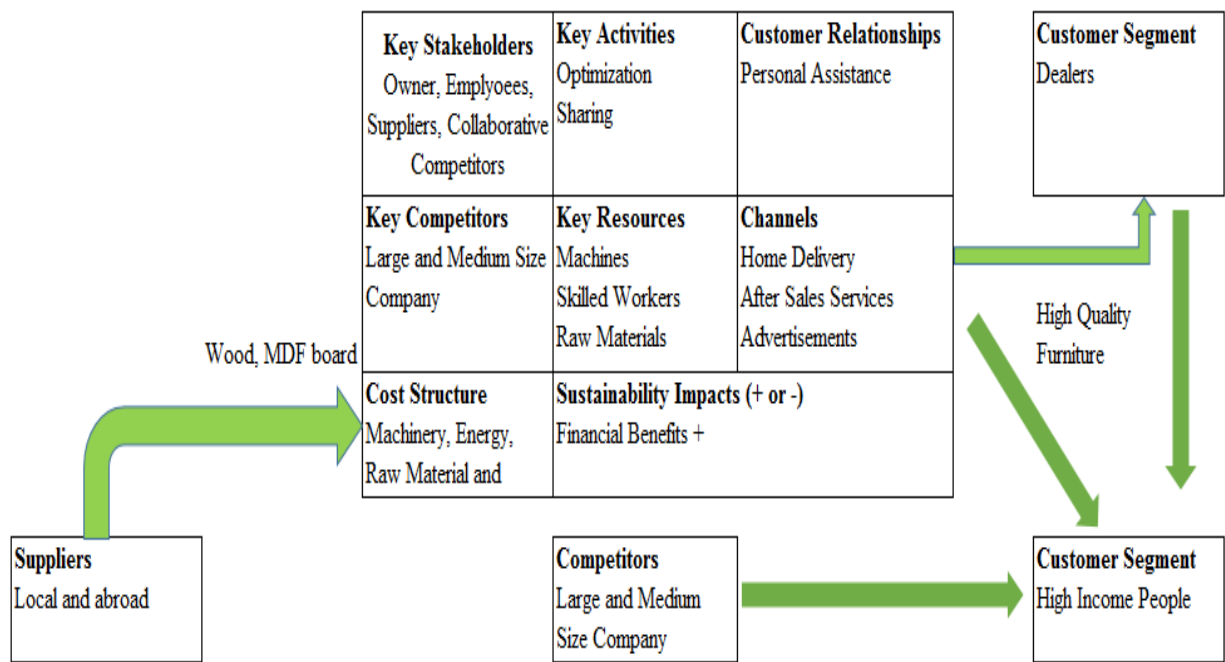


Figure 16. BCM of Nadia Furniture Limited

The company is only benefited by financially but in a bigger sense it also helps society by creating job for uneducated poor people as workers. The company believes if they use second-hand furniture, their brand value will be down. Their customers might confuse whether the new furniture is new or not. Again, the company thinks reusing will not improve its customer experience as their customer segment needs new furniture. The respondents of this company also state the high price

of renewable energy make it impossible to use. They also think collaboration is necessary but it needs an equilibrium situation where both parties will get benefits. Moreover, the respondents of this company think as organizations mainly focus on their financial benefits, it is necessary to find out how a company can get financial benefits by adding positive impacts on society and environment.

7.3.Results

The both cases agree upon that collaboration is necessary for getting resources even if the company not practicing CE in its business. Optimization is also found one of the key activities for both linear and circular businesses. Customer satisfaction is the key success factor for every companies. However, transition towards circular economy mainly depends on some factors such as:

- customer segment and their needs,
- possibility to get financial benefits out of it (as companies mainly focus on their financial benefits rather than social and environmental benefits),
- raw materials or products (whether it is possible to reuse or not) and
- legal issues.

The challenges or barriers for transition toward CE which are found from the case studies are as follows:

- Raising customer awareness regarding CE,
- Finding way for improving customer experience,
- Maintaining win-win situation with partners for collaboration,
- New technology for improving longevity of the products and raw materials,
- Generating ideas to convert social and environmental benefits to financial benefits, and
- Legal issues regarding price of renewable energy and reuse of materials.

8. DISCUSSION AND CONCLUSIONS

This study summarizes the importance of CE and CBMI from various literatures. Then, it identifies the gaps of existing CBMI tools and process frameworks. Finally, it introduces a new tool and a new process framework to overcome the gaps.

As the existing production systems fail to solve material scarcity (Preston, 2012; Antikainen et al., 2016; EMF, 2016), environmental (WWF, 2016; Antikainen et al., 2016; EMF, 2016) and social problems effectively (Antikainen et al., 2016; EMF, 2016), it is high time to think about CE in practice which will bring financial benefits as well to companies (Antikainen et al., 2016; EMF, 2016).

On the other hand, implementation of CE needs new BMs (EMF, 2016; Renswoude et al., 2015) for rethinking how to maximize the value of products and materials that leads to reduce the consumption of natural resources and create positive social and environmental effect (Kraaijenhagen et al., 2016). This implementation needs collaboration (Antikainen et al., 2016), system thinking (Mentink, 2014) and always has direct or indirect consequence to one or more than one BM pillars that leads firm a BMI process (Sempels, 2014). Though many researchers indicate the necessity of BMI for sustainability (Bocken, 2015; Bocken et al., 2014; Boons et al., 2013; Stubbs et al., 2008; Porter et al., 2011; Yunus et al., 2010; FORA, 2010), it is not clear how managers can innovate their business model towards better sustainability as it has not been addressed satisfactorily yet (Foss et al., 2017). Mentink (2014) argues that current linear business models are not fit in circular economy due to different products or services, different (relationships with) customers, different production processes, and different revenue models which sometimes include other types of values than financial profit. Again, existing business models for the circular economy have inadequate transferability and there is no complete framework supporting every kind of company in designing a circular business model (Lewandowski, 2016). For this reason,

designing circular business models are required to stimulate and foster the implementation of circular economy (Lewandowski, 2016).

However, this study presents the gaps of existing CBMI tools and process frameworks. There is no CBMI tool which explains competition aspects (Widmer, 2016). Mentink (2014) states that system thinking is the most vital gap of existing BMI tools. Again, collaboration (Mentink, 2014) and sustainability impacts (Antikainen et al., 2016) are also missing in most of the BMI tools. Thus, in this study, a new tool and a new framework are developed and introduced to cope with these challenges. After analyzing two cases, a list of barriers with two BMs are also found in this study. The theoretical contributions and managerial implications of the findings of this study are presented below. The reliability, validity and generalizability of this study are also explained in this chapter. The limitations of the study and further research opportunities are discussed at the end of this chapter.

8.1.Theoretical Contribution

This study introduces Business Combo Model (BCM), an upgraded tool for CBMI which is mainly adapted from Business Model Canvas (BMC), Business Cycle Canvas (BCC), and Sustainable Circular Business Model (SCBM). Business Model Canvas (Osterwalder et al., 2010) is better in business rationale but it lacks in system thinking and collaboration (Mentink, 2014). Again, it lacks in sustainability impacts (Antikainen et al., 2016) and competition (Widmer, 2016). On the other hand, BCC is excellent in system thinking and collaboration but it is not focused on sustainability impacts (Mentink, 2014). Again, it is not better than BMC in the context of business rationale (Mentink, 2014) and there is no room for competition (Widmer, 2016). However, both BMC and BCC lack sustainability impacts and in that case SCBM (Antikainen et al., 2016) can help. The business combo model (BCM) combines the components of these tools in a way to get all the requirements of CBMI. It adds seven building blocks of BMC to ensure proper business rationale while it adapts supply chain network from BCC to confirm system thinking and collaboration. It

also adapts key stakeholders and sustainability impacts from SCBM. In addition, it introduces key competitors for better understanding the existing and future rivals which have also influence on the market.

On the other hand, the study introduces the 5 I framework, a process framework or guideline for CBMI which is mainly adapted from the 4 I framework and the CBMI framework. Though there are some tools for CBMI and the number of CBMI tools is increasing, there are very few process frameworks or guidelines to describe how to innovate CBM (Mentink, 2014). The 4 I framework (Frankenberger et al., 2013) introduces four forth and back iterative phases (initiation, ideation, integration, and implementation) for innovating BMs but misses the identification or preparation phase (Mentink, 2014) while the CBMI framework introduces all the five phases including the preparation phase but misses the forth and back iteration. In contrast, the 5 I framework presents all the five phases with iteration and includes some required challenges as well.

In addition, this the first study of CE in Bangladesh and can be used as a base to study more about CE in Bangladesh. The study presents a list of barriers for transition to CE and the 5 I framework suggests to take these into account in the very first stage of the CBMI process.

8.2. Managerial Implications

The BCM has all necessary components by which practitioners can manage collaboration, system thinking with the understanding of business rationale and sustainability impacts. The visualization of supply chain network allows practitioners to understand the whole system in an effective and easier way which will lead them to think in system and innovate better BMs. Again, this visual supply chain allows managers to find the proper players for collaboration. Managers can also think about their sustainability impacts from this tool. They may find it more useful as the BCM allows competitor analysis. The tool shows the critical raw materials which need to be closed in loop. It may also help in make or buy decisions by analyzing the whole business system. Both the

managers of existing companies and the new entrepreneurs (who want to start new business) may find the BCM very beneficial and suitable. Entrepreneurs may find some gaps or opportunity after using the BCM tool to start a unique business within a current business system. As the BCM enables mapping the whole business system, especially, entrepreneurs may use this tool to find out which position in business system would be better for them (which would be more profitable but less competition).

Again, the 5 I framework presents the systematic way to practitioners for organizing the CBMI. It suggests to get necessary knowledge about the CE, customer needs, companies' capabilities, drivers, and barriers in the very first stage of CBMI process that may help to think early about the possibility to transit towards CE. It allows managers to think gradually and reduces the risk of project failure. In addition, managers may also find new way to do business after taking the systematic steps according to the 5 I framework.

The list of barriers gives hints which obstacles managers may face in their CBMI process and thus, make it easier for them to decide whether the transition to CE will be beneficial or not. Companies, especially, startups may take this study as a guide to think creatively to establish their business in a new paradigm.

8.3. Reliability, Validity, and Generalizability

Reliability defines whether the output of the study yields similar on other occasion and by other researcher, and the transparency of transforming raw data (Saunders et al., 2016). In this thesis, the main outcome BCM tool and 5 I framework are developed from other well-known tools and frameworks. It reflects the reliability. Again, semi- structured interviews are recorded. However, the list of barriers and the BM of cases are depended on company strategies, customer awareness

and other trends and drivers. Thus, on other occasion it may not be found same and makes it less reliable.

Validity defines the similarity of a study findings with reality (Saunders et al., 2016). Though there is a possibility to question about the validity of the list of barriers which are found from interviewing only four respondents, the BCM and 5 I frameworks are developed from well-known tools and frameworks. That indicate valid outcomes.

Generalizability means the ability to get the similar outcome of the research from different settings of research (Saunders et al., 2016). In this thesis, the main outcomes are the BCM tool and the 5 I process framework which are flexible by nature and developed from other literatures. These allow different arrangements of business for CBMI. In addition, BCM model is tested in two cases as a triangulation to develop BMs. Thus, the study can be regarded as generalizable. However, the barriers which are found from only two cases may not be regarded as a generalizable theory, it may change company to company.

8.4.Limitations and Further Research

As the study was conducted on only two cases in the same industry (furniture manufacturing), same country and society the list of barriers may be found different in other settings of research design. Again, there is a possibility to have more barriers during CBMI which are not mentioned in this study as the respondents have no prior knowledge and experiences on CBMI. In addition, the 5 I process framework could not be tested on the cases due to lack of time.

However, there are still many scopes for further studies. Some of them are listed as follows:

- The study recommends to use BCM and 5 I process framework for other businesses with different settings of research design.

- As customers play a vital role in CBMI, studies related to: customer experience and CBM; customer as the driver of CE; way to increase customer awareness towards CE and so on can be done in future.
- Research on the methods of maintaining win-win situation among partners are necessary.
- Research on converting social and environmental benefits to financial benefits can also be done in future.
- More technology related research to improve product lifecycle can also be carried out.
- In the 5 I framework, it is stated that a team with internal and external expertise (open innovation) should be formed for CBMI. Thus, it would be a very significant research to find the ways how open innovation can be merged with CBMI.
- Research can also be conducted on the method of circularity evaluation.
- Research on computer aided design tool may conduct for complex system of CBM and handling excessive information.

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APPENDICES

Appendix 1. Semi- structured Interview Themes and Questions

Appendix 2. Sustainable business model archetypes

Appendix 3. Other Tools of Circular Business Model Innovation

Appendix 1. Semi- structured Interview Themes and Questions

The structure of the interview for both cases are same. According to Saunders et al. (2016) in semi-structured interviews, the researcher will have a list of themes and questions to be covered. In this study the list of themes are covered through the flow of conversation. The list of themes are as follows:

Company description;

Product or service description;

Knowledge on Circular Business Model;

Understanding the need of sustainability;

Their position in the market;

Positions of other players in the market; and

Description of their supply chain.

There are also specific questions which are discussed with all the respondent in both companies. These are as follows:

Do you have any activities in your company which is related to regeneration, share, optimization, reuse or remanufacturing (loop), virtualize and exchange?

If you do, then what is the reason? If not, then what is the main problems behind it?

What type of customer buy your products?

How can you reach and communicate with them?

How do you manage relationship with them?

From where do you manage your raw material?

Do you have any collaboration with your supplier, customer, or other players?

If yes, then how? Or If no, then what are the key reasons behind it?

Is there any positive output come from your company regarding environment or society?

If yes, then how? If no, then what is the challenge behind it?

What are your main resources (raw materials and others as well) for the business?

What do you think about using raw materials again?

Appendix 2. Sustainable business model archetypes

Groupings	Technological			Social			Organisational	
	Archetypes			Archetypes			Archetypes	
	Maximise material and energy efficiency	Create value from waste	Substitute with renewables and natural processes	Deliver functionality rather than ownership	Adopt a stewardship role	Encourage sufficiency	Repurpose for society/ environment	Develop scale up solutions
Examples	Low carbon manufacturing/ solutions	Circular economy, closed loop	Move from non-renewable to renewable energy sources	Product-oriented PSS - maintenance, extended warrantee	Biodiversity protection	Consumer Education (models); communication and awareness	Not for profit	Collaborative approaches (sourcing, production, lobbying)
	Lean manufacturing	Cradle-2-Cradle	Solar and wind-power based energy innovations	Use oriented PSS- Rental, lease, shared	Consumer care - promote consumer health and well-being	Demand management (including cap & trade)	Hybrid businesses, Social enterprise (for profit)	Incubators and Entrepreneur support models
	Additive manufacturing	Industrial symbiosis	Zero emissions initiative	Result-oriented PSS- Pay per use	Ethical trade (fair trade)	Slow fashion	Alternative ownership: cooperative, mutual, (farmers) collectives	Licensing, Franchising
	De-materialisation (of products/ packaging)	Reuse, recycle, re-manufacture	Blue Economy	Private Finance Initiative (PFI)	Choice editing by retailers	Product longevity	Social and biodiversity regeneration initiatives ('net positive')	Open innovation (platforms)
	Increased functionality (to reduce total number of products required)	Take back management	Biomimicry	Design, Build, Finance, Operate (DBFO)	Radical transparency about environmental/ societal impacts	Premium branding/ limited availability	Base of pyramid solutions	Crowd sourcing/ funding
		Use excess capacity	The Natural Step	Chemical Management Services (CMS)	Resource stewardship	Frugal business		
	Extended producer responsibility	Sharing assets (shared ownership and collaborative consumption)	Slow manufacturing			Responsible product distribution/ promotion	Localisation	"Patient / slow capital" collaborations
		Extended producer responsibility	Green chemistry				Home based, flexible working	

Figure: Sustainable business model archetypes (Bocken et al., 2014)

Appendix 3. Other Tools of Circular Business Model Innovation

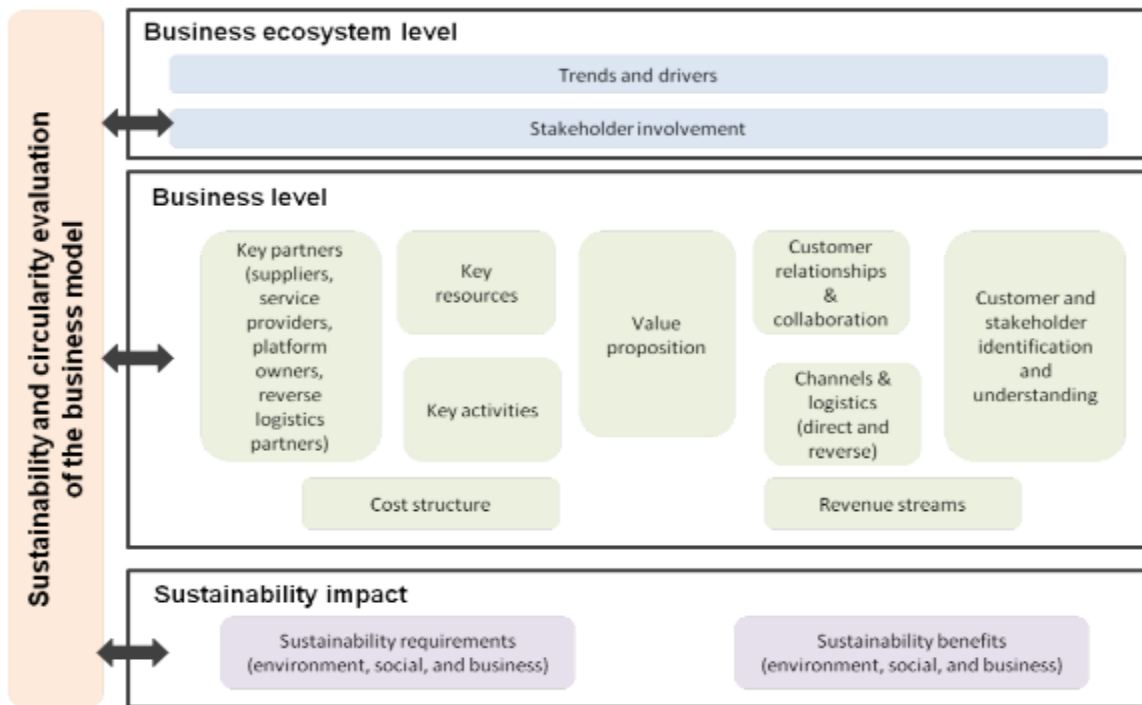


Figure: sustainable circular business model

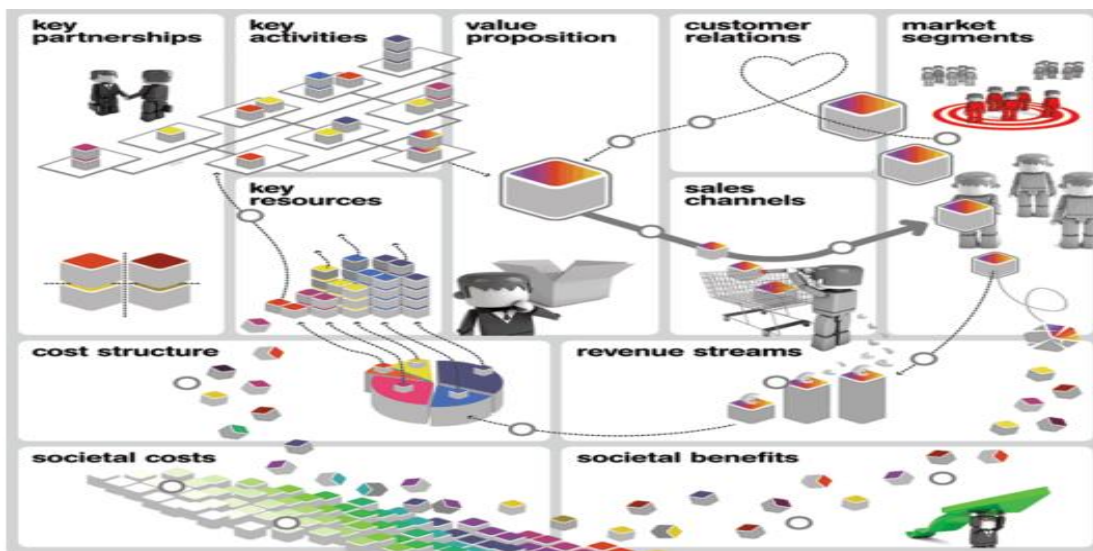


Figure: The play-it-forward tool

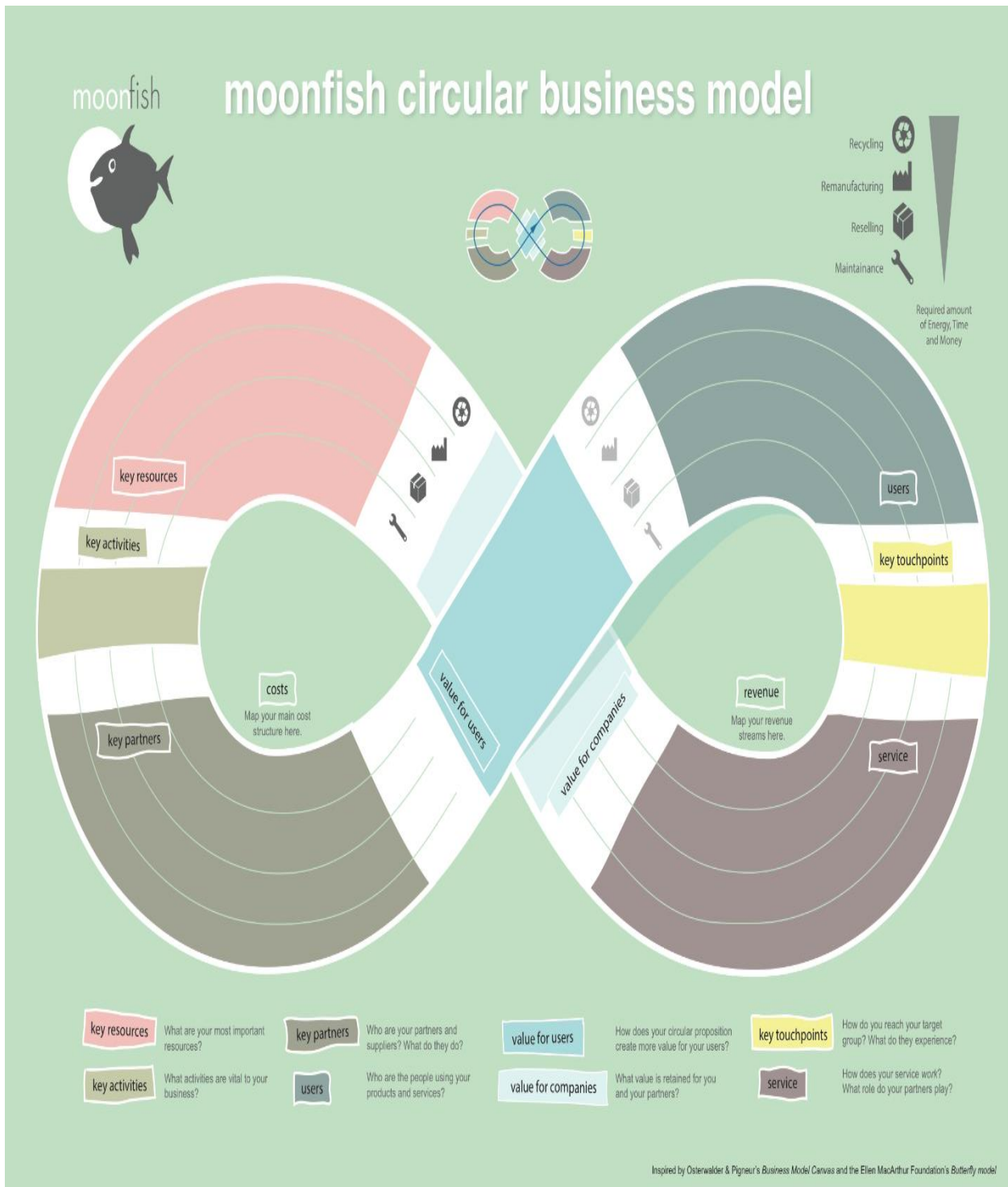


Figure: Moonfish Circular Business Model