論文 / 著書情報
Article / Book Information

題目(和文)	ビジネスモデル・キャンバスとDEMO構成モデルにもとづく新しいビジネスモデル創出に関する一考察
Title(English)	A Study on New Business Model Creation Process Based on Business Model Canvas and DEMO Construction Model
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出典(和文)	学位:博士(学術), 学位授与機関:東京工業大学, 報告番号:甲第11562号, 授与年月日:2020年6月30日, 学位の種別:課程博士, 審査員:妹尾 大,井上 光太郎,鈴木 定省,永田 京子,鍾 淑玲
Citation(English)	Degree:Doctor (Academic), Conferring organization: Tokyo Institute of Technology, Report number:甲第11562号, Conferred date:2020/6/30, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Type(English)	Doctoral Thesis

A STUDY ON NEW BUSINESS MODEL CREATION PROCESS BASED ON BUSINESS MODEL CANVAS AND DEMO CONSTRUCTION MODEL

A Dissertation

Submitted to the Department of Industrial Engineering and Economics

School of Engineering Tokyo Institute of Technology

in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

Novandra Rhezza Pratama

ACKNOWLEDGMENTS

First of all, I want to thank Allah SWT for His blessing through all my life. I am deeply thankful for my former supervisor Professor Junichi Iijima and my current supervisor Professor Dai Senoo for their important role on my study in Tokyo Tech. Professor Iijima has given me continuous guidance, knowledge transfer, and opportunities, so that I'm able to conduct my research and finish this dissertation. Professor Senoo has agreed to take over Professor Iijima's role as an academic supervisor after his retirement, and made sure that I can continue my study, and eventually graduate and get my degree.

I would like to appreciate thesis committee, Professor Kotaro Inoue, Associate Professor Sadami Suzuki, Associate Professor Sulin Chung, and Associate Professor Kyoko Nagata for their time, valuable comments and suggestions on the thesis.

I also want to thank Iijima and Senoo Laboratory group for their valuable discussion and advices. I want to express my gratitude to Assistant Professor Jaehyun Park for his thoughtful guidance and advice. I also want to thank Suga, Tarek, Chaeyoung, Xiaohan, and Jouni as fellow doctoral students for our fruitful discourse.

Last but not least, I would like to thank my family, both of my parents, my brothers and sister, and especially my wife Dita for their continued support of my study. Special thanks also for LPDP (Indonesia Endowment Fund for Education) for financial support of my study, also not forgetting fellow Indonesian students studying in Tokyo Tech.

Tokyo, 25 April 2020

Novandra Rhezza Pratama

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Tokyo Institute of Technology, 2020

ABSTRACT

Enterprise engineering is a discipline aspect of an enterprise, including designing and modeling a system. A system can be represented as a function or as a construction. To create a new system, we can perform manipulation of existing systems. A construction system can be decomposed into several subsystems, and those subsystems can be merged into another construction system. However, to manipulate a function system, we need to define a construction of that system and manipulate the construction. Function of an enterprise can be represented by Business Model Canvas, meanwhile, construction of an enterprise can be represented by DEMO (Design & Engineering Methodology for Organizations) Construction Model. e3value is introduced as a method to conduct Value Operation. A New Business Model Creation Process is introduced as a method of creating new business in this research. This research attempts to create a New Business Model Creation Process using transformation between function and construction, and validate its effectiveness using business model of Indonesian telecommunication industry. This study contributes to the idea of how to create a new business model, that we can gather many Business Models, perform the manipulation by transform them into Construction Models and then modify those Construction Models to create a new Construction Models and transform it into new Business Models.

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1. INTRODUCTION

1.1 Background

The competitive nature of business in this modern society leads to the necessity of business innovation to create a new business. To create a new, successful business, a deep and complete understanding of enterprise business as a system is necessary, aided by enterprise engineering. Enterprise engineering is a discipline aspect of an enterprise, including designing and modeling a system. A system of enterprise business can be represented in two ways, as a function or as a construction, as explained in τ-theory (Dietz et al., 2013). Function illustrates the set of services that a system is able to provide, meanwhile construction explains the structure, composition, and environment of a system.

To create a new system, we can perform manipulation of existing systems. A construction system can be decomposed into several subsystems, and those subsystems can be merged into another construction system (Suga and Iijima, 2015). However a function system, or a black box model, is a dominant but vague sort of model, and does not explicitly shows any information about construction (Dietz, 2006). Therefore to manipulate a function system, we need to define a specification or construction of that system, and manipulate the construction. Function and construction have the same scientific basis, i.e. application of physical tools and mathematical models (Gudo, Gutmann, and Scholz, 2002), hence function can be transformed into construction and vice versa, this is called functional/constructional transformation (Mannaert, Verelst, and De Bruyn, 2016).

In modeling a function of an enterprise, a representation of Business Model can be applied (Pratama and Iijima, 2018a). Business model is a management tool (Magretta, 2002) that represents value in a business enterprise (Aversa et al., 2015) and activities of a company including the generation of marketable information, products and/or services as value-added component (Wirtz et al., 2016). A value is regarded as the usefulness or importance of a

certain product/service perceived by its customer. In recent years, the interest in Business Model has increased significantly among scholars and practitioners (Zott, Amit and Massa, 2011), and is getting more relevance in information system fields (Salgado et al., 2014). One of the established business model represetations is Business Model Canvas (Osterwalder and Pigneur, 2010) that expresses the building block of a given business serving as a value or function of the business, and one of the most popular frameworks of business models.

Construction of an enterprise can be represented by DEMO (Design & Engineering Methodology for Organizations) (Dietz, 2006), in particular, DEMO Construction Model, one of the aspect models of DEMO. The manipulation, merging and decomposing DEMO Construction Model can be explained in algebraic notation (Suga and Iijima, 2015), therefore it is possible to create a pool of submodels of construction models, and then merging them to create a new construction model. From those new construction models, a new business model can be created, therefore a new business can be established.

In Indonesia, business of telecommunication industry has developed rapidly (Maradona and Chand, 2018). Telecommunication companies in Indonesia have provided the best services, improving operational systems to improve their business performance (Dachyar and Risky, 2014). Purnomo, Suryana, and Sari (2018) mentioned that the number of Internet users in Indonesia in 2016 reached 132.7 million peoples (about 51.8%), increased from 88.1 million in 2014.

To create a new business model, we can create a new business model from scratch, or modify the existing one by a process of (de)composition of a model, called *manipulation* in line with enterprise engineering concept. The phrase ´There's no need to reinvent the wheel´ describes the fact that, at a closer look, only few phenomena are really new. Suppose we want to create a new business, a new business model is necessary to picture the business. To generate a new business model from business model manipulation, we can gather many

existing business models, and then perform manipulation to those models to create a new business model. Business model manipulation has been discussed by Aversa et al. (2015). They applied the concept of modularity in manipulating the business model. However, there is no explanation of rigorous manipulation of business model, or any function-based model, and the method to conduct it. This can be explained in the sense that a functional (de)composition is fully dependent on the imagination of the 'observing' subjects, making it highly subjective. On the other hand, a construction model can be manipulated, merged, or decomposed by using algebraic notation (Suga and Iijima (2015), further explained in (Suga and Iijima, 2018a), and demonstrated in (Pratama and Iijima, 2020)), making it possible to analyze and synthesize, or simply manipulate, a construction model. The advantage of this method is removing the necessity of model checking. Therefore, I hypothesized that rigorous manipulation of Business Model Canvas (a function model, or 'black box') can be indirectly achieved by transforming it into DEMO Construction Model (a construction model, or 'white box') as a functional/constructional transformation, then conduct manipulation of such model. After manipulation of the construction model is finished, the resulting model can be transformed into a new Business Model Canvas as a new model for a new business. To determine the value proposition of the new business a Value Operation (Pratama and Iijima, 2019) can be conducted. This whole process is called New Business Model Creation Process. To realize this process, a framework of functional/constructional transformation between business model and construction model is necessary; this is the main focus of this research. A case study of Telecommunication Industry in Indonesia is used to validate the framework.

There are already some researches about Business Model Canvas mapping to other enterprise models, as summarized by Caetano et al. (2017). They present representation and analysis of some semantic models, including Business Model Canvas, e3Value, and Archimate. Some researches concerning DEMO model mapping with other models were also

already conducted, such as e3value (Pombinho, Tribolet, and Aveiro, 2014), and Organizational Implementation (Op't Land and Krouwel, 2013). The correspondence between Business Model Canvas and DEMO Construction Model is already provided (Pratama and Iijima (2018a, 2018b)), however, it only explains about the transformation from function to construction and vice-versa, and the implementation of this framework in a real business case is not yet to be conducted.

1.2 Research Objective

This research aims to comprehensively explain New Business Model Creation Process as a state-of-the-art, and its application in telecommunication industry in Indonesia. This work will serve as a method of business model innovation to create a new business and its value propositions. By using this framework, one can gather several business models, generate construction models from them and create a pool of submodels, modify them to create a new construction model, and generate a new business model to create a new business in a certain industry. In addition, by linking DEMO Construction Model and Business Model Canvas, this research enhances the interchangeability of both DEMO Construction Model and Business Model Canvas, as it is beneficial to support information systems development process (Wang, Albani, and Barjis, 2011).

This research aims to answer these following research questions to address the emerged problems:

RQ1: How can we generate a new Business Model by rigorous manipulation?

RQ2: How can we create a new Value Proposition by conducting Value Operation?

RQ3: How can we create a new Business Model of Telecommunication industry?

1.3 Focus and Scope

This research attempts to create a framework of New Business Model Creation Process, including transformation model between function and construction in functional-constructional transformation, and implement the model in telecommunication industry by conducting the phases of New Business Model Creation Process.

This research proposes New Business Model Creation Process, as a state-of-the-art of this research. This process consists of four main phases: Transformation from existing Business Model Canvas to Construction Model, New Construction Model generation using split and merge operation, Transformation from new Construction Model to new Business Model Canvas, and Value Operation.

In this research, a case study of Telecommuncation Industry in Indonesia is used to test the proposed framework. Some Business Model Canvas are captured as inputs for New Business Model Creation Process framework, then apply the framework by transforming the existing Business Model Canvases into DEMO Construction Model, then generating new Construction Model using split an merge operations, then transforming the new Construction Model into a new Business Model Canvas, and finally conducting Value Operation to complete the new Business Model Canvas, thus completing the case study.

1.4 Outline

The dissertation is grouped into eight related chapters. The flow and relationship of chapters are provided in Figure 1.1. Chapter one explains the background, research objective, focus and scope, outlines, and potential contributions of the research. Chapter two reviews the literature related to the research, mainly Business Model, Construction Model, and Function, Construction, and Transformation. Concept and development of Business Model will be discussed, including Business Model Manipulation and Business Model Representation.

Business Model Canvas as an example of Business Model Representation will also be thoroughly discussed. Construction Model, specifically DEMO Construction Model, will be explained. The relationship between Business Model as a function, Construction Model as a construction, and transformation between them will also be reviewed, complemented with value aspect in the discussion.

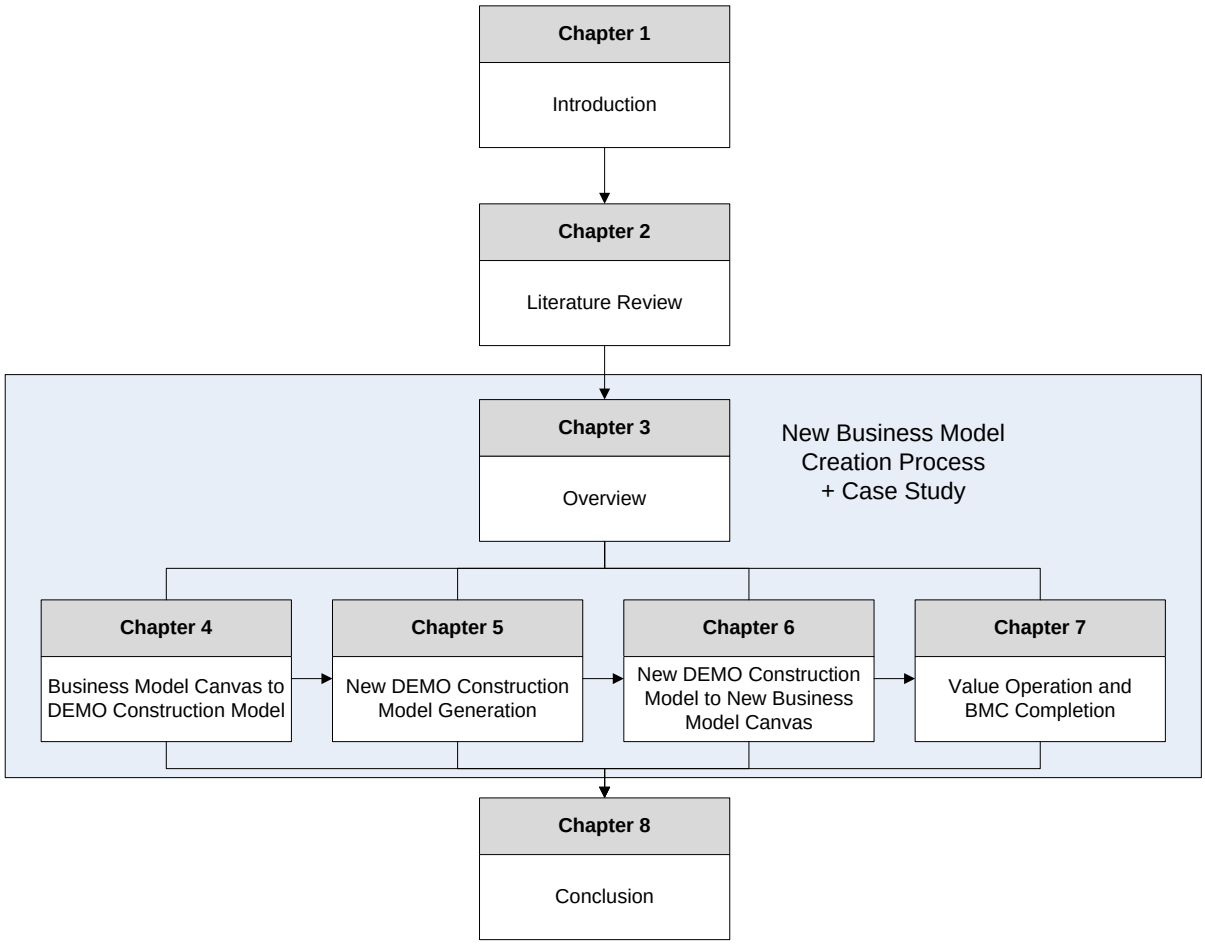


Figure 1.1 Outline of the Research

The following five chapters develop a proposed framework of New Business Model Creation Process to systemically generate a new Business Model. Each phases of the framework will be thoroughly explained one by one, completed with some conditions and assumptions. A case study of Telecommunication Industry in Indonesia is also provided in these chapters. Using the proposed framework described, the case study will act as an

application for the framework. All four phases will be explained in detail, together with the input-process-output of each phase. These chapters will also discuss my previous publication.

Chapter three will be overview of New Business Process Creation Process and the case study of Indonesian telecommunication industry. Chapter four will discuss transformation from existing Business Model Canvas to DEMO Construction Model (Pratama and Iijima, 2018a), completed with the case study. Chapter five will discuss New Construction Model Generation using Split and Merge Operation (Pratama and Iijima, 2020), completed with the case study. Chapter six will discuss Transformation from New Construction Model to New Business Model Canvas (Pratama and Iijima, 2018b), completed with the case study. Chapter seven will discuss Value Operation (Pratama and Iijima, 2019), completed with the case study, resulting in complete BMC. At the end of the chapter, a discussion will be provided to analyze the results. Finally chapter eight will cover the conclusion, contribution, and future work of this research.

1.5 Potential Contributions

The potential contributions of this study are related to business modelling and system development; in particular business model generation, model manipulation of business model, and transformation between business (function) model and construction model. As mentioned in the Section 1.1, rigorous manipulation of business (function) model is not possible. This research try to provide workaround by transform the business model into a construction model that is possible to rigorously manipulate. To be able to do this, a methodology of transformation between business model and construction model has to be explored, then a framework can be developed to conduct the full process. With this, a correspondence between business model and construction model, and the framework of New Business Model Creation Process will be established, further adds to the potential contribution of this research.

By using this framework, I hope that one can gather several business models, generate construction models from them and create a pool of submodels, modify them to create a new construction model, and generate a new business model to create a new business in a certain industry.

2. LITERATURE REVIEW

2.1 Business Model

Business model can be seen as a tool for depicting, innovating and evaluating business logics in startups and in existing organizations (Veit et al., 2014), that contains a set of elements and their relationships and allows expressing the business logic (Osterwalder, 2004), especially in IT-enabled or digital industries. Business model is also used as a tool, analysis or a framework in information systems research. Research on Business Model has been extensively discussed over the last 15 years (Foss and Saebi, 2017). Business Model, and more recently Business Model Innovation has been influential in business management research, especially on business sustainability (Bocken et al., 2014). There are several representations of business model, the most popular are Business Model Canvas (Osterwalder and Pigneur, 2010) and Business Model Navigator (Gassmann, Frankenberger, and Csik, 2013). e3value (Gordjin, 2002), a value-oriented network model, can also conidered as representations of business model. Foss and Saebi (2017) suggest four streams of Business Model Innovation research: Conceptualizing Business Model Innovation, Business Model Innovation as an Organizational Change Process, Business Model Innovation as an Outcome, and Consequences of Business Model Innovation. A survey (Massa, Tucci, and Afuah, 2017) suggested that business model research trends continued to increase in terms of publications. Most recently, Maucuer and Renaud (2019) compare the theoretical pillars and research fronts of Business Model research in these two foundational disciplines. However, most of them focused on Business Model generation and/or innovation through the act of craftsmanship; not focusing on methodology of business model manipulation.

2.1.1 Business Model Manipulation

Aversa et al. (2015) introduce the concept of modularity in business model manipulation, called Six Operators (Baldwin and Clark, 2000). These syntactical operators include splitting, substituting, augmenting, inverting, excluding, and porting. However, they only mention the concept and the example; they did not introduce a framework or methodology of Business Model manipulation.

The Six Operators are described as follows:

1) Splitting

Splitting can be described as separating an element of business model into several new elements. In the business model domain, 'splitting' is the operator that enables cognitive inquiries into the separation of an individual element into several subelements. Examples include new product identification to meet customer needs (e.g., HBO), or shifting from one time to recurring customers by introduction of subscription billing policies (e.g. Microsoft Office).

2) Substituting

Substituting can be described as replacing an element of business model with another element that can perform similar task. In the business model domain, 'substituting' is an operator that allows cognitive inquiries into replacing one original element of business model with a different one that performs the same task but in a different way. Examples include integrating the supply chain vertically in place of relying on suppliers outside of the company (e.g., Starbucks), or changing from a single product offering to a mass market segment (e.g., Ely Lilli).

3) Augmenting

Augmenting can be described as establishing a new element of business model (or more, depends on multisided business model layer) to improve the business model value and/or its

elements. In the business model domain, ’augmenting’ is an operator that enables cognitive inquiries into leveraging or establishing complementarities across business model, to increase the business model value and/or of its constituent elements. Examples include adding total quality management function to control the supply chain more effectively (e.g., Toyota) or moving from single-sided business model to multi-sided platform (e.g., Google).

4) Inverting

Inverting can be described as exerting a certain part of a business model to become a stand-alone business model or element. In the business model domain, ‘inverting’ is an operator that allows cognitive inquiries into the leverage of a distinct element of business model into a stand-alone status. Examples include creating new departments from already existing departments in the company (e.g., Xerox), or promoting a part of the business model to core status from peripheral (e.g., Gillette razor-blade).

5) Excluding

Excluding can be described as eliminating a component to narrow down function of the business model. In the business model domain, ‘excluding’ is an operator that allows cognitive inquiries into removing business model components, for example, turning into a single-sided business model from a double-sided one. Examples include no frills offering at lower cost (e.g., Ryanair), or eliminating additional sides and services of a business model (e.g., US National Public Radio).

6) Porting

Porting can be described as moving a business model component (or an entire model) from one domain to another. In the business model domain, ‘porting’ is the operator that enables cognitive inquiries by adopting a business model (or some elements of business model) from different domains and industries, and which are ‘new to the field’. Examples

include adapting the razorblade model from shaving to printers (e.g., Epson Printers) or importing social network interaction into video gaming (e.g., Sony Playstation).

Figure 2.1 depicts the illustrations of the modular operators. It represents elements of business model (and related arrows) according to how the application of the modular operator affects them:

- single solid lines – preexisting elements which are not influenced by the modular operator
- double lined, grey filled, elements – new elements that are introduced in the business model by the operator
- dotted lines – elements which are eliminated from the business model
- squares and circles – to differentiate between elements of different business models, or sides of a multi-sided business model

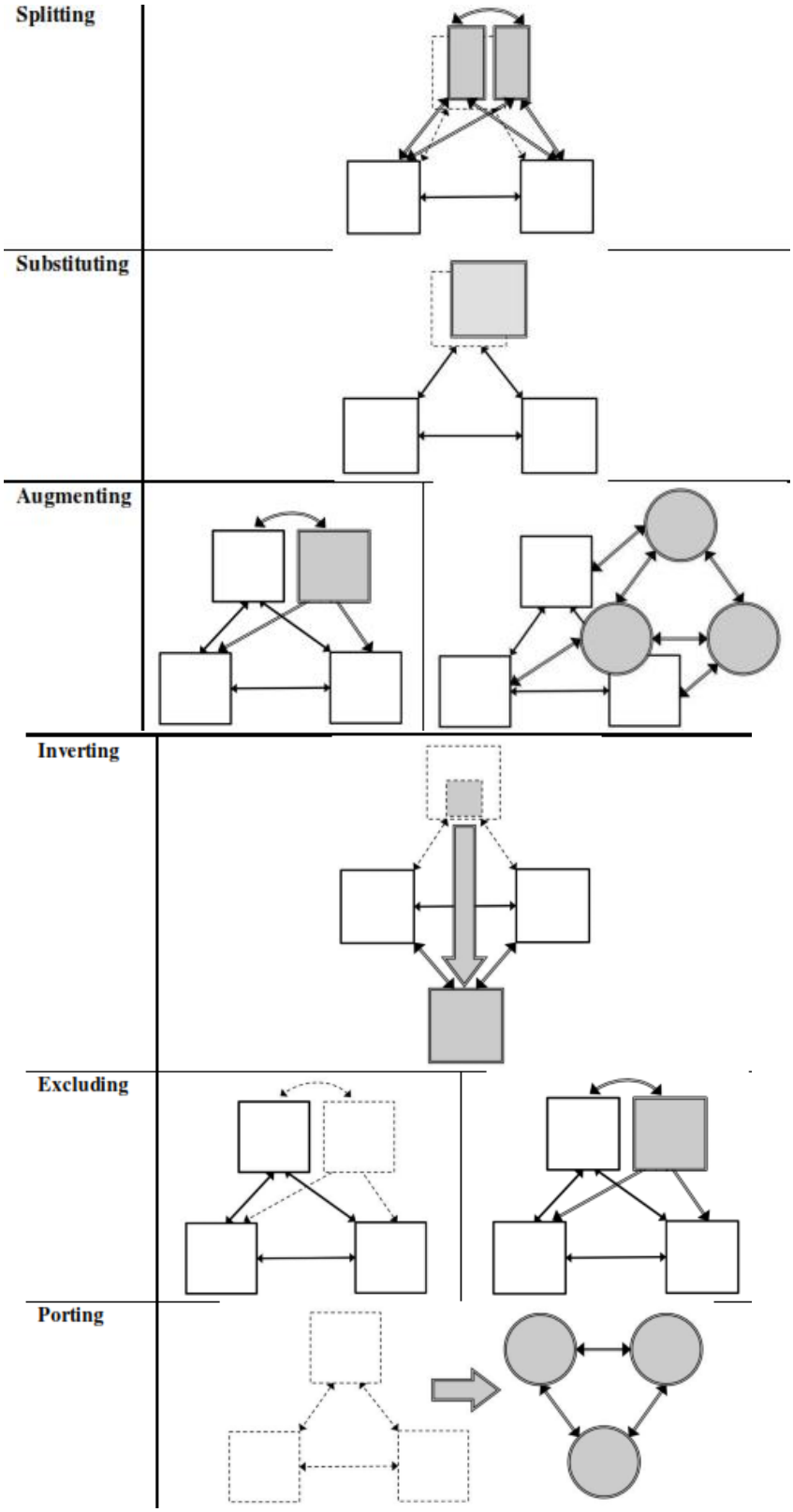


Figure 2.1 Modular Operation

2.1.2 Business Model Representation

To facilitate business model synthesis and analysis, also to enable Business Model Innovation, an approach for representing business model is necessary, called Business Model Representation. Business Model Representation can be based on textual elements, graphical, or mixture of both, in which contains formalized ontology to show, or represent, a business model (Veit et al., 2014). Business Model Representation can enable experimentation of Business Model Innovation and to provide a basis for defining requirements to the information systems (Eriksson and Penker, 2000).

Kundisch et al. (2012) summarized several models of Business Model Representation, and classified them based on their main characteristics and framework. They found that the concept of Business Model Representations vary depends on the domain of origin (Strategy, E-business, Information Systems, etc.) and main scope (General, E-business, ICT, etc.). They classified the framework of Business Model Representation as follows:

- Reach

  There are three layers of business logic (Al-Debei and Avison, 2010); *Business Model* is the middle layer, between layers of *Business Strategy* and *Business Process*. To be classified as Business Model Representation, a model representation, naturally, has to represent Business Model Layer. A Business Model Representation can reach strategy layer if it is explicitly intended to represent strategic aspects, or provides notational elements which can be related to both the Strategy and the Business Model layer. Similarly, a Business Model Representation can reach into the Business Process layer if it provides a detailed, low-level view on activities and on the order in which these activities are performed, as well as representation of the Business Model layer.

- Perspective

The conceptualization of Business Model Representation can be more elaborate, the more views it can provide. Depends on the abstraction level, a Business Model Representation may feature a *single view* or *multiple views*. The vast majority of the Business Model Representations feature a single view.

- Notation principle

  Notation principle, in the Business Model Representation context, can be categorized into two categories: *map-based approaches* and *network-based approaches*. Both defines the concept to represent a Business Model, but differs in their visualization and the richness information contained in the approaches. Map-based approaches lay out the concepts one by one, providing a template which spatially structures the key characteristics of a specific Business Model. The map-based approach is suited for describing a larger number of different concepts. In contrast, network-based approach is rather suited for representing complex networks of the elements of a limited number of concepts.

- Tool support

  For a given Business Model Representation, the ease of use (change, analyze, share, etc) can be determined by availability of tool support. A tool support can give *formalization*, *design*, and *financial evaluation* tools to the given representation.

2.1.3 Business Model Canvas

Business Model Canvas (Osterwalder and Pigneur, 2010), is a strategic management tool for developing a new business model, or simply capture the existing one (Salgado et al., 2014). Business Model Canvas was first introduced as a new design science approach of business model ontology (Osterwalder, 2004). Business Model Canvas is popular in its way to

pinpoint the essential elements of business as leverage for innovation (Martikainen, Niemi, and Pekkanen, 2014).

Business Model Canvas has 9 building blocks as a representation of business activity (Osterwalder and Pigneur, 2010). These building blocks are described as follows:

1) Customer Segments

The Customer Segments Building Block defines the party, people or organizations that the company targets to deliver its value. Customer is an important part of the business model. In order to satisfy customers, segments of the customer can be defined and classified, relative to their needs, behaviors, or other attributes. A business model may define one, single segment or several, different segments of customers.

2) Value Propositions

The Value Propositions Building Block describes the products or services that the company provides as a value for their Customer Segment. The Value Proposition is the reason why customers turn to one company over another. Value Proposition consists of products and/or services that fulfill the requirements of Customer Segments, to solve their problem or satisfy their needs.

3) Channels

The Channels Building Block describes the way of transmission and transfer of Value Proposition to reach its Customer Segments. Channels act as company's interface with customers, and may include communication, distribution, and sales. Channels play an important role in the business model as a customer touch point.

4) Customer Relationships

The Customer Relationships Building Block describes relationship between the company and its Customer Segments. The Customer Relationships called for by the company's business model can influence the overall customer experience. A company should clarify the

type of relationships (personal, automated, etc.) they want to establish with Customer Segments.

5) Revenue Streams

The Revenue Streams Building Block describes the revenue that the company receives from its Customer Segment. A company must think about for what value each Customer Segment is truly willing to pay to generate one or more revenue from them. Each Revenue Streams may have different pricing mechanisms, depends on type of product/services, payment scheme, etc.

6) Key Resources

The Key Resources Building Block describes the assets or resources that the company possesses to run a business model. Key Resources allow a company to create and offer Value Proposition. Different Key Resources are needed depending on the type of business model. Key Resources can be anything; physical, financial, intellectual, or human, and do not necessarily own by the company itself.

7) Key Activities

The Key Activities Building Block describes the activity that the company does to run the business model. Every business model calls for a number of Key Activities, as these are the most important actions a company must take to operate successfully. Key Activities are required to create and offer a Value Proposition, like Key Resources. Depending on the type of business model, Key Activities may be different.

8) Key Partners

The Key Partners Building Block defines the party, people or organizations that work together with the company to run the business model. Key partners can be a supplier, joint ventures, or even a competitor in the form of strategic partnerships. Companies create

alliances for many reasons, to optimize their business models, reduce risks, or acquire resources.

9) Cost Structure

The Cost Structure describes the costs that the company has to cover to run the business model. This building block describes the most important costs incurred while operating a particular business model. Creating and delivering Value Propositions, maintaining Customer Relationships, and generating revenue all incur costs.

Figure 2.2 shows the business model canvas. In the Business Model Canvas, the building blocks are positioned according to their classification. The left side of the canvas represents the internal business of the company on how to create business values, whereas the right side represents the customer side of the business and how to deliver those values. The bottom side can also be classified as a financial aspect of the business.

In the context of Business Model Representation classification, the domain of origin of Business Model Canvas is E-business, and its main scope can be categorized as general. Business Model Canvas not only discuss about Business Model Layer, but also Strategy layer, given that Key Activities and Key Resources gives the company means to provide Value Proposition, also Customer Relationships and Channels gives them access to deliver those Value Propositions to their Customer Segments. Given that Business Model Canvas only stands form a viewpoint of stakeholders, it only provides a single view. Business Model Canvas' 9 building blocks are the layout of each concept, but without a distinct graphical notation of the concepts and their relationships, only their positioning perspectives. Therefore it is classified as map-based approaches. Regarding tool support, the canvas itself is already considered as design tools, and the building blocks concept is a formalization tools.

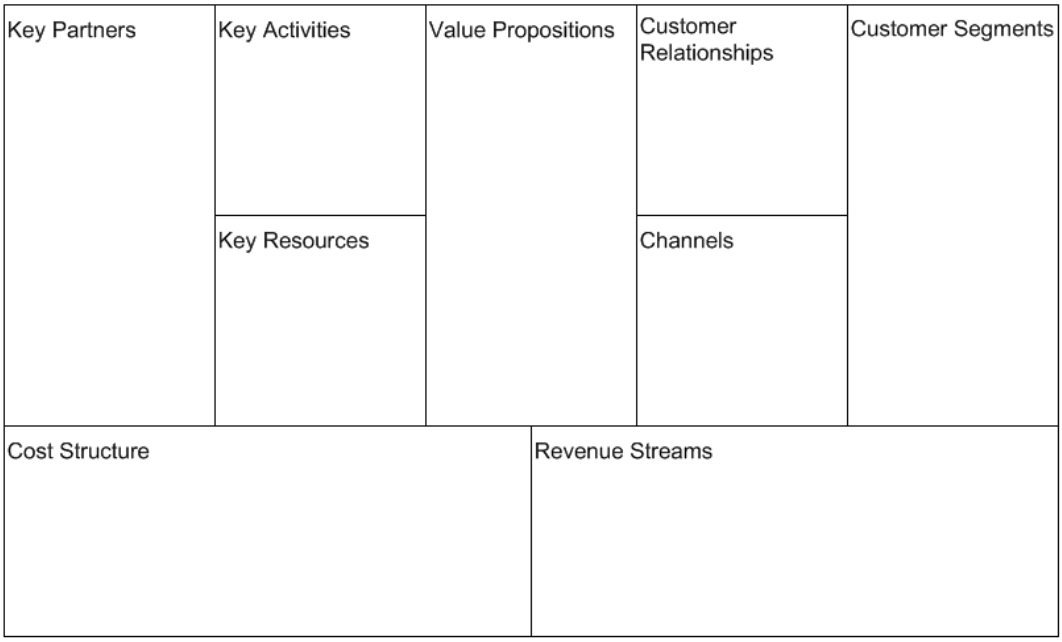


Figure 2.2 Business Model Canvas (Osterwalder & Pigneur, 2010)

2.1.4 Business Model Canvas Transformation Pattern

The manipulation of business model is conducted to achieve the goal of reinventing business model. In context of Business Model Canvas, Osterwalder and Pigneur (2010) introduces Business Model Patterns, a semantic Business Model Transformation as a well-known business concept in standardized format. The modular operators used to manipulate the business model based on each pattern will also be explained.

1. *Unbundling Business Models*

The concept of the "unbundled" corporation holds that there are three fundamentally different types of businesses: Customer Relationship businesses, product innovation businesses, and infrastructure businesses. Each type has different economic, competitive, and cultural imperatives. The three types may co-exist within a single corporation, but ideally they are "unbundled" into separate entities in order to avoid conflicts or undesirable trade-offs. Figure 2.3 shows the patterns of unbundling business models.

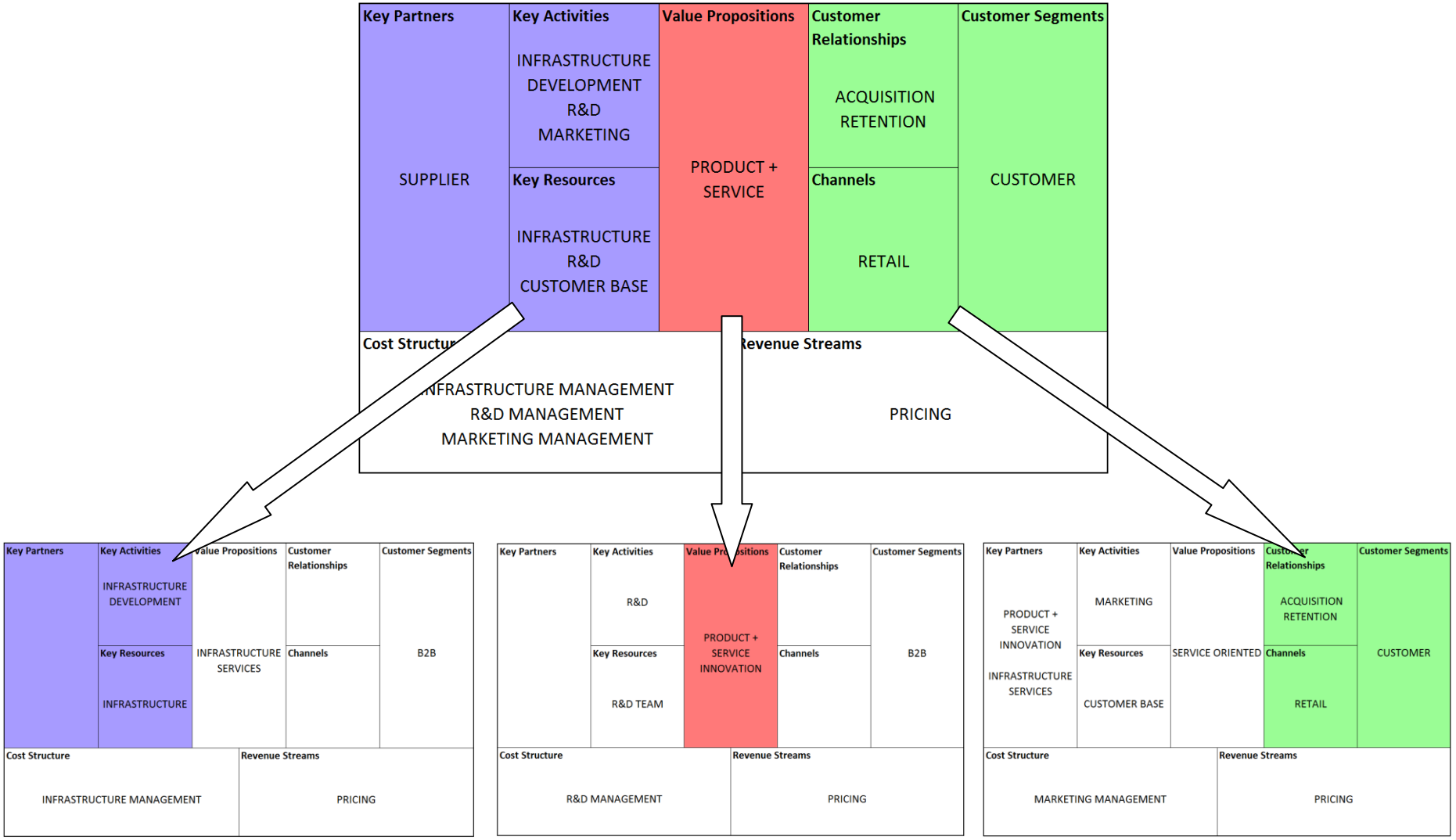


Figure 2.3 Unbundling Business Models

The unbundling of business model is essentially uses *splitting* operator: a whole existing business model is split into two or more resulting new business model. The removal of one or more components in the new business models also means *excluding* operators also used.

2. The Long Tail

Long Tail Business Models are about selling less of more: They focus on offering a large number of niche products, each of which sells relatively infrequently. Aggregate sales of niche items can be as lucrative as the traditional model whereby a small number of bestsellers account for most revenues. Long Tail business models require low inventory costs and strong platforms to make niche content readily available to interested buyers. Figure 2.4 shows the patterns of the long tail.

In the pattern of long tail business model, the product and market of broad range of product is replaced into many niche product and segment, means the operators of *substituting* applies here.

3. Multi-Sided Platforms

Multi-Sided Platforms bring together two or more distinct but interdependent groups of customers. Such platforms are of value to one group of customers only if the other groups of customers are also present. The platform creates value by facilitating interactions between the different groups. A multi-sided platform grows in value to the extent that it attracts more users, a phenomenon known as the network effect. Figure 2.5 shows the patterns of multi-sided platform.

In this pattern, adding more platform means adding new element of business models to increase the value of the business model, thus *augmenting* operator applies here.

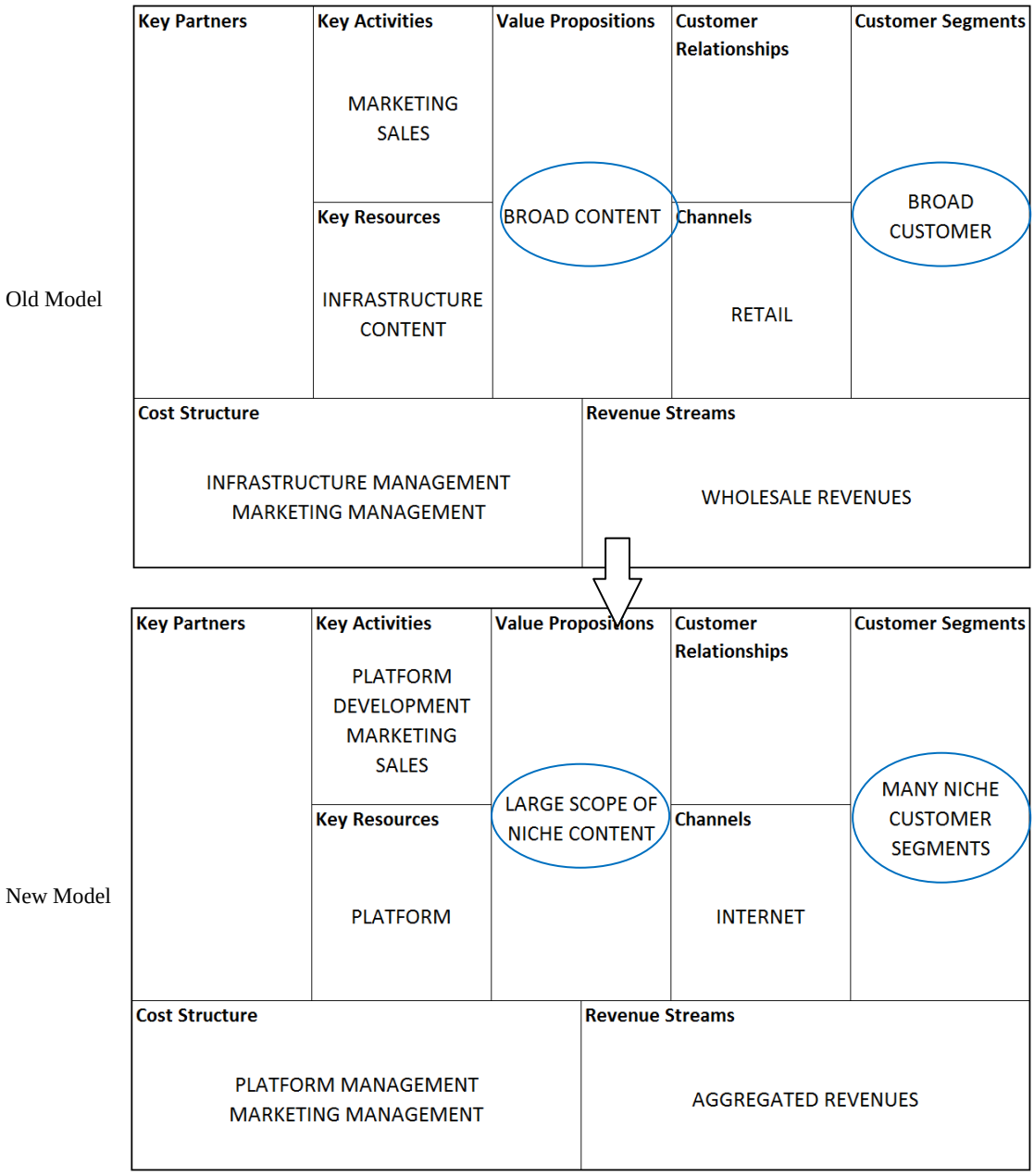


Figure 2.4 The Long Tail

4. Free as a Business Model

In the Free business model at least one substantial Customer Segment is able to continuously benefit from a free-of-charge offer. Different patterns make the free offer possible. Non-paying customers are financed by another part of the business model or by

another Customer Segment. Figure 2.6 shows one example of Free as a Business Model pattern, Bait & Hook.

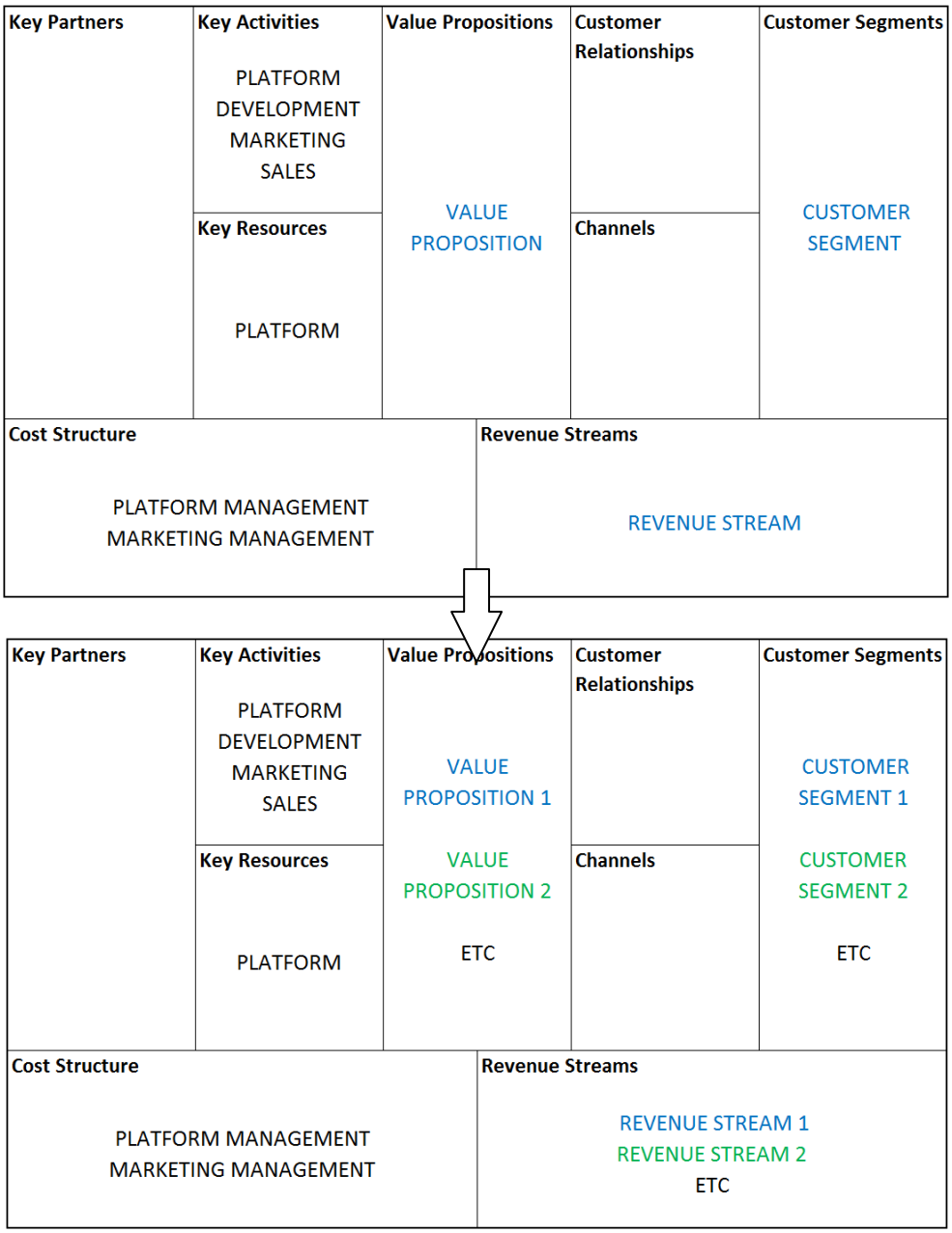


Figure 2.5 Multi-Sided Platform

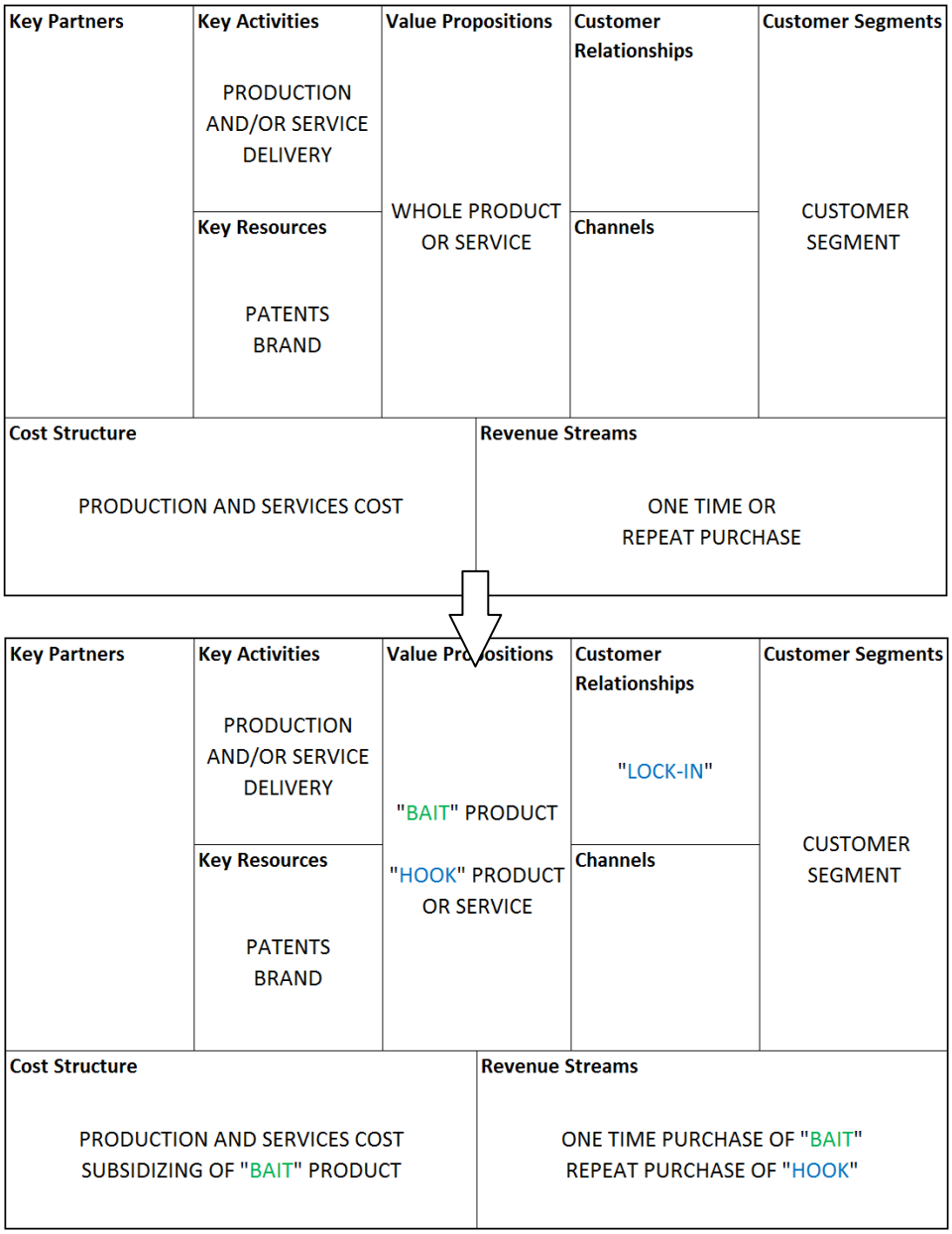


Figure 2.6 The Bait & Hook

The Bait & Hook pattern derives from Gillette's razor and blades model. Gillette sell razor handles at a steep discount to create demand for their disposable blades. This business model then adapted by printer company that sell printers at a very low prices, but

they generate profits from the sales of ink cartridge; this essentially moving a business model component (or an entire model) from one domain to another, or called *porting*.

5. Open Business Models

Open Business Models can be used by companies to create and capture value by systematically collaborating with outside partners. This may happen from the "outside-in" by exploiting external ideas within the firm, or from the "inside-out" by providing external parties with ideas or assets lying idle within the firm. Figure 2.7 shows the patterns of Open Business Models.

The outside-in pattern means replacing R&D activities with bringing external ideas, applying *substituting* operator. The inside-out pattern means the selling of unused R&D results, creating a stand-alone business model, applying *inverting* operator.

2.1.5 Business Model Canvas Manipulation

Based on Six Operators and Business Model Pattern, we can summarize the method of Business Model Canvas Manipulation based on patterns and operators used (Table 2.1). Note that this table only served as a general picture, not an absolute rule, means that to manipulate a business model according to one pattern, a certain operators don’t have to be used.

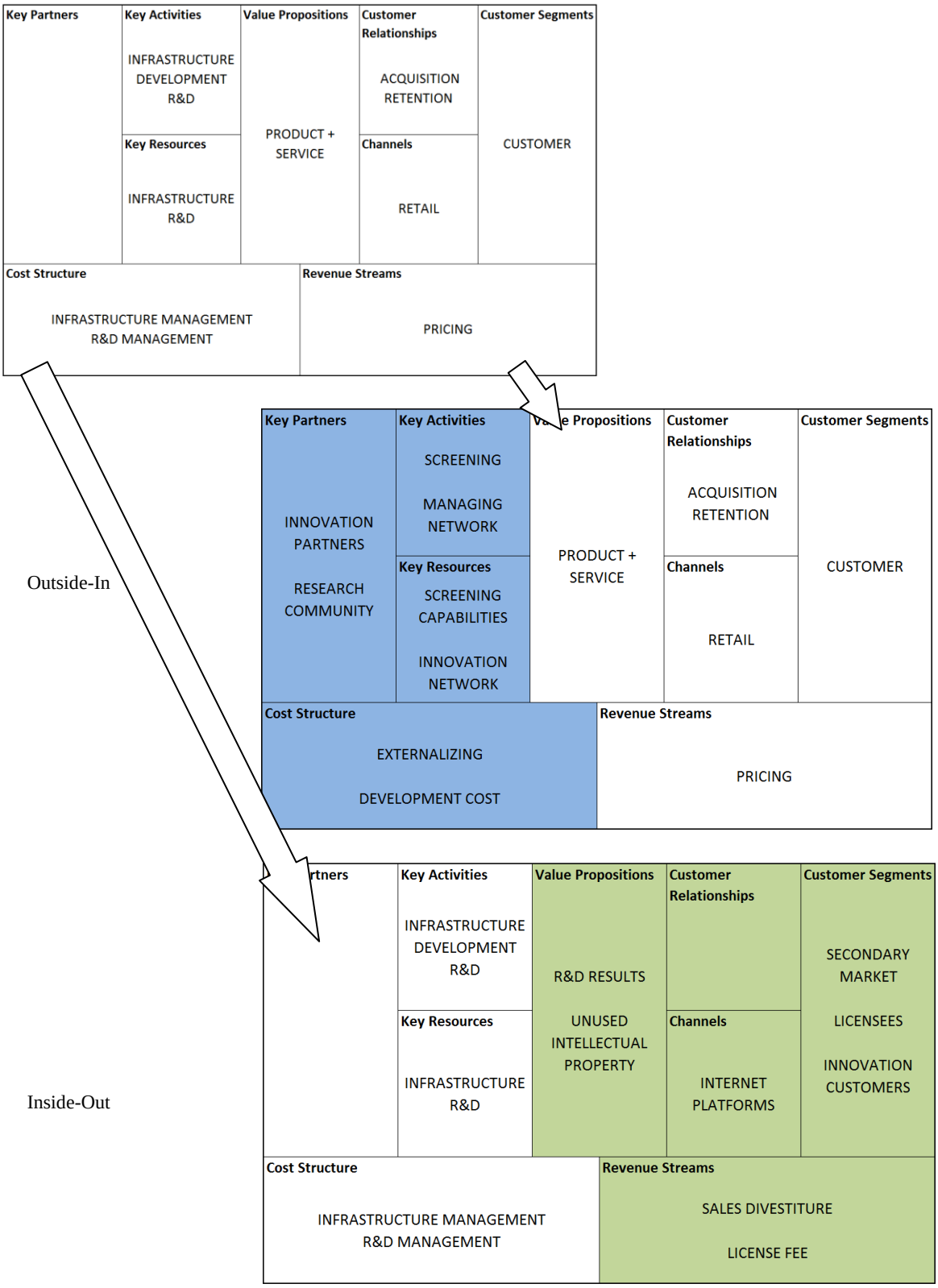


Figure 2.7 Open Business Models

Table 2.1 Correspondence of BMC Pattern and Six Operators

BMC Pattern	Operators
Unbundling Business Models	Splitting, Excluding
The Long Tail	Substituting
Multi-Sided Platforms	Augmenting
Free as a Business Model	Porting
Open Business Models	Substituting, Inverting

Of course, beside the mentioned patterns, there is many more business model patterns (Gassmann et al., 2013). The main point of this discussion is that to conduct business model manipulation according to the desired business model pattern, modular operators can be used. However, the modularity of Business Model Canvas itself is up to debate; by looking the canvas at a glance, one cannot identify the relationship between the components of different building blocks. The manipulation process itself also highly dependent on the designers and their interpretation on the business model, and its building blocks, components, and their relationships. Therefore it is not possible to conduct semi-automatic manipulation.

2.2 Construction Model

From the previous section, we know that Business Model Canvas covers two of three layers of business logic; Business Model layer and Strategy layer. To extend our view about a business, we also need to view Business Process layer. In the Business Process layer, there are already several Business Process Modelling Language (BPML) as a

representation of Business Process (List and Korherr, 2006), for example Business Process Modelling Notation (BPMN), Event Driven Process Chain (EPC), UML Activity Diagram, etc. However, most of these BPMLs are focusing on the linkage between tasks, not much emphasis on the business itself. The construction (white-box) model is not explicitly apparent, even some models are actually function (black-box)-oriented (Dietz, 2006). Therefore to explore Business Process layer (Figure 2.8), and understand the construction of it, a Construction Model of a Business Process is necessary. A *Construction Model* is a model that shows the composition, the environment, and the structure (Dietz, 2006), as well as the relationships. One of the established Construction Model of a business is DEMO Construction Model.

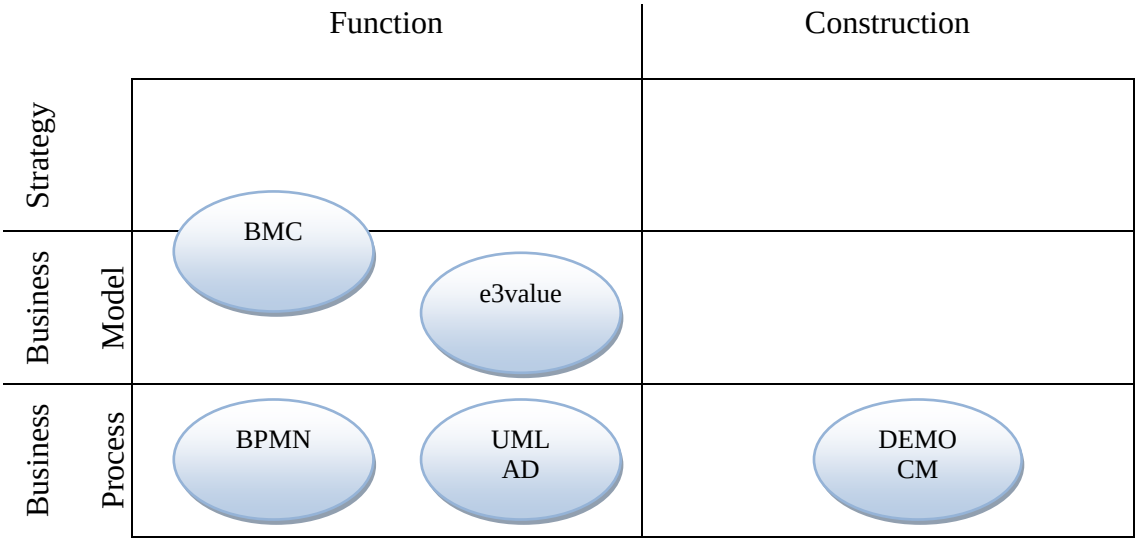


Figure 2.8 Position of several models relative to business layer and model orientation

2.2.1 DEMO Construction Model

Design & Engineering Methodology for Organizations (DEMO) can be described as *a meta-model for modeling organizations* (Dietz, 2006). It is a methodology of the enterprise ontology, an approach that additionally distinguishes between essential (ontological), infological and datalogical production steps (Albani and Dietz, 2011).

The organization of an enterprise; it can be considered to consist of three aspect organizations: the B-organization, the I-organization, and the D-organization, with I-organization and the D-organization are supportive to B-organization. DEMO is applied to build ontological models (B-organization) of enterprises.

DEMO Construction Model (CM) indicates transaction kinds and actor roles associated with them and also information links between them, or in a simplified term, the construction of the organization (Perinforma, 2015). It specifies the composition, the environment and the structure of the organization (Albani and Dietz, 2011). A Transaction Kind represents coordination act/fact in a business conversation, and an Actor Role represents the initiator/executor of such coordination. CM is a part of four aspect models (Figure 2.9) expressing the ontological knowledge of the target enterprise. The other aspect models are Process Model (PM), Action Model (AM), and Fact Model (FM).

The Process Model (PM) details each single transaction type of the CM by means of the universal transaction pattern. Next, it contains the causal and conditional relationships between transactions. Business processes thus are tree structures of transactions. The Action Model (AM) specifies the business rules that serve as guidelines for the actors in dealing with business events, i.e., occurrences of coordination facts. The Fact Model (FM)

specifies the object classes, fact types and ontological coexistence rules in the production world.

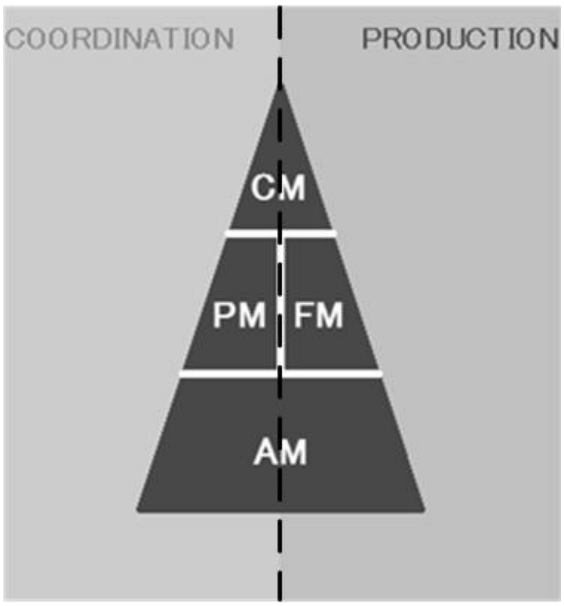
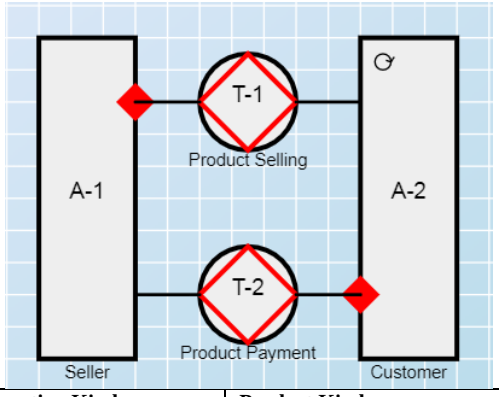


Figure 2.9 DEMO Aspect Models (Dietz, 2006)

In this study, we only focus on the coordination part, or interaction model of CM of an organization, which contains Actor Transaction Diagram (ATD) which is part of Organization Construction Diagram (OCD), and Transaction Product Table (TPT). These two composed the interaction structure of an organization (Dietz, 2006). Figure 2.10 expresses an example of ATD and TPT of an organization, I use an example of a simple retail shop that sells a product. ATD consists of Actor Roles and Transaction Kinds identified (Dietz, 2013). **Actor Role** defined as the unit of authority, responsibility, and competence of the system. **Transaction Kind** defined as a sequence of acts that comprises transaction pattern: request, promise, declare, and accept. An Actor Role can be an *initiator* and/or *executor* of a Transaction Kind. Actor Role can be classified as an *Elementary Actor Role*, an Actor Role that is the executor of one Transaction Kind, or a



Transaction Kinds	Product Kinds
T1 Product Selling	Product selling has been completed
T2 Product Payment	Product fee has been paid

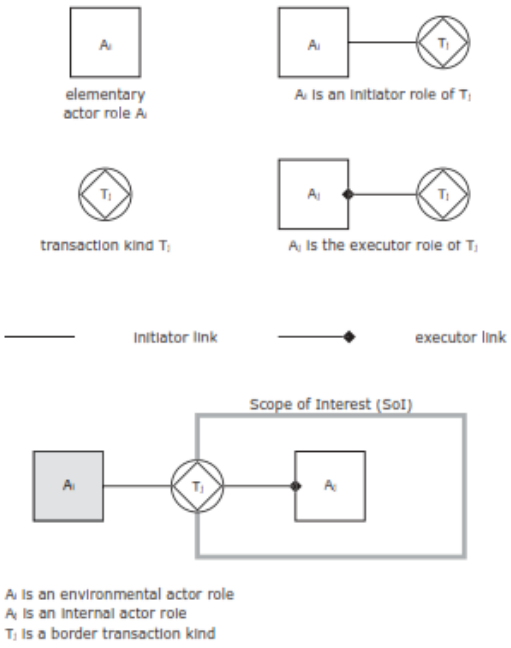


Figure 2.10 Example ATD and TPT of an organization. Legends of ATD excerpted from (Dietz, 2013)

Composite Actor Role, composed by multiple Elementary Actor Roles. In ATD, Actor Roles are shown in a rectangle and transaction kinds depicted as a circle with diamond. A line connecting both of them indicates there is a link: line without diamond indicates

initiator link, and line with diamond indicates executor link. TPT shows the transaction kinds and the product kind of each transaction kind. There can be a *Scope of Interest* (SoI) to divides the Actor Roles into environmental and internal Actor Role. A Transaction Kind lies within the border of SoI is called Border Transaction Kinds.

Transaction kinds in DEMO Construction Model may be related to each other. It is possible that a transaction kind, in practice, is inside the flow of another transaction kind, or in other words, belongs to a Transaction Tree (Dietz, 2006). Taking an example of Figure 2.10, in practice, Product Payment is part of Product Selling. To complete Product Selling, Product Payment must be completed. I call such transactions as Parent-Child Transactions.

DEMO Construction Model has been applied mainly in information system research, in particular, organizational ontology (Op't Land et al., 2009) (Op't Land and Dietz, 2008) and business process (Liu and Iijima, 2015) (Hunka and Belunek, 2015).

DEMO Construction Model, with ATD as its representation, emphasizes clear coordination models so that it is possible to conduct rigorous manipulation of Construction Model. Suga and Iijima (2018a) developed a formal specification of ATD and its submodels and defined algebraic operation as a means of model manipulation. They formalized the definition of a transaction kind $\boldsymbol{T}$, an actor role $\boldsymbol{A}$, a model $<\boldsymbol{A}, \boldsymbol{T}>$, and submodel of a model $<\boldsymbol{A}, \boldsymbol{T}>$. Submodel is defined as a part of a given model that has been already created. They also defined operators of Construction Model manipulation, named *merge*, *complement*, and *digest*. Tool support for this model manipulation was also developed (Suga and Iijima, 2018b).

2.3 Function, Construction, and Transformation

The notion of a system can be represented in two ways, as a function or as a construction, consistent with τ-theory (Dietz et al., 2013). The τ-theory (τ is pronounced as TAO, standing for teleology across ontology) is a theory about system perspectives. It particularly clarifies the notions of teleology and ontology, their fundamental difference as well as their relationship. According to this theory, function illustrates the set of services that a system is able to provide, meanwhile construction explains the structure, composition, and environment of a system.

A real-life system or a using system (US) can be represented as an object system (OS) consist of functional model and system ontology (Dietz, 2005). The representation process of OS from US is further developed into system development process (Dietz, 2006). In system development process, a construction of US is developed into function of OS via subprocess of *function design*, then continued with development of construction of OS via subprocess of *construction design* (Dietz, 2006). Figure 2.11 shows the basic steps in context of developing a system, part of system development process.

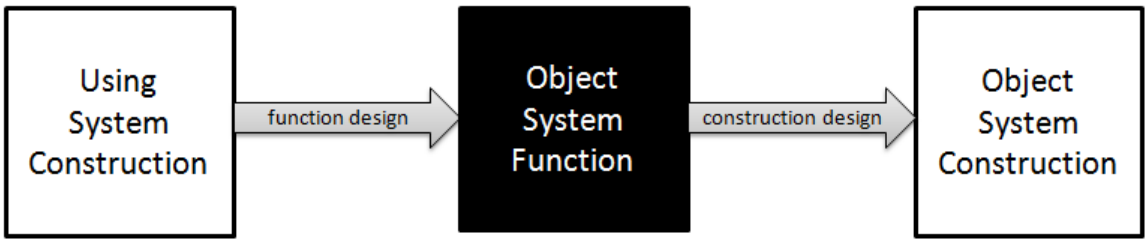


Figure 2.11 System Development Process (Dietz, 2006)

As mentioned in Section 1, Business Model is classified as function model; it visualizes the purpose of an enterprise. As a function model is a black-box model, rigorous

manipulation is not possible without knowing the structure or construction (white-box) of the model. In other words, the transformation of business model into construction model is necessary to be able to conduct rigorous business model manipulation. DEMO Construction Model is one of the white-box models of the enterprise (Dietz, 2006) that illustrates the essence, or business level, of an enterprise. Suga and Iijima (2018a) found that manipulation of DEMO Construction Model can be conducted using algebraic notation. The advantage of this method is removing the necessity of model checking; however, there is no mention of the meaningfulness of the model. This research aims to amends the above research gaps, by creating a framework of Business Model manipulation utilizing the already established Construction Model manipulation as an intermediary process.

Value is one of the important aspects of Business Model that shows the purpose of goods/services produced by the business. In a Business Model manipulation, the process of how to generate the new value proposition for new business should be considered, I call it Value Operation. However, according to (Pratama and Iijima, 2018a), there is no correspondence of Value Proposition in Construction Model; therefore Construction Model manipulation does not involve Value Operation. Because of this, the process of Value Operation is conducted separately and in parallel with Construction Model manipulation. Value Operation can be done using the modular operators in Figure 2.1, using a platform for value constellation; one of such platform is e3Value (Gordijn, 2002).

2.3.1 e3value

e3value is a value model that shows the exchange of things with an economic value between actors (Gordijn and Akkermans, 2003). Developed by Gordijn (2002) as an alternative to process or activity model, e3value shows the economically reciprocal of value (Caetano et al., 2017), that is, one providing a value object expects to receive a reciprocal value object in return. In addition to the first 9 concepts of e3value (Gordijn and Akkermans, 2003), there is one more concept introduced to better express the flow of Value Object, called Value Transmission (Pombinho, Tribolet, and Aveiro, 2014). Because of this additional concept, there is an addition to e3value ontology that was developed by Caetano et al. (2017) as shown in Figure 2.12. Table 2.2 lists the e3value concept description.

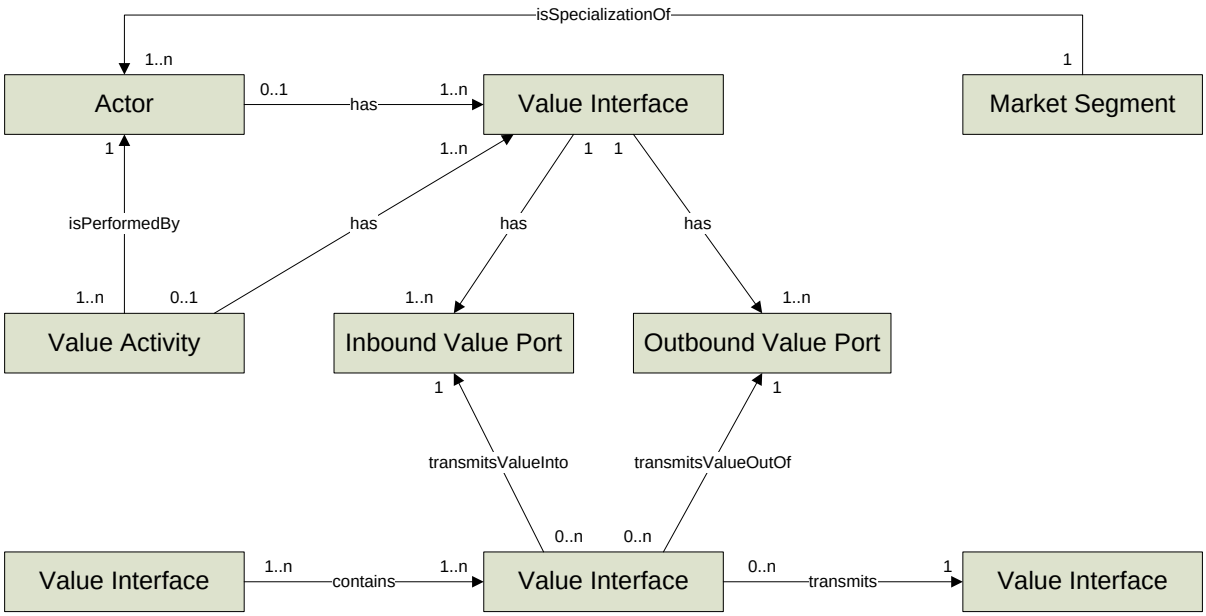


Figure 2.12 e3value Ontology Concept (Caetano et al., 2017)

Table 2.2 e3value Concept Description (Gordjin and Akkemans, 2003; Pombinho, Tribolet, and Aveiro, 2014)

Concept	**Definition**
Actor	An economically independent entity capable of exchange Value Object
Value Object	An object (services, products, money) that is of value for one or more Actors
Value Port	An abstraction of how an Actor provide or request Value Object
Value Offering	A set of equally directed (outgoing and ingoing) Value Ports
Value Interface	A set of Value Ports with economic reciprocity consists of one or more Value Offerings
Value Exchange	The transmission of Value Objects from outgoing to ingoing Value Ports
Market Segment	A group of Actors that share common economic perspective
Composite Actor	A group of Actors with one common Value Interface
Value Activity	An activity performed by Actors to yield a profit or increase the economic value of Value Object
Value Transmission	A flow of a Value Object from one Actor to another

Gordijn, Osterwalder, and Pigneur (2005), further refined by Caetano et al. (2017), conducted correspondence mapping between Business Model Canvas and e3value. They found that Value Proposition in Business Model Canvas corresponds to the Value Interface; in which Value Objects flow through the Value Ports in e3value. In other words, in Value Interface, there is Value Exchange between one or more Value Objects (Value Proposition components, i.e. services or products) via outgoing Value Transmission and the other Value Objects (money) via ingoing Value Transmission, from the perspective of one Actor (company), as illustrated in Figure 2.13.

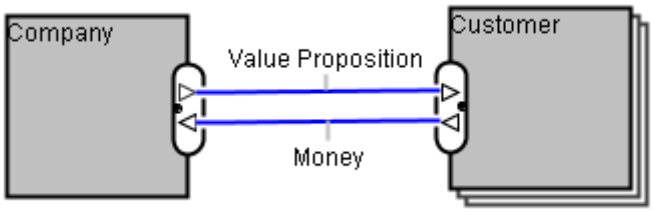


Figure 2.13 Value Interface of Value Proposition Components and Money in e3value

In conclusion, the manipulation of Business Model can be achieved by transforming Business Model into Construction Model, then conduct Construction Model manipulation, then transform the manipulated Construction Model into Business Model, and subsequently conducting Value Operation to obtain the new Value Proposition of the new Business Model.

3 OVERVIEW

This chapter is a prelude chapter of the proposed works. In this chapter, we can look at the overview of New Business Model Creation Process in Section 3.1 and the case study of Telecommunication Industry in Indonesia in Section 3.2.

3.1 Overview of New Business Model Creation Process

This research proposes New Business Model Creation Process, as a state-of-the-art of this research. Figure 3.1 illustrated the New Business Model Creation Process. Business Model Canvas illustrated as a black box, and DEMO Construction Model illustrated as a white box.

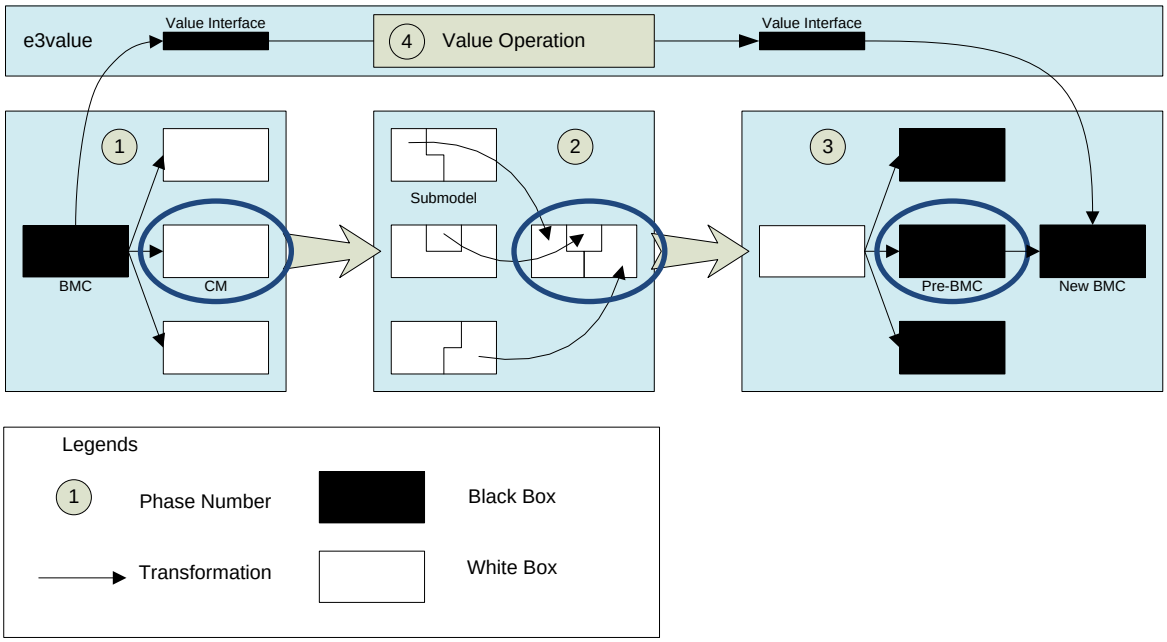


Figure 3.1 New Business Model Creation Process

This process consists of four main phases:

Phase 1: Business Model Canvas to DEMO Construction Model (Chapter 4)

In this phase, one or more existing BMC is transformed into an initial CM. One BMC may result in one or more CM.

Phase 2: New DEMO Construction Model Generation (Chapter 5)

In this phase, some initial CMs form previous phase is split to create submodels, and those submodels are merged into a new CM.

Phase 3: New DEMO Construction Model to New Business Model Canvas (Chapter 6)

In this phase, new CM from the previous phase is transformed into a new BMC. One CM may result in one or more BMC.

Phase 4: Value Operation (Chapter 7)

This phase consists of transforming Value Proposition of existing BMC into Value Interface of e3Value, Value Interface manipulation operation, and generates a new Value Proposition.

By using this framework, one can gather several business models, generate construction models from them and create a pool of submodels, modify them to create a new construction model, and generate a new business model to create a new business in a certain industry.

3.2 Business Model Canvas of Indonesian Telecommunication Industry

This research proposed the New Business Model Creation Process, as a method to synthesize new business model. DEMO Construction model is used to show construction model, and Business Model Canvas is used as a framework of business model. Case study of Telecommunication Industry in Indonesia will be used to demonstrate the proposed methodology. Telecommunication industry, or sector, consists of companies that makes

communication possible through phone or Internet, allowing data in words, voice, audio or video to be sent anywhere in the world (Beers, 2019). Telecommunication industry is selected as a case study because of the variety of business in the industry, allowing the capture of several, distinct business models.

In this study, I captured 8 business models from 3 Indonesian telecommunication companies. The business model is captured from the existing business elements of the company, and represents telecommunication sector defined in (Beers, 2019). The business models captured are:

1. Mobile Internet Package
2. Mobile Cash
3. SMS Banking
4. IoT Vending Machine Controller
5. Video Package
6. In-Apps Purchase
7. Location-Based Advertisement
8. Home Internet

3.2.1 Mobile Internet Package

This is the standard mobile Internet package, to provide guaranteed mobile internet service. The BMC of Mobile Internet Package can be seen in Figure 3.2. The following is the description of Mobile Internet Package:

A mobile user who wants to use Internet service can buy or subscribe to the Internet package from designated outlets, or via USSD service with the help of the contact center.

The company develops Internet products, conduct promotion, and activate the Internet service via a network system. Billing system deducts the amount of Internet service fee from the mobile balance (prepaid), or via credit card (postpaid).

<table>
<tr>
<td rowspan="2">Key Partners
Promotion partner

Outlet partner</td>
<td>Key Activities
Service activation</td>
<td rowspan="2">Value Propositions
Provide guaranteed mobile internet service with fair and affordable tariff</td>
<td>Customer Relationships
Contact center</td>
<td rowspan="2">Customer Segments
Mobile user</td>
</tr>
<tr>
<td>Key Resources
Product development team

Network

Billing system</td>
<td>Channels
Outlets

Self service purchase (apps, USSD)</td>
</tr>
<tr>
<td colspan="2">Cost Structure
Network

Billing system

Product Development Cost</td>
<td colspan="3">Revenue Streams
Price per product</td>
</tr>
</table>

Figure 3.2 BMC of Mobile Internet Package

3.2.2 Mobile Cash

This is the feature of mobile service, to provide alternative payment through Mobile and provide safe, easy use of e-money. The BMC of Mobile Cash can be seen in Figure 3.3. The following is the description of Mobile Cash:

A mobile user can activate e-money features via Mobile Cash apps, or via USSD service with the help of the contact center. A customer can pay for a goods or services of

designated merchant using mobile e-money via Mobile Cash apps. The company develops networing and acquisition of merchants, and maintains e-money system. E-money balance can be filled from the mobile balance (prepaid), or via credit card (postpaid).

<table>
<tr><td rowspan="2">Key Partners
Merchant</td><td>Key Activities
Merchant Acquisition</td><td rowspan="2">Value Propositions
Provide alternative payment through Mobile

Provide safe, easy use of e-money</td><td>Customer Relationships
Contact center</td><td rowspan="2">Customer Segments
e-money user

Cashless society</td></tr>
<tr><td>Key Resources
E-Money Unit

Technical Developer</td><td>Channels
Mobile Cash apps

Self Service (USSD)</td></tr>
<tr><td colspan="3">Cost Structure
Network

Merchant fee</td><td colspan="2">Revenue Streams
Charge per transaction</td></tr>
</table>

Figure 3.3 BMC of Mobile Cash

3.2.3 SMS Banking

This is the feature of mobile service, to provide SMS Banking anytime (transfer payment, enquiry, etc). The BMC of SMS Banking can be seen in Figure 3.4. The following is the description of SMS Banking:

A bank account owner can conduct banking transaction (checking balance, money transfer, etc.) via Mobile SMS. The company engage with bank and conduct promotion via

a mobile banking unit. Billing system deducts the mobile banking fee from the mobile balance (prepaid), or via credit card (postpaid).

<table>
<tr><td rowspan="2">Key Partners
Bank</td><td>Key Activities
Bank Engagement

Promotion</td><td rowspan="2">Value Propositions
Provide SMS Banking anytime (transfer payment, enquiry, etc)</td><td>Customer Relationships
Mobile company contact center

Bank contact center</td><td rowspan="2">Customer Segments
Bank Account owner</td></tr>
<tr><td>Key Resources
Mobile Banking unit

Product Manager</td><td>Channels
Bank office

Self service (USSD)</td></tr>
<tr><td colspan="2">Cost Structure
Revenue Sharing</td><td colspan="3">Revenue Streams
Price per SMS Banking</td></tr>
</table>

Figure 3.4 BMC of SMS Banking

3.2.4 IoT Vending Machine Controller

This is an IoT device installed at a vending machine, to provide stock control device for Vending Machine. The BMC of IoT Vending Machine Controller can be seen in Figure 3.5. The following is the description of IoT Vending Machine Controller:

An IoT Device can be installed to a vending machine to provide customer needs (i.e. stock control). The company develops IoT device, including design, networking, and

billing system. The company and vending machine owner form a contract, renewed every 6 months to 2 years.

<table>
<tr><td rowspan="2">Key Partners
Device provider</td><td>Key Activities
Customer problem identification

Product design</td><td rowspan="2">Value Propositions
Provide stock control device for Vending Machine</td><td>Customer Relationships
Acccount manager</td><td rowspan="2">Customer Segments
Vending Machine owner</td></tr>
<tr><td>Key Resources
Network

RnD

Billing system</td><td>Channels
Direct</td></tr>
<tr><td colspan="3">Cost Structure
Device purchasing

Network

Billing system</td><td colspan="2">Revenue Streams
Contract</td></tr>
</table>

Figure 3.5 BMC of IoT Vending Machine Controller

3.2.5 Video Package

This is the feature of mobile service, to provide movie video anytime. The BMC of Video Package can be seen in Figure 3.6. The following is the description of Video Package:

A mobile user can watch a movie video provided by designated partner via mobile apps. The company engages with movie publisher and develops technical integration of movie and app. A certain movie can be subscribed using one-time purchase, and deducts the fee from the mobile balance (prepaid), or via credit card (postpaid).

<table>
<tr><td rowspan="2">Key Partners
Movie publisher</td><td>Key Activities
Partner engagement

Technical integration</td><td rowspan="2">Value Propositions
Provide movie video anytime</td><td>Customer Relationships
CS System</td><td rowspan="2">Customer Segments
Movie enthusiasts</td></tr>
<tr><td>Key Resources
Partner manager

Product developer</td><td>Channels
Self service (apps, USSD)</td></tr>
<tr><td colspan="2">Cost Structure
Subscription fee

IT system operation</td><td colspan="3">Revenue Streams
One time purchase subscription</td></tr>
</table>

Figure 3.6 BMC of Video Package

3.2.6 In-Apps Purchase

This is the feature of mobile service, to provide credit balance and in-app purchase. The BMC of In-Apps Purchase can be seen in Figure 3.7. The following is the description of In-Apps Purchase:

A mobile user who wants to purchase an item from the apps can use mobile credit balance. Credit balance can be activated via designated apps. The company develops partnerships with apps publisher. Amount of item price per unit deducted automatically from the credit balance.

<table>
<tr><td rowspan="2">Key Partners
Apps publisher</td><td>Key Activities
Apps/Item Selling</td><td rowspan="2">Value Propositions
Provide credit balance and in-app purchase</td><td>Customer Relationships
CS System

SNS</td><td rowspan="2">Customer Segments
Mobile Apps user</td></tr>
<tr><td>Key Resources
Partner manager</td><td>Channels
Apps</td></tr>
<tr><td colspan="2">Cost Structure
Revenue Sharing

IT System operation</td><td colspan="3">Revenue Streams
Apps/Item price per unit</td></tr>
</table>

Figure 3.7 BMC of In-Apps Purchase

3.2.7 Location-Based Advertisement

This is an advertisement service provided by a mobile service provider, to provide accurate and relevant targeting for advertisement. The BMC of Location-Based Advertisement can be seen in Figure 3.8. The following is the description of Location-Based Advertisement:

A customer who wants to advertise their products or services can put the advertisement to the company. The company then shows the advertisements via their mobile network. Company also develops customer profiling to provide accurate and relevant targeting for advertisement. The company and advertiser owner form a contract, renewed every 6 months to 2 years.

<table>
<tr><td rowspan="2">Key Partners
Customer profiling partner</td><td>Key Activities
Sales

Customer profiling</td><td rowspan="2">Value Propositions
Provide accurate and relevant targeting for advertisement</td><td>Customer Relationships
Account manager</td><td rowspan="2">Customer Segments
Advertiser</td></tr>
<tr><td>Key Resources
Technical developer</td><td>Channels
Direct</td></tr>
<tr><td colspan="2">Cost Structure
Network</td><td colspan="3">Revenue Streams
Contract</td></tr>
</table>

Figure 3.8 BMC of Location-Based Advertisement

3.2.8 Home Internet

This is the Internet device targeted to home usage bundled with phone and cable TV service, to provide home phone, internet, and TV package. The BMC of Home Internet can be seen in Figure 3.9. The following is the description of Home Internet:

A customer who wants to use phone, internet, and TV service at home can subscribe to the Home Internet package from designated outlets, or via phone. The company install the device on site and develops the infrastructure and network. A customer who wants to advertise their products or services can also put the advertisement in the network. The company and the customer form a contract, renewed every 2 years. A top up for additional service is also possible.

<table>
<tr><td rowspan="2">Key Partners
Technology partner

Device provider</td><td>Key Activities
Managing digital business</td><td rowspan="2">Value Propositions
Provide home phone, internet, TV package</td><td>Customer Relationships
Account manager

Call center</td><td rowspan="2">Customer Segments
Global customer

Individual

Enterprise

Business

Government</td></tr>
<tr><td>Key Resources
Digital business

Infrastructure

Asset management subsidiary

Security subsidiary</td><td>Channels
Phone (in/out)

Advertisement

Business enterprise

Self service</td></tr>
<tr><td colspan="3">Cost Structure
Technology
Device Purchasing
Asset Management
Security Management</td><td colspan="2">Revenue Streams
Subscription Payment

Top Up

Advertisement Fee</td></tr>
</table>

Figure 3.9 BMC of Home Internet

4 BUSINESS MODEL CANVAS TO DEMO CONSTRUCTION MODEL

This chapter discuss transformation from existing Business Model Canvas to DEMO Construction Model, completed with the case study. This work is Phase 1 of the New Business Model Creation Process. This work is already done in (Pratama and Iijima, 2018a). Section 4.1 discusses about the transformation process with the example, Section 4.2 discusses about the case study of Telecommunication Industry in Indonesia, and Section 4.3 summarizes the chapter.

4.1 Transformation from existing Business Model Canvas to DEMO Construction Model

To make the transformation from BMC into construction model easier, the authors propose a new concept: DEMO-Oriented Business Model Canvas (BMC). DEMO-Oriented BMC is a specified BMC that includes components of organizational building blocks of DEMO Construction Model, which are actor role and transaction kind. Each building block in BMC may contain either of actor roles or transaction kinds, both of them, or none of them.

These steps also involve decision making about contents of building blocks in DEMO-Oriented BMC, and eventually DEMO CM. Given that a functional model can have many different construction models depends on the scope of interest, the resulting DEMO-Oriented BMC may differ. Therefore, this phase cannot be done automatically.

Table 4.1 shows the proposed correspondence table between Business Model Canvas and DEMO Construction Model. This table acts as a guideline to determine the entities in

each building block of DEMO-Oriented BMC. The process of transformation from Business Model Canvas into DEMO Construction Model can be divided into two parts. The first part is the transformation from Business Model Canvas to DEMO-Oriented BMC (Part A), and the second part is the transformation from DEMO-Oriented BMC to DEMO Construction Model (Part B).

Table 4.1 Correspondence between BMC and CM concepts

Business Model Canvas	**Construction Model**
Customer Segments	Actor Roles
Value Propositions	-
Channels	-
Customer Relationships	Transaction Kinds
Revenue Streams	Transaction Kinds
Key Resources	Actor Roles
Key Activities	Transaction Kinds
Key Partners	Actor Roles, Transaction Kinds
Cost Structure	Transaction Kinds

4.1.1 DEMO-Oriented Business Model Canvas

To make conversion from BMC into construction model easier, I need to introduce DEMO-Oriented Business Model Canvas (BMC). DEMO-Oriented BMC is a specified BMC that includes components of organisational building blocks of DEMO Construction Model, which are actor role and transaction kind. Each building block in BMC may

contain either of actor roles or transaction kinds, both of them, or none of them. All items in each building block are given notation to identify which building blocks they belong to, in order to ease the identification and conversion process. The notation pattern is NNm where NN indicates building block notation and m indicates element number. The building block notations are given based on Osterwalder and Pigneur (2010).

Below is the description of each building block in DEMO-Oriented BMC:

1) Customer Segments

This building block consists of target customer that the company intends to deliver its value, and is an **Actor Role** denoted as **CSm**.

2) Value Propositions

This building block consists of value delivered by the company, and has no appropriate correspondence in construction model, and is denoted as **VPm**.

3) Channels

This building block represents the way of communication, not the communication itself, so that there is no appropriate correspondence in construction model, and is denoted as **CHm**.

4) Customer Relationships

This building block consists of activities by the company to support the customer, and is a **Transaction Kind** denoted as **CRm**.

5) Revenue Streams

This building block consists of payment activities that is done by the customer, and is a **Transaction Kind** denoted as **R$m**.

6) Key Resources

This building block consists of resources within the company, which are:

- Human Resources is an **Actor Role** denoted as **KR-Hm**, and/or
- Other resources like facilities and knowledge are included, but not a part of construction model, and denoted as **KR-Fm**.

7) Key Activities

This building block consists of activities that are conducted by the company to provide value to their customer, and contains a **Transaction Kind** denoted as **KAm**.

8) Key Partners

This building block consists of two parts, which are:

- Supplier or partner that is an Actor Role denoted as KP-Am, and/or
- Activities provided by them to the company that is a Transaction Kind denoted as KP-Tm.

9) Cost Structure

This building block consists of activities in a company that incurred costs to the company, and is a **Transaction Kind** that can be divided as:

- **External** Transaction Kinds (related to external actor roles) are denoted as **C$-Em**, and/or
- **Internal** Transaction Kinds (not related to external actor roles) are denoted as **C$-Im**.

We can generate DEMO-Oriented BMC directly from description on business, or convert it from a standard BMC. The process flow in Figure 4.1 represents how to create DEMO-Oriented BMC from standard BMC.

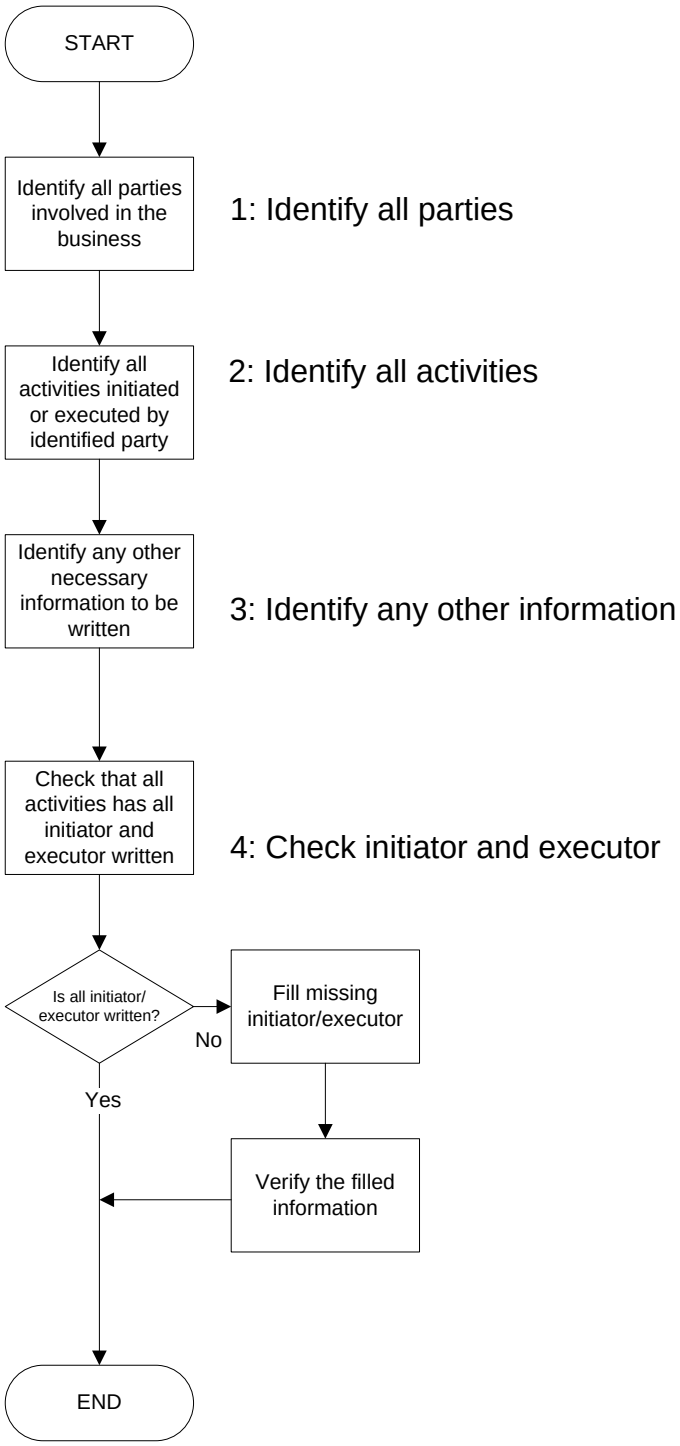


Figure 4.1 DEMO-Oriented BMC Generation flow chart

The step-by-step process of DEMO-Oriented BMC Generation is explained as follows:

STEP A-1 : Identify all parties

The first step is to identify all parties involved in the business that is stated in existing BMC. The involved party can be divided as internal (e.g. human resources) and external (e.g., supplier or customer). Then write it as a noun in their respective building blocks. These will represent Actor Roles in the DEMO CM.

STEP A-2 : Identify all activities

The next step is to identify all activities of business coordination stated in existing BMC, also other activities initiated or executed by parties that are identified from the previous step. If there is a payment activity, indicate it clearly. Then write it as a noun in their respective building blocks. These will represent Transaction Kind in the DEMO CM.

STEP A-3 : Identify any other information

The next step is to identify any other necessary information to be written in DEMO-Oriented BMC. These usually include values obtained from the business, channels to deliver value or company resources. These will not represent any components in DEMO CM and act as a complementary of DEMO-Oriented BMC.

STEP A-4 : Complete the BMC

The final step is to check that all activities have all initiator and executor written in DEMO-Oriented BMC. Sometimes there is missing information about who is the initiator or executor of an activity in the standard BMC. As DEMO CM needs all information of

the Actor Roles that become initiator and executor of all Transaction Kinds, this missing information of initiator/executor of an activity has to be filled. The filled information, and the resulting DEMO-Oriented BMC, should be verified by the stakeholders of the business. These steps also involve decision making about contents of DEMO-Oriented BMC, and eventually DEMO CM. Given that a functional model can have many different construction models depends on scope of interest, the resulting DEMO-Oriented BMC may differ.

I provide an example of City Logistics case to show the proposed methodology. City Logistics (Quak, Balm, and Posthumus, 2014) is a study of developing a Bentobox as a business model of a city logistics and delivery service. The Bentobox is a delivery station with removable trolleys to deliver goods within the city. Operators can deliver the parcels to the recipients, or the recipients can take the parcels themselves from the delivery station after receiving username and password from operators. A Business Model Canvas of this case is already provided, and can be seen in Figure 4.2.

I applied the four steps proposed here.

STEP A-1 : Identify all parties

The parties or actors involved in this business and stated in the BMC are all identified. They are included in their respective building blocks:

- Key Partners: KP-A1 Bentobox Supplier and KP-A2 Vehicle Supplier
- Key Resources: KR-H1 Driver
- Customer Segments: CS1 Small Shop Owner

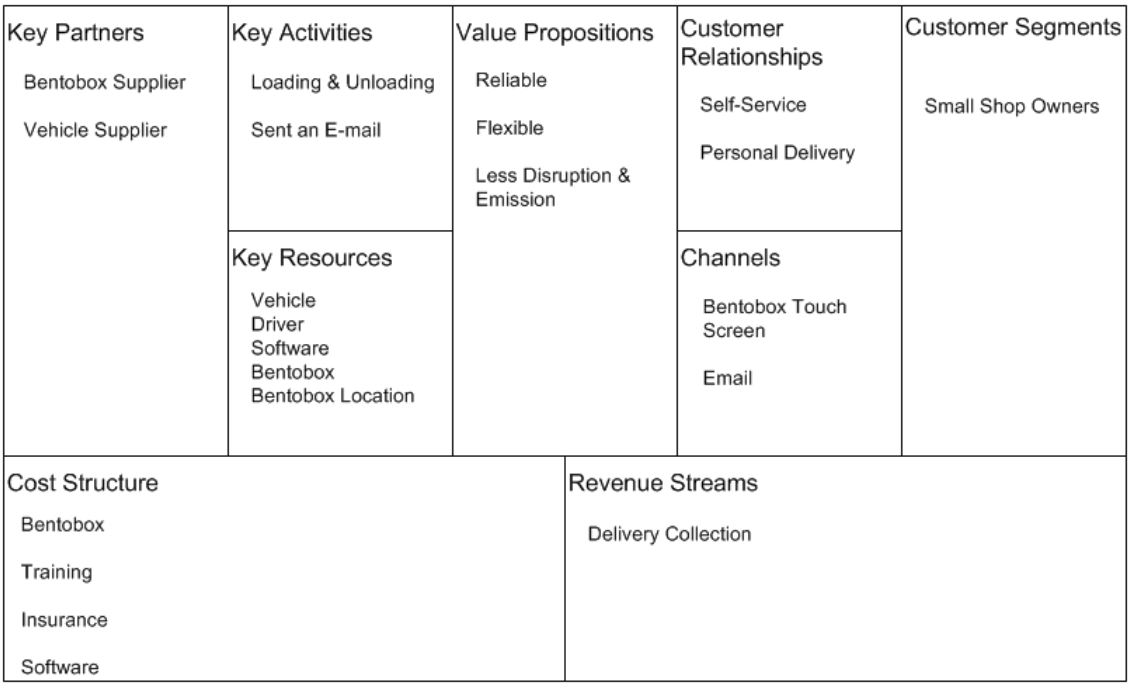


Figure 4.2 Business Model Canvas of City Logistics (Quak, Balm, & Posthumus, 2014)

STEP A-2 : Identify all activities

The business activities or transaction that stated in the BMC can be identified. Bentobox should be renamed as Bentobox Payment to indicate payment transaction, and Delivery Collection should be renamed as Delivery Payment for the same reason. Loading & Unloading and Sent an E-mail is part of business activity of Delivery Completion. Self-Service and Personal Delivery is part of business activity of Customer Support. Insurance and Software is part of Operation & Maintenance in the internal of the company. Training is the business activity of HR Training, also in the internal of the company.

The business activities that initiated or executed by parties identified in Step 1 can also be identified. Bentobox Supplier executed Bentobox Supply and initiated Bentobox Payment, and Vehicle Supplier executed Vehicle Supply and Vehicle Payment. Driver executed Goods Delivery, that is part of a Cost Structure building block, because the

delivery itself incurred cost to the company. Small Shop Owner initiated Delivery Completion and Customer Support, and executed Delivery Payment.

These activities then included in their respective building blocks:

- Key Partners: KP-T1 Bentobox Supply and KP-T2 Vehicle Supply
- Key Activities: KA1 Delivery Completion
- Customer Relationships: CR1 Customer Support
- Cost Structure: C$-E1 Bentobox Supply Payment, C$-E2 Vehicle Supply Payment, C$-I1 HR Training, C$-I2 Operation & Maintenance, and C$-I3 Goods Delivery
- Revenue Streams: R$1 Delivery Payment

STEP A-3 : Identify any other information

The other necessary information to be written in DEMO-Oriented BMC can be identified from other components that are neither an actor nor a transaction, or part of them. For the sake of simplicity, I only write them as-is form the existing BMC, and included in their respective building blocks:

- Key Resources: KR-F1 Vehicle, KR-F2 Software, KR-F3 Bentobox, and KR-F4 Bentobox Location
- Value Proposition: VP1 Reliable, VP2 Flexible, and VP3 Less Disruption & Emission
- Channels: CH1 Bentobox Touch Screen and CH2 Email

STEP A-4: Complete the BMC

In this step, each transaction is checked whether they have their respective initiator and executor written in DEMO-Oriented BMC. If such initiator and executor are not yet stated

in the BMC, a new parties or actors needs to be defined, and include them in their appropriate building blocks. This step involves decision making and verification, whether the newly defined actors are actually involved in the business. After the process, I found out that the following information should be added in the DEMO-Oriented BMC:

- Key Resources: KR-H2 Delivery Manager, KR-H3 Customer Service Manager, KR-H4 HR Manager, KR-H5 Operation Manager, KR-H6 Bentobox Purchasing Manager, and KR-H7 Vehicle Manager

The resulting DEMO-Oriented BMC can be seen in Figure 4.3. Note that there is no difference in building blocks compared to other BMC, only the content of each building block is specified to organizational building blocks of DEMO CM.

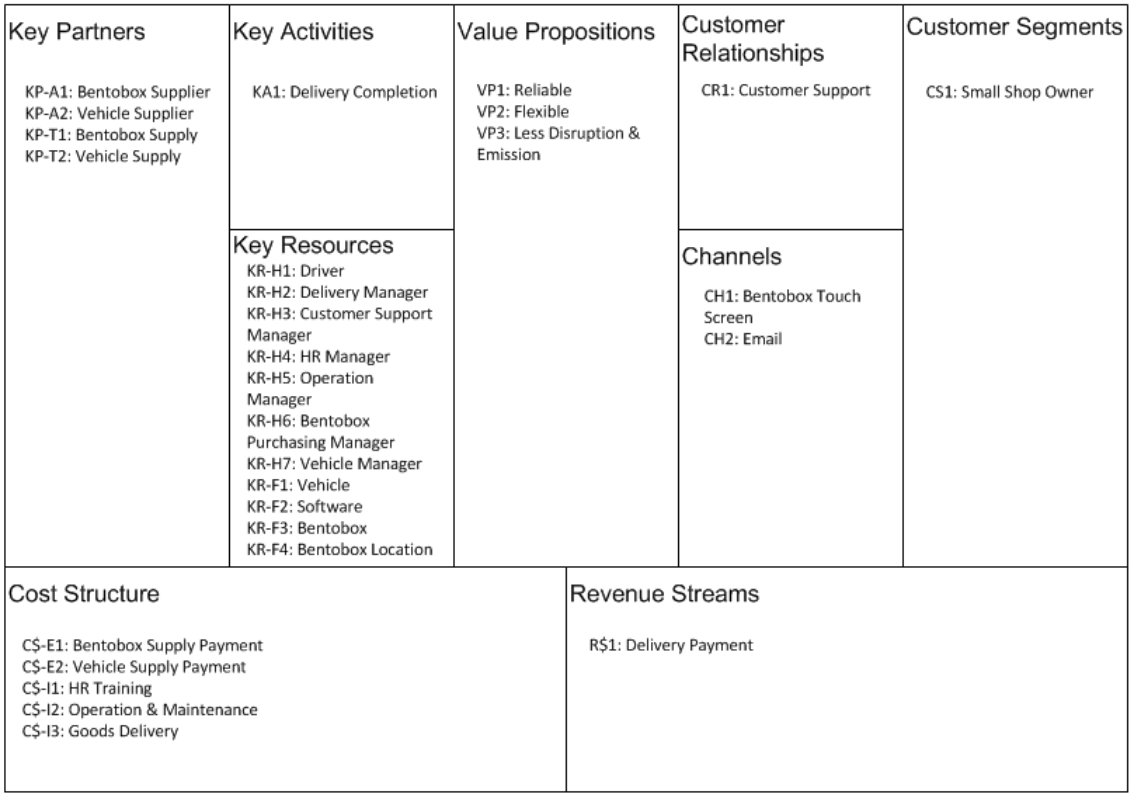


Figure 4.3 DEMO-Oriented BMC of City Logistics

4.1.2 Generating DEMO Construction Model

After DEMO-Oriented BMC is completed, we can generate DEMO Construction Model. The summary can be seen in the Figure 4.4. DEMO CM Generation process from DEMO-Oriented BMC is explained as follows:

STEP B-1 : Identify Transaction Kinds

The first step is to identify any transaction kind in the BMC. Identify any activity that is initiated or executed by the company in the BMC that can be considered as a transaction kind, then make the table of its notation and the transaction kind.

STEP B-2 : Identify Actor Roles

The next step is to identify any actor role in the BMC. Identify any party that is involved in this business and stated in BMC that can be considered as an actor role. Also, identify the type of the actor role, whether it is internal or environmental actor role, then make a table of its notation, actor role, and type.

STEP B-3 : Generate Transaction Product Table

The next step is to generate one part of DEMO CM, which is Transaction Product Table (TPT). Identify the Product Kind for each identified transaction. Draw Transaction Product Table consists of Transaction Kind and Product Kind.

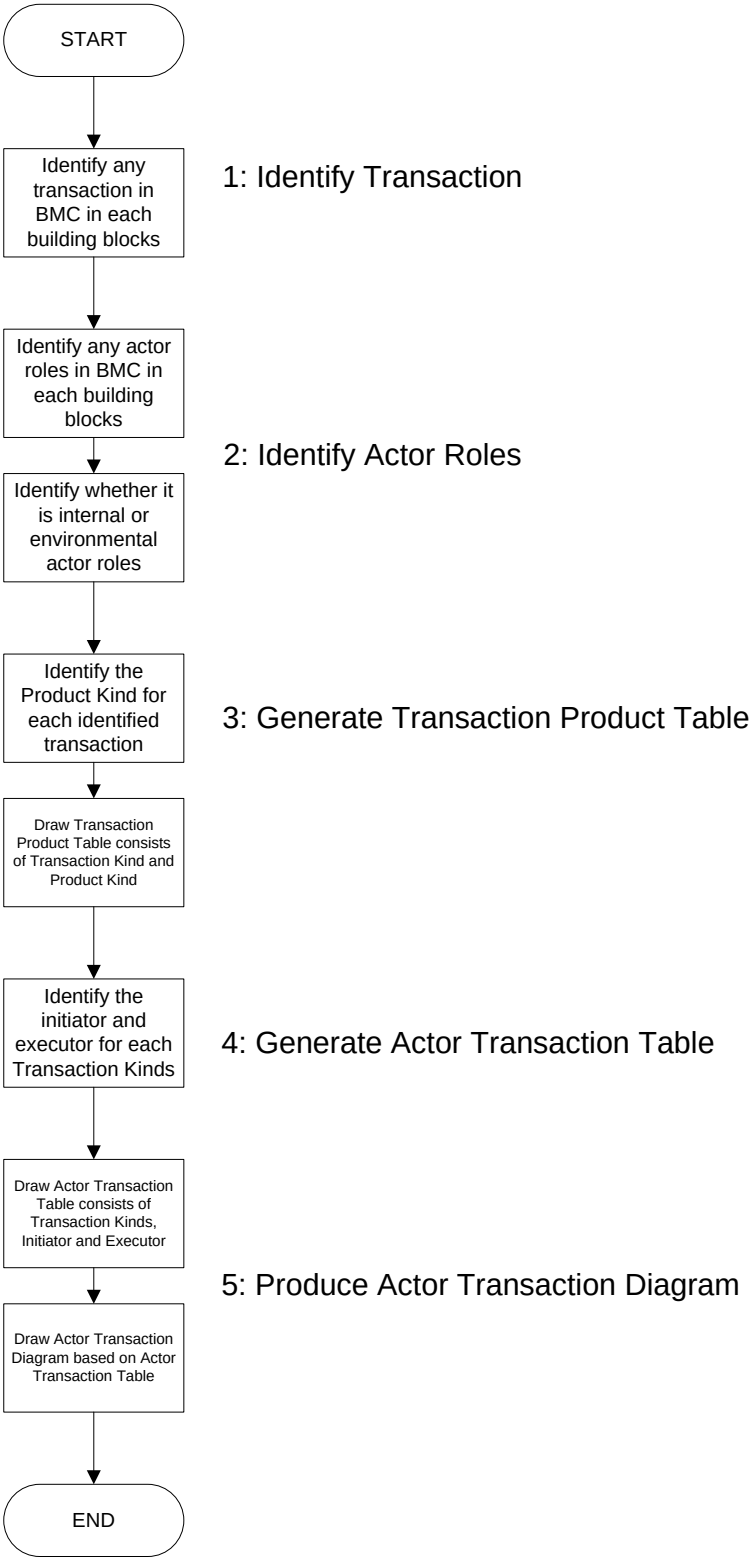


Figure 4.4 DEMO CM Generation flow chart

STEP B-4 : Generate Actor Transaction Table

The next step is to generate Actor Transaction Table as a baseline to create Actor Transaction Diagram later. Identify the initiator and executor for each transaction kinds from the identified actor roles. Draw Actor Transaction Table consists of Transaction Kind, Initiator, and Executor.

As a baseline, Table 4.2 shows the actor-transaction relation table as an aid to determine the initiator of executor for each transaction, based on their building block notation.

Table 4.2 Actor-Transaction Relation

Transaction Building Block	**Initiator Building Block**	**Executor Building Block**
Key Activities (KA)	Customer Segment (CS)	Key Resources (KR)
Revenue Streams (R$)	Key Resources (KR)	Customer Segment (CS)
Customer Relationships (CR)	Customer Segment (CS)	Key Resources (KR)
Key Partners (KP-T)	Key Resources (KR)	Key Partners (KP-A)
Cost Structure (C$-E)	Key Partners (KP-A)	Key Resources (KR)
Cost Structure (C$-I)	Key Resources (KR)	Key Resources (KR)

STEP B-5 : Produce Actor Transaction Diagram

The last step is to produce another part of DEMO CM, which is Actor Transaction Diagram, thus completing DEMO CM. Draw Actor Transaction Diagram based on Actor Transaction Table. The resulting Actor Transaction Diagram then verified whether it is suitable and valid as a construction model of the business.

Following the Bentobox case, we proceed to the next phase proposed here.

STEP B-1 : Identify Transaction Kinds

Using Table 4.1, we can identify Transaction Kinds from DEMO-Oriented BMC. Those are Delivery Completion, Delivery Payment, Customer Support, Bentobox Supply, Vehicle Supply, Bentobox Supply Payment, Vehicle Supply Payment, HR Training, Operation Management, and Goods Delivery.

STEP B-2 : Identify Actor Roles

Again, using Table 4.1, we can identify Actor Roles from DEMO-Oriented BMC. Those are Bentobox Supplier, Vehicle Supplier, Driver, Delivery Manager, Customer Service Manager, HR Manager, Operation Manager, Bentobox Purchasing Manager, Vehicle Manager, and Small Shop Owner.

STEP B-3 : Generate Transaction Product Table

Based on results in STEP B-2, we can generate Transaction Product Table after the Product Kinds of each Transaction Kinds are identified. The resulting TPT can be seen in Table 4.3.

STEP B-4 : Generate Actor Transaction Table

Based on the rule in Table 4.2, we can identify and draw the Actor Transaction Table of City Logistics. The result can be seen in Table 4.4.

STEP B-5 : Produce Actor Transaction Diagram

Finally we can produce Actor Transaction Diagram to complete generation process based on Table 4.4. The resulting ATD (Figure 4.5) is suitable to represent a construction model of City Logistics.

Table 4.3 Transaction Product Table of City Logistics

T No.	**Transaction Kinds**	**P No.**	**Product Kinds**
T01	Delivery Completion	PP01	Delivery has been completed
T02	Goods Delivery	PP02	Goods has been delivered
T03	Delivery Payment	PP03	Delivery fee has been paid
T04	Customer Support	PP04	Customer support has been done
T05	Bentobox Supply	PP05	Bentobox supply has been done
T06	Bentobox Supply Payment	PP06	Bentobox fee has been paid
T07	Vehicle Supply	PP07	Vehicle supply has been done
T08	Vehicle Supply Payment	PP08	Vehicle fee has been paid
T09	HR Training	PP09	HR Training has been done
T10	Operation & Maintenance	PP10	Operation & Maintenance has been done

Table 4.4 Actor Transaction Table of City Logistics

Transaction Kinds	**Initiator**	**Executor**
Delivery Completion	Small Shop Owner	Delivery Manager
Goods Delivery	Delivery Manager	Driver
Delivery Payment	Delivery Manager	Small Shop Owner
Customer Support	Consumer	Customer Service Manager
Bentobox Supply	Bentobox Purchasing Manager	Bentobox Supplier
Bentobox Supply Payment	Bentobox Supplier	Bentobox Purchasing Manager
Vehicle Supply	Vehicle Manager	Vehicle Supplier
Vehicle Supply Payment	Vehicle Supplier	Vehicle Manager
HR Training	HR Manager	HR Manager
Operation & Maintenance	Operation Manager	Operation Manager

4.2 Transformation from existing Business Model Canvas of Indonesian Telecommunication Industry to DEMO Construction Model

From the existing BMC shown in Chapter 3.2, I apply Phase 1 of New Business Model Creation Process. Before transforming into DEMO CM, I compose DEMO-Oriented BMC. For simplicity, this section will only explain one of the captured business model; Mobile Internet Package. The resulting DEMO CM of other models are illustrated in Appendix 1.

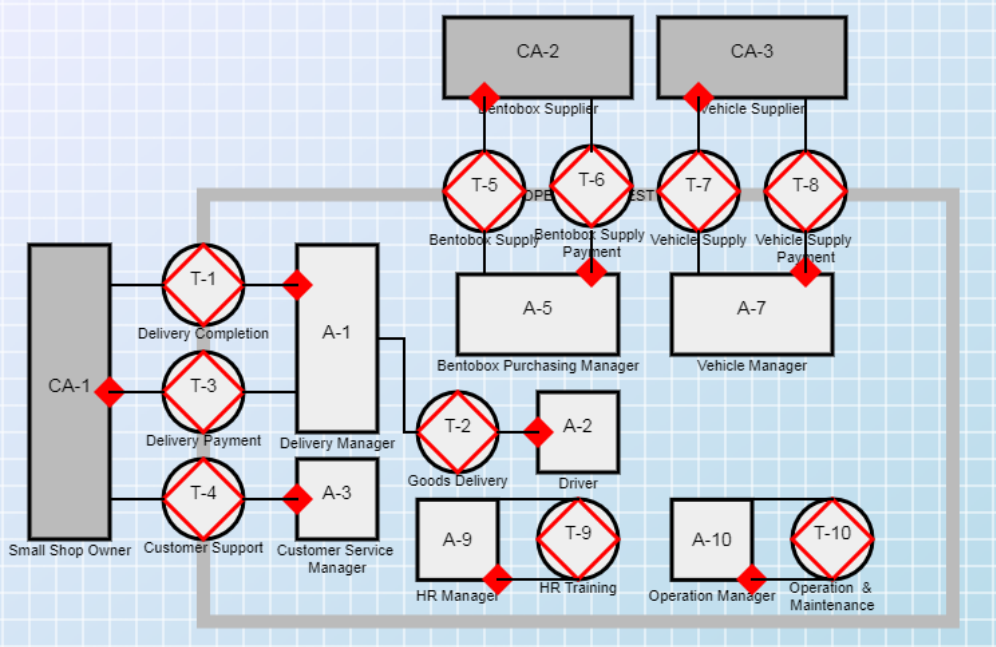


Figure 4.5 Actor Transaction Diagram of City Logistics

4.2.1 DEMO-Oriented Business Model Canvas

I applied the STEP A proposed in previous section here.

STEP A-1 : Identify all parties

In this step, all parties involved in the business and stated in the BMC are all identified. In Key Partners, I identified Promotion Partner and Outlet Partner as parties. In Key Resources, I identified Product Development Team. In Customer Segments, I identified Mobile User. They are included in their respective building blocks:

- Key Partners: KP-A1 Promotion Partner, KP-A2 Outlet Partner
- Key Resources: KR-H1 Product Development Team
- Customer Segments: CS1 Mobile User

STEP A-2 : Identify all activities

In this step, all business activities conducted in the business are all identified. This includes activities stated in the BMC and other activities involving parties identified in Step 1. First, I check business activities stated in BMC. In Key Activities, I identified Service Activation as activities. In Cost Structure, Network, Billing System, and Product Development are a cost incurred from the activities of Network Management, Billing System Management, and Product Development respectively. In Revenue Streams, Price per Product is the revenue generated from the activity of Service Payment.

The business activities involving parties identified in Step A-1 can be determined. I determined that Promotion Partner conduct Promotion, and Outlet Partner conduct Product Consignment. These are activities provided by Key Partners to the company.

These activities then included in their respective building blocks:

- Key Activities: KA1 Service Activation
- Key Partners: KP-T1 Promotion, KP-T2 Product Consignment
- Cost Structure: C$-I1 Network Management, C$-I2 Billing System Management, C$-I3 Product Development
- Revenue Streams: R$1 Service Payment

STEP A-3 : Identify any other information

In this step, any other necessary information that are neither parties nor activities in the initial BMC are all identified. This step acts as a complement to DEMO-related components in DEMO-Oriented BMC, in order to satisfy the requirement of a complete BMC. For the sake of simplicity, I only write them as-is form the existing BMC, and included in their respective building blocks:

- Key Resources: KR-F1 Network, KR-F2 Billing system
- Value Proposition: VP1 Provide guaranteed mobile internet service with fair and affordable tariff
- Customer Relationships: CR1 Contact Center
- Channel: CH1 Outlets, CH2 Self service purchase (apps, USSD)

STEP A-4 : Complete the DEMO-Oriented BMC

In this step, each transaction is checked whether they have their respective initiator and executor written in DEMO-Oriented BMC, in order to transform it into DEMO CM. If such initiator and executor are not yet stated in the BMC, new parties or actors needs to be defined, and include them in their appropriate building blocks. This step involves decision making and verification, whether the newly defined actors are actually involved in the business.

To make this process easier, an Actor-Transaction Table can be developed. First, I list all activities identified in Step A-2 as Transaction Kinds, then I determine the initiator/executor of such Transaction Kinds from the parties identified in Step A-1 as Actor Roles. If there is still a void, determine appropriate actor roles. Table 4.5 is the Actor-Transaction Table of Mobile Internet Package before the addition of actor roles. It can be seen in the table that some of the components are still empty.

I proceed to determine the empty components. Service Activation in practice is executed by system, however, in DEMO, there has to be an actor role that is responsible for every transaction kinds. I determined Service Manager as executor actor roles. I determined Promotion and Product Consignment is initiated by Partner Manager. Network

Management and Billing System Management are self-activated transaction kinds, therefore the initiator and executor are same. I determined Network Manager and System Manager as the respective actor roles. After the process, I found out that the following information should be added in the DEMO-Oriented BMC:

Table 4.5 Actor-Transaction Table of Mobile Internet Package (before)

Transaction Kinds	**Initiator**	**Executor**
KA1 Service Activation	CS1 Mobile User	
R$1 Service Payment		CS1 Mobile User
KP-T1 Promotion		KP-A1 Promotion Partner
KP-T2 Product Consignment		KP-A2 Outlet Partner
C$-I1 Network Management		
C$-I2 Billing System Management		
C$-I3 Product Development	KR-H1 Product Development Team	KR-H1 Product Development Team

- Key Resources: KR-H2 Service Manager, KR-H3 Network Manager, KR-H4 System Manager, KR-H5 Partner Manager

The resulting DEMO-Oriented BMC can be seen in Figure 4.6. Note that there is no difference in building blocks compared to other BMC, only the content of each building block is specified to organizational building blocks of DEMO CM.

<table>
<tr>
<td rowspan="2">Key Partners
KP-A1 Promotion partner

KP-A2 Outlet partner

KP-A1 Promotion

KP-T2 Product Consignment</td>
<td>Key Activities
KA1 Service activation</td>
<td rowspan="2">Value Propositions
VP1 Provide guaranteed mobile internet service with fair and affordable tariff</td>
<td>Customer Relationships
CR1 Contact center</td>
<td rowspan="2">Customer Segments
CS1 Mobile user</td>
</tr>
<tr>
<td>Key Resources
KR-H1 Product development team
KR-H2 Service Manager
KR-H3 Network Manager
KR-H4 System Manager
KR-H5 Partner Manager
KR-F1 Network
KR-F2 Billing system</td>
<td>Channels
CR2 Outlets

CR3 Self service purchase (apps, USSD)</td>
</tr>
<tr>
<td colspan="3">Cost Structure
C$-I1 Network Management

C$-I2 Billing system Management

C$-I3 Product Development</td>
<td colspan="2">Revenue Streams
R$1 Service payment</td>
</tr>
</table>

Figure 4.6 DEMO-Oriented BMC of Mobile Internet Package

4.2.2 Generating DEMO Construction Model

After I complete DEMO-Oriented BMC, I precede to the STEP B proposed in previous section to transform the DEMO-Oriented BMC of Mobile Internet Package into a DEMO CM, in particular, TPT and ATD of Mobile Internet Package.

STEP B-1 : Identify Transaction Kinds

All Transaction Kinds are already mentioned in Table 4.5. Those are Service Activation, Promotion, Product Consignment, Network Management, Billing System Management, Product Development, and Service Payment.

STEP B-2 : Identify Actor Roles

Actor Roles are mentioned in Table 4.5, plus the additional Actor Roles determined in STEP A-4 of DEMO-Oriented BMC Generation process. Those are Mobile User, Promotion Partner, Outlet Partner, Product Development Team, Service Manager, Network Manager, System Manager, Marketing Manager, Sales Manager.

STEP B-3 : Generate Transaction Product Table

Based on results in STEP B-2, we can generate Transaction Product Table after the Product Kinds of each Transaction Kinds are identified. The resulting TPT can be seen in Table 4.6.

Table 4.6 Transaction Product Table of Mobile Internet Package

T No.	**Transaction Kinds**	**Product Kinds**
T01	Service Activation	Service Activation has been completed
T02	Service Payment	Service fee has been paid
T03	Promotion	Promotion has been done
T04	Product Consignment	Product Consignment has been done
T05	Network Management	Network Management has been done
T06	Billing System Management	Billing System Management has been done
T07	Product Development	Product Development has been done

STEP B-4 : Generate Actor Transaction Table

Based on the rule in Table 4.1, we can identify and draw the Actor Transaction Table of Mobile Internet Package. The result can be seen in Table 4.7.

STEP B-5 : Produce Actor Transaction Diagram

Finally, we can produce Actor Transaction Diagram to complete generation process based on Table 4.7. The resulting ATD (Figure 4.7) is suitable to represent a construction model of Mobile Internet Package. Note that the numbering of Actor Roles complies with Condition 3 of algebraic notation in (Suga and Iijima, 2018a); the executor of a transaction kind gets the same number as the transaction kind, regardless of actor role types.

Table 4.7 Actor-Transaction Table of Mobile Internet Package (after)

Transaction Kinds	**Initiator**	**Executor**
T01 Service Activation	Mobile User	Service Manager
T02 Service Payment	Service Manager	Mobile User
T03 Promotion	Partner Manager	Promotion Partner
T04 Product Consignment	Partner Manager	Outlet Partner
T05 Network Management	Network Manager	Network Manager
T06 Billing System Management	System Manager	System Manager
T07 Product Development	Product Development Team	Product Development Team

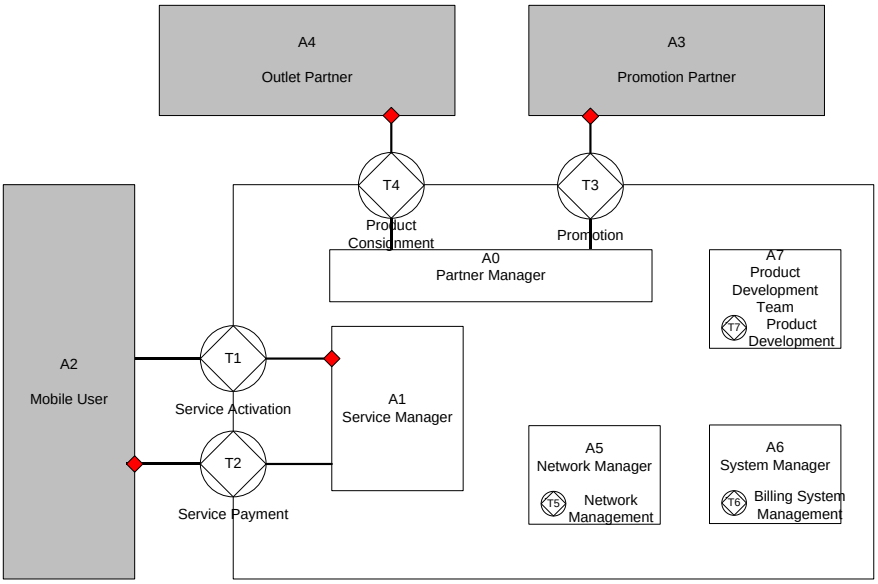


Figure 4.7 Actor Transaction Diagram of Mobile Internet Package

4.3 Chapter Summary

This chapter proposed a methodology to generate DEMO Construction Model from Business Model Canvas. This chapter visualized the connection between Business Model Canvas as a function and DEMO Construction Model as a construction. This chapter explained the transformation from Business Model Canvas into DEMO Construction Model, and conduct the case study. I found the correspondence between building blocks in Business Model Canvas and DEMO Construction Model. I suggest DEMO-Oriented BMC as a specified BMC containing the organizational building blocks of DEMO CM, and step-by-step process to create it. The case study of Telecommunication Industry in Indonesia also explains the transformation from BMC to CM, with a step-by-step process. The proposed methodology proved to be able to create DEMO Construction Model from Business Model Canvas.

5 NEW DEMO CONSTRUCTION MODEL GENERATION

This chapter discuss New DEMO Construction Model Generation using Split and Merge Operation, completed with the case study. This works is Phase 2 of New Business Model Creation Process. This work is based on the notion that manipulation of DEMO Construction Model can be explained using algebraic notation (Suga and Iijima, 2015) (Suga and Iijima, 2018a), and demonstrated in a recent research (Pratama and Iijima, 2020). Section 5.1 discusses about the generation process with the example, Section 5.2 discusses about the case study of Telecommunication Industry in Indonesia, and Section 5.3 summarizes the chapter.

5.1 New DEMO Construction Model Generation using Split and Merge Operation

In this phase, operation is done to DEMO CM that resulted from transformation in the previous phase. To better understand this section, I introduced some related statements below. To understand deeply about construction of algebra, see (Suga and Iijima, 2018a):

1) A model <$\boldsymbol{A}$, $\boldsymbol{T}$> is an instance of ATD containing a pair of set of actor roles $\boldsymbol{A}$ and transaction kinds $\boldsymbol{T}$. A transaction kind $T \in \boldsymbol{T}$ is described as $T = (A_{in}, A_{ex})$ with $A_{in}, A_{ex} \in \boldsymbol{A}$ that represents initiator and executor for transaction kind T. For example in Figure 5.1, the initial model α is a model $\mathcal{M}_\alpha = \langle\{A_1,A_2,A_3,A_4,A_5\},\{T_1,T_2,T_3,T_4,T_5\}\rangle$ in α contains actor roles and transaction kinds of ATD of initial model α, where $T_1 = (A_2, A_1)$ etc.

2) There is a set E consists of environmental actor roles, and a set B consists of border transaction kinds. For example in Figure 5.1, the environmental actor roles are $E_\alpha = \{A_2, A_3\}$ and the border transaction kinds are $B_\alpha = \{T_1, T_2, T_3, T_4\}$.

3) All models of ATD must satisfy the following conditions, according to (Suga and Iijima, 2018a):

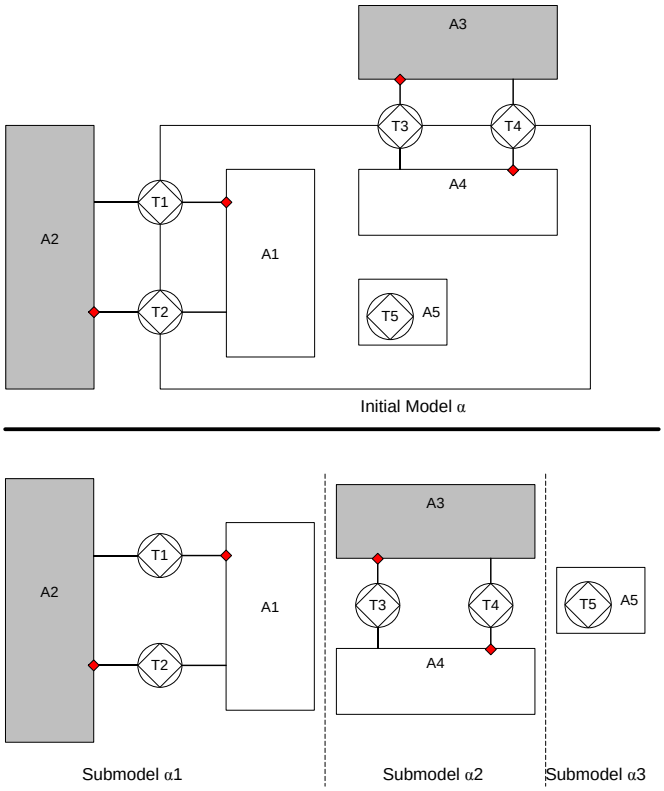


Figure 5.1 Model and Submodel

- (Unique Actor Role Name Identification) If the names of two actor roles are equal, the two actor roles are the same
- (Unique Transaction Kind Name Identification) If the names of two transaction kinds are equal, the two transaction kinds are equal

- (Numbering Identification) The executor of a transaction kind gets the same number as the transaction kind
- (Closed ATD for Actor Role) All the actor roles responsible for a transaction kind included in the set of actor roles of the ATD
- (Actor Role Participation) For every actor role in the ATD, there is at least one transaction kind such that the actor role participates.

4) A submodel of a model <***A***, ***T***> is a pair of ***A'*** $\subseteq$ ***A*** and ***T'*** $\subseteq$ ***T*** satisfying the five conditions mentioned in 3). For example, submodel $\mathcal{M}_{\alpha 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in α is a submodel α1 corresponds to initial model α consists of actor roles A1 and A2, and transaction kinds T1 and T2, as depicted in Figure 5.1.

5) A submodel can be classified into 3 categories:
   - Payment-Coupled Submodel: Parent-Child Transaction submodel that involves "payment" transaction kinds from a "customer" actor role denoted as **p-type** submodel.
   - Border Submodel: A submodel that has at least one border transaction kinds that do not involve "payment" transaction from a "customer" actor role denoted as **q-type** submodel.
   - No-border Submodel: A submodel that has no border transaction kinds denoted as **r-type** submodel.

   If a submodel is able to be classified as Payment-Coupled Submodel, then it cannot be classified as Border Submodel or No-border Submodel, making the classification mutually exclusive with each other. Looking at Figure 5.1, if we assume that T2 is

Payment Transaction, then submodel α1 is Payment-Coupled Submodel, submodel α2 is Border Submodel, and submodel α3 is a No-border Submodel.

6) In the split operation, I remove the system boundary line that defines the Scope of Interest (SoI) for the sake of simplicity in the specification of algebraic notation. In merge operation, I draw the system boundary based on the attribute of actor roles and transaction kinds that composed the merged model. In principle, a system boundary line should pass through border transaction kinds, and all environmental actor roles should be placed outside the system boundary.

Given initial model <***A***, ***T***>, there are 3 steps to generate new CMs.

5.1.1 Split Operation of the Initial CM to Create Submodels

In this step, one or several initial models are split into several submodels. In addition to above conditions, a submodel resulting from the split operation must also hold these following conditions:

- Contains at least 1 transaction kind *T* and corresponding actor roles (initiator and executor) (*A, A'*)
- If there are Parent-Child Transactions, the submodel must contain all transaction kinds of such parent-child transactions and their respective actor roles.

Figure 5.1 also shows the split operation of initial model α. As mentioned, submodel $\mathcal{M}_{\alpha 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in α is a submodel α1 corresponds to initial model α.

To maximize the number of submodels, a submodel should be as simple as possible, i.e. contains the smallest possible number of transaction kinds, with their respective actor

roles. After the submodels of several initial models are generated, a pool of submodels can be created.

I will explain about testing my proposed methodology to an EU-Rent Case from Business Motivation Model (BMM) (The Business Rules Group, 2010) as a case study. The description of EU-Rent is as follows: *EU-Rent is a company that rents cars to persons, operating from geographically dispersed branches. The cars of EU-Rent are divided in car types (brands and models); for every car type there is a particular rental tariff per day. A car may be rented by a reservation in advance or by a 'walk-in' customer on the day of renting. A rental contract specifies the start and end dates of the rental, the cartype one wishes, the branch where the rental starts (called the pick-up branch), and the branch where the rental will end (called the drop-off branch). Rentals have a maximum duration. The person who rents the car is called the renter. The one who is going to drive is called the driver.* (Op't Land and Dietz, 2012). A DEMO Construction Model of this case is already provided (Op't Land and Dietz, 2012); TPT in Table 5.1, and ATD in Figure 5.2.

Example of submodels resulted from split operation is shown in Figure 5.3. Note that based on business description, in order to conduct rental start, a rental payment must be promised to made. In other words, T01 rental start and T05 rental payment is a Parent-Child Transaction.

Table 5.1 TPT of EU-Rent (Op't Land and Dietz, 2012)

Transaction Kinds	**Product Kinds**
T01 rental start	[rental] has been started
T02 rental end	[rental] has been ended
T03 car pick-up	the car of [rental] has been picked-up
T04 car drop-off	the car of [rental] has been dropped-off
T05 rental payment	[rental] has been paid

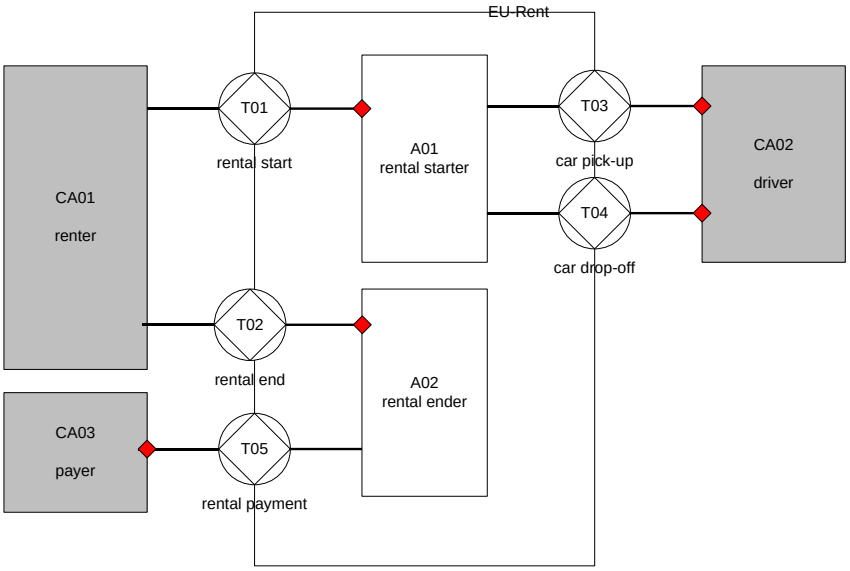
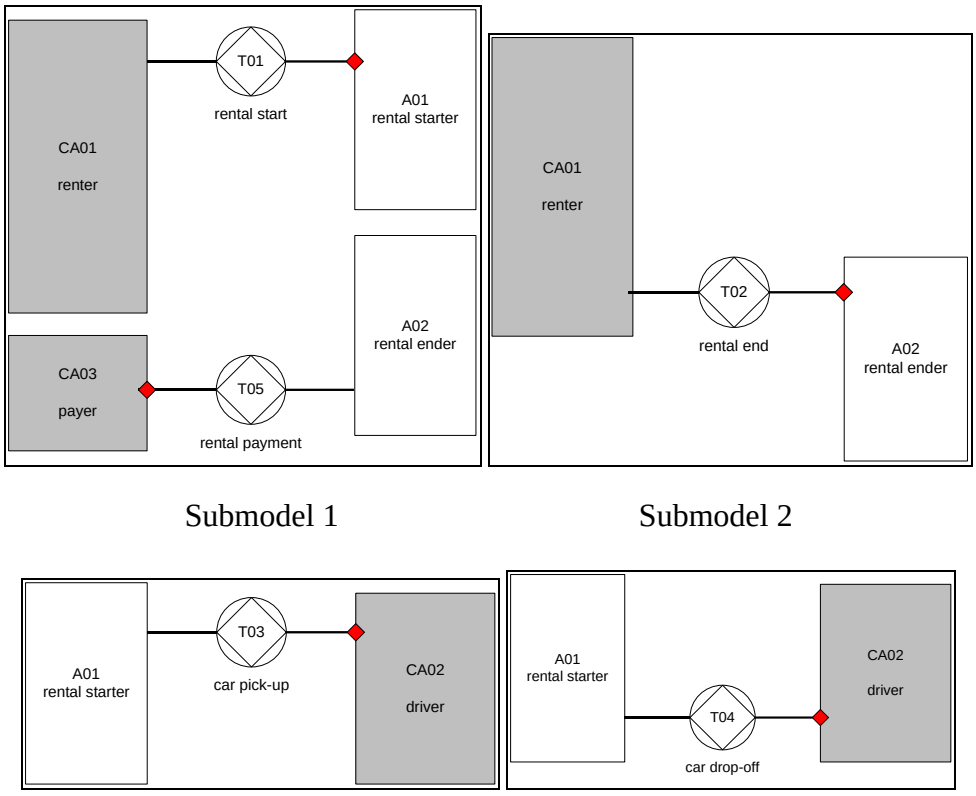


Figure 5.2 ATD of EU-Rent (Op't Land and Dietz, 2012)



Submodel 1 Submodel 2

Submodel 3 Submodel 4

Figure 5.3 Submodels of EU-Rent

5.1.2 Merge Operation of Submodels

From pool of submodels resulted from the previous step, a new model can be formed. A new model <$\boldsymbol{A^*}$, $\boldsymbol{T^*}$> is the merged submodels of <$\boldsymbol{A_1}$, $\boldsymbol{T_1}$>,…,<$\boldsymbol{A_n}$, $\boldsymbol{T_n}$> so that <$\boldsymbol{A^*}$, $\boldsymbol{T^*}$> = <$\boldsymbol{A_1} \cup \ldots \cup \boldsymbol{A_n}$, $\boldsymbol{T_1} \cup \ldots \cup \boldsymbol{T_n}$>. To find the possibility of a new model that is meaningful, the following conditions of a new model must be fulfilled:

1. There can be only one **p-type** submodel in a new model. A new model is meant to be a simple business model, therefore only one payment transaction is necessary.

2. New model cannot have **r-type** submodels. The new model focused on transaction between internal and environmental actor roles, therefore I exclude submodel without border transaction kinds.
3. The new model is composed of no more than 3 submodels. More combination of submodels means expanding the possibility of new models; too many combinations can make the new model selection become too complicated.
4. New model cannot be an element of a single initial model ($\boldsymbol{A^*} \subseteq \boldsymbol{A}$ and $\boldsymbol{T^*} \subseteq \boldsymbol{T}$), as it will not be a new model if it is only a part of one initial model.

Using these criteria, new model consists of one **p-type** submodel and up to two **q-type** submodels. The possibility of new models depends on the number of combination of **p-type** and **q-type** submodels. If necessary, preliminary selection of submodels to be included in merge operation can be conducted to narrow down the possibility of non-meaningful models. Of course, it is possible to manually select those submodels and merge them to create a new, meaningful model. After the models are merged, draw system boundary line based on the attributes of actor roles and transaction kinds as mentioned in 6).

Using the submodels obtained in previous example, by merging Submodel 1 and 2, I obtained New Model A, as depicted in Figure 5.4.

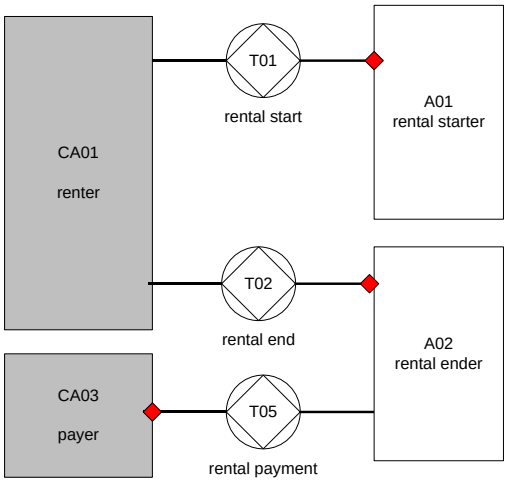


Figure 5.4 New model A

5.1.3 Selection of New Models

After I found the number of possible submodels, selection of new models can be conducted. The previous steps only result in a set of possible new models, without regarding their meaningfulness and newness of the model. This can be done by examining the possible new models and determine the selection criteria; the criteria are different depends on the business context. Cluster analysis on submodels can help this step; a submodel is merged with another submodel from a distinctively different cluster may not form a meaningful model. Another method that can be used is to measure the semantic closeness of submodels within the merged model using computer-aided software.

These new models are in the form of DEMO Construction Model. To implement this model, we also need to know the value aspect of the model, which as mentioned in Chapter 2.3, there is no correspondence of value aspect in DEMO Construction Model. This is why the whole series of New Business Model Creation Process is proposed in the first place; to extend this process into business models with their value aspect.

5.2 New DEMO Construction Model Generation of Indonesian Telecommunication Industry

In this section, I applied the steps introduced in previous section.

5.2.1 Split Operation of the Initial CM to Create Submodels

The first step of this phase is to split the initial CM to create submodels. Firstly I assign the notation for each model, as follows:

- Mobile Internet Package ($\mathcal{M}_{\alpha}$)
- Mobile Cash ($\mathcal{M}_{\beta}$)
- SMS Banking ($\mathcal{M}_{\gamma}$)
- IoT Vending Machine Controller ($\mathcal{M}_{\delta}$)
- Video Package ($\mathcal{M}_{\varepsilon}$)
- In-Apps Purchase ($\mathcal{M}_{\zeta}$)
- Location-Based Advertisement ($\mathcal{M}_{\eta}$)
- Home Internet ($\mathcal{M}_{\theta}$)

As an example, given the initial CM of Mobile Internet Package $\mathcal{M}\alpha$, the submodels of Mobile Internet Package is illustrated in Figure 5.5.

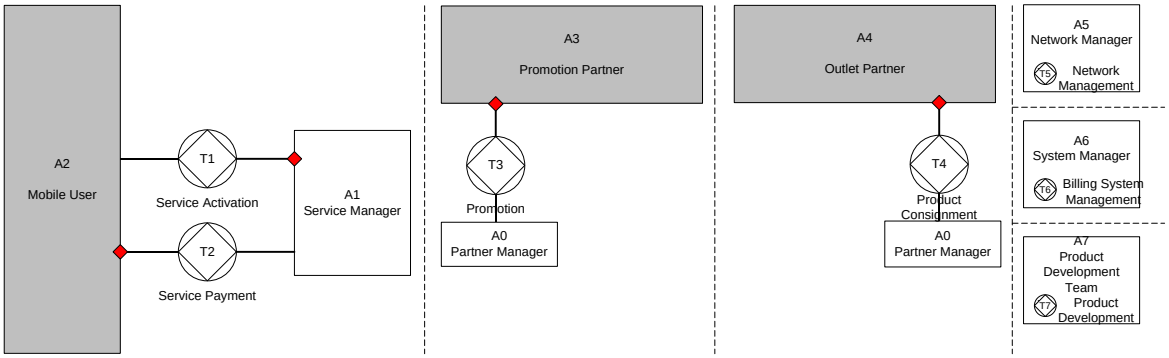


Figure 5.5 Submodels of Mobile Internet Package

The submodels for $\mathcal{M}_\alpha$ denoted as follows:

$\mathcal{M}_{\alpha 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in α (**p-type** submodel)

$\mathcal{M}_{\alpha 2} = \langle\{A_0,A_3\},\{T_3\}\rangle$ in α (**q-type** submodel)

$\mathcal{M}_{\alpha 3} = \langle\{A_0,A_4\},\{T_4\}\rangle$ in α (**q-type** submodel)

$\mathcal{M}_{\alpha 4} = \langle\{A_5\},\{T_5\}\rangle$ in α (**r-type** submodel)

$\mathcal{M}_{\alpha 5} = \langle\{A_6\},\{T_6\}\rangle$ in α (**r-type** submodel)

$\mathcal{M}_{\alpha 6} = \langle\{A_7\},\{T_7\}\rangle$ in α (**r-type** submodel)

After conducting split operation in the entire initial model, we can summarize it in Table 5.2.

Table 5.2 Summary of the submodels

No	Model Name	No of submodel	**p-type** submodel	**q-type** submodel	**r-type** submodel
1	Mobile Internet Package ($\mathcal{M}_{\alpha}$)	6	1 ($\mathcal{M}_{\alpha 1}$)	2 ($\mathcal{M}_{\alpha 2,}$ $\mathcal{M}_{\alpha 3}$)	3 ($\mathcal{M}_{\alpha 4,}$ $\mathcal{M}_{\alpha 5,}$ $\mathcal{M}_{\alpha 6}$)
2	Mobile Cash ($\mathcal{M}_{\beta}$)	3	1 ($\mathcal{M}_{\beta 1}$)	1 ($\mathcal{M}_{\beta 2}$)	1 ($\mathcal{M}_{\beta 3}$)
3	SMS Banking ($\mathcal{M}_{\gamma}$)	4	1 ($\mathcal{M}_{\gamma 1}$)	1 ($\mathcal{M}_{\gamma 2}$)	2 ($\mathcal{M}_{\gamma 3,}$ $\mathcal{M}_{\gamma 4}$)
4	IoT Vending Machine Controller ($\mathcal{M}_{\delta}$)	5	1 ($\mathcal{M}_{\delta 1}$)	1 ($\mathcal{M}_{\delta 2}$)	3 ($\mathcal{M}_{\delta 3,}$ $\mathcal{M}_{\delta 4,}$ $\mathcal{M}_{\delta 5}$)
5	Video Package ($\mathcal{M}_{\varepsilon}$)	4	1 ($\mathcal{M}_{\varepsilon 1}$)	1 ($\mathcal{M}_{\varepsilon 2}$)	2 ($\mathcal{M}_{\varepsilon 3.}$ $\mathcal{M}_{\varepsilon 4}$)
6	In-Apps Purchase ($\mathcal{M}_{\zeta}$)	3	1 ($\mathcal{M}_{\zeta 1}$)	1 ($\mathcal{M}_{\zeta 2}$)	1 ($\mathcal{M}_{\zeta 3}$)
7	Location-Based Advertisement (M_{η})	3	1 ($\mathcal{M}_{\eta 1}$)	1 ($\mathcal{M}_{\eta 2}$)	1 ($\mathcal{M}_{\eta 3}$)
8	Home Internet ($\mathcal{M}_{\theta}$)	8	3 ($\mathcal{M}_{\theta 1,}$ $\mathcal{M}_{\theta 2,}$ $\mathcal{M}_{\theta 3}$)	2 ($\mathcal{M}_{\theta 4,}$ $\mathcal{M}_{\theta 5}$)	3 ($\mathcal{M}_{\theta 6,}$ $\mathcal{M}_{\theta 7,}$ $\mathcal{M}_{\theta 8}$)
		36	10	10	16

5.2.2 Merge Operation of Submodels

I can calculate the number of possibility of the new models, by calculating the combination of **p-type** and **q-type** submodels satisfying the conditions of a new model, minus the models that have the exact same composition with the submodel of initial models. The total number of possible merged model with 1 *P* and up to 2 *Q*, where *P* is the number of **p-type** submodels and *Q* is the number of **q-type** submodels, is equal to:

$$P \times ({}_{Q}C_0 + {}_{Q}C_1 + {}_{Q}C_2)$$

With 10 **p-type** submodels and 10 **q-type** submodels, the number is $10 \times ({}_{10}C_0 + {}_{10}C_1 + {}_{10}C_2)$ = 560 models.

The number of submodels that has the exact same composition with the submodel of initial model *i*, where *Pi* is the number of **p-type** submodel in initial model *i* and *Qi* is the number of **q-type** submodel in initial model *i*, is equal to:

$$Pi \times ({}_{Qi}C_0 + {}_{Qi}C_1 + {}_{Qi}C_2) \text{ if } Qi \geq 2$$

$$Pi \times ({}_{Qi}C_0 + {}_{Qi}C_1) \text{ if } Qi = 1, \text{ thus equal to } 2Pi$$

$$Pi \times ({}_{Qi}C_0) \text{ if } Qi = 0, \text{ thus equal to } Pi$$

With their respective number of **p-type** and **q-type** submodels according to Table 5.2, the number of submodels that has the exact same composition with the submodel of the respective initial model is:

$$\text{Model } \alpha\text{: } 1 \times ({}_{2}C_0 + {}_{2}C_1 + {}_{2}C_2) = 4 \text{ models}$$

$$\text{Model } \beta\text{: } 2 \times 1 = 2 \text{ models}$$

$$\text{Model } \gamma\text{: } 2 \times 1 = 2 \text{ models}$$

$$\text{Model } \delta\text{: } 2 \times 1 = 2 \text{ models}$$

Model ε: $2 \times 1 = 2$ models

Model ζ: $2 \times 1 = 2$ models

Model η: $2 \times 1 = 2$ models

Model θ: $3 \times ({}_2C_0 + {}_2C_1 + {}_2C_2) = 12$ models

In total 28 models. Subtracting 560 by 28 I found the possibility of new models is 532 models. This number is too large to check one by one, so I examine the submodels to narrow down the possibility of new models. I determined that 5 of the submodels ($\mathcal{M}_{\alpha 2}$, $\mathcal{M}_{\alpha 3}$, $\mathcal{M}_{\eta 1}$, $\mathcal{M}_{\theta 2}$, and $\mathcal{M}_{\theta 4}$) are a generic submodel that does not change the essence of the business, therefore they are excluded. There are also some similar submodels ($\mathcal{M}_{\eta 1}$ is similar to $\mathcal{M}_{\theta 3}$), so I also remove one of them. Table 5.3 summarizes the submodels that are used in the next merge operation.

Table 5.3 Summary of the submodels that are used in the next merge operation

Model No	***p***	***q***
1	1	0
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	0	0
8	2	1
Total	8	6

Using the data in Table 5.3 instead, we can calculate the possibility of new models, $8 \times ({}_6C_0+{}_6C_1+{}_6C_2) = 176$ models. And calculate the number of models that has the exact same composition with the submodel of initial models:

Model α: 1 model

Model β: $2 \times 1 = 2$ models

Model γ: $2 \times 1 = 2$ models

Model δ: $2 \times 1 = 2$ models

Model ε: $2 \times 1 = 2$ models

Model ζ: $2 \times 1 = 2$ models

Model η: 0 models

Model θ: $2 \times 2 = 4$ models

In total 15 models. Subtracting 176 by 15, I found the possibility of the new models is 161 models instead of 560 models. This number is still relatively large, however, it is a reasonable number to check each model briefly.

5.2.3 Selection of New Models

A discussion is conducted to discuss the new submodels. I determine the meaningfulness of the model and determine 3 models that are the most meaningful and new relative to existing models.

The following section describes the construction models of the selected models

Portable Internet Device

This model (Figure 5.6) is the merger of submodel $\mathcal{M}_{\alpha 1}$ and $\mathcal{M}_{\delta 2}$. A customer can purchase a portable device (similar to mobile wifi) with the same SIM card number to those of customer's so that another device can connect to the Internet using the mobile connection without subscribing to a new SIM card.

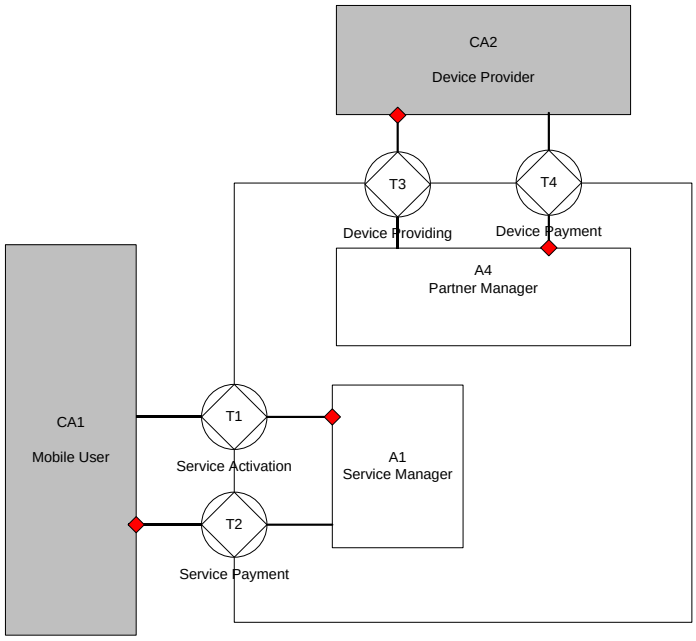


Figure 5.6 Construction Model of Portable Internet Device

Bank-Integrated Mobile Cash

This model (Figure 5.7) is the merger of submodel $\mathcal{M}_{\beta 1}$ and $\mathcal{M}_{\gamma 2}$. This is a Mobile Cash that is connected to a bank account. A customer can link mobile cash to their bank account or debit card, making it easier to top up mobile cash.

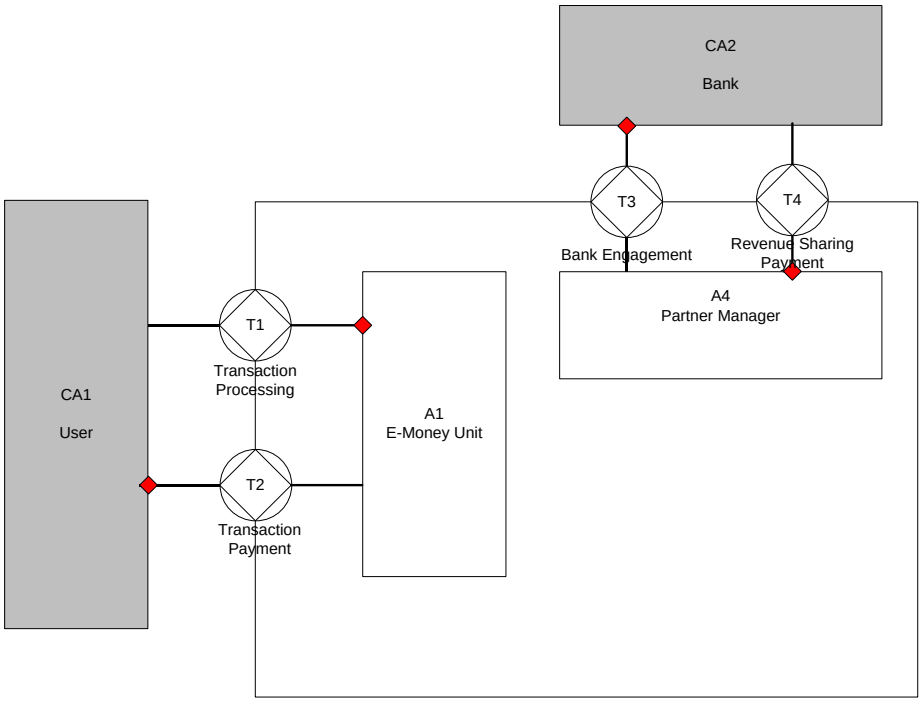


Figure 5.7 Construction Model of Bank-integrated Mobile Cash

Home Theatre

This model (Figure 5.8) is the merger of submodel $\mathcal{M}_{\theta 1,}$ $\mathcal{M}_{\varepsilon 2,}$ and $\mathcal{M}_{\theta 5}$. This is an add-on to home internet subscriber. A customer can watch a movie provided by an internet service provider. A device to enhance the movie experience can be added.

5.3 Chapter Summary

This article demonstrated the Construction Model Generation as a method to synthesize a new enterprise model using Telecommunication Industry in Indonesia as a case study. This chapter defined the criteria of submodels split from the existing model, and the criteria of merged models to be applicable, so that these models can potentially be implemented as a new enterprise model. Construction Model Generation using case study

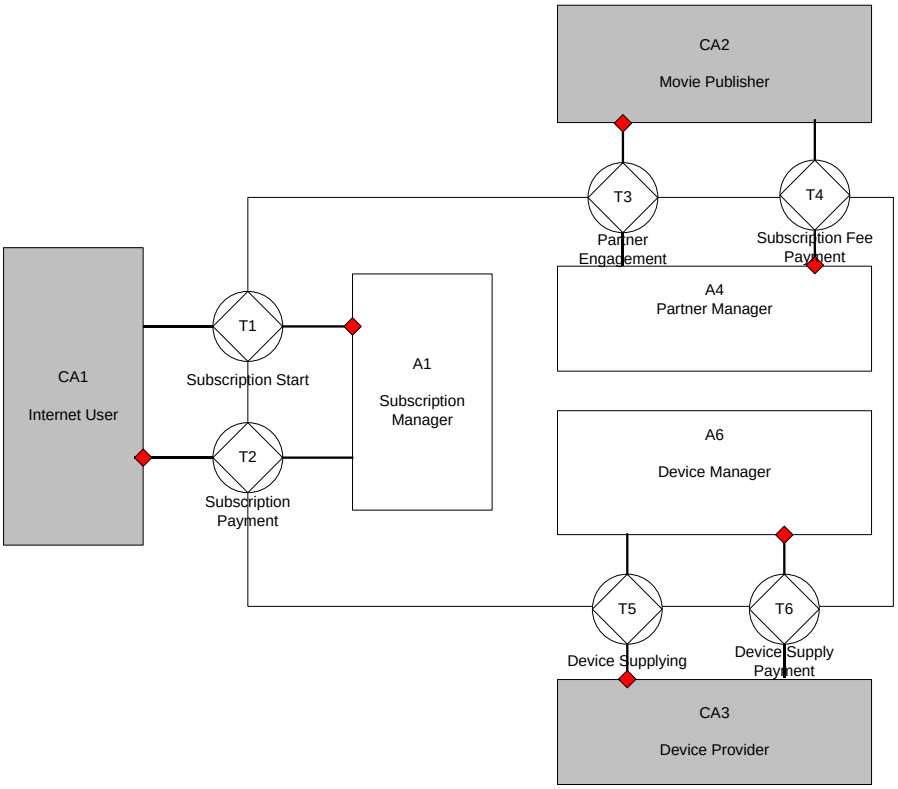


Figure 5.8 Construction Model of Home Theatre

of Telecommunication Industry in Indonesia is conducted to demonstrate the model manipulation using DEMO Construction Model. I conduct split and merge operation of those models, and I found 3 new, meaningful models of DEMO Construction Model as a new enterprise model.

6 NEW DEMO CONSTRUCTION MODEL TO NEW BUSINESS MODEL CANVAS

This chapter discuss Transformation from New Construction Model to New Business Model Canvas, completed with the case study. This works is Phase 3 of the new business model creation process. This work is already done in (Pratama and Iijima, 2018b). Section 6.1 discusses about the transformation process with the example, Section 6.2 discusses about the case study of Telecommunication Industry in Indonesia, and Section 6.3 summarizes the chapter.

6.1 Transformation from New DEMO Construction Model to New Business Model Canvas

A decision tree is proposed to help the synthesis process of BMC. The generated BMC from this process is called Pre-Business Model Canvas (Pre-BMC), the Pre-BMC Generation is considered intermediate process. To complete the canvas, we need additional information regarding the business, using key questions.

6.1.1 Decision Tree

By examining each building blocks description and using this table, I propose a decision tree to help the synthesis process of BMC. Decision Tree is one of the most popular approaches for data mining (Lior, 2014) and has been widely used in many disciplines (Friedman, Hastie, and Tibshirani, 2001). Decision tree is capable to extract useful

information and conduct classification and prediction (Song and Ying, 2015). In this research, decision tree is used to transform DEMO CM into BMC.

The proposed decision tree is illustrated in Figure 6.1, this Decision Tree is explained as follows: The Decision Tree consists of 16 nodes and 9 leaves. Each element in DEMO CM is identified, then classified it into BMC Building Block element using this Decision Tree. This Decision Tree can only applied to business-related DEMO CM, that is DEMO CM that includes customer-related actor roles and payment-related transaction kinds that is executed by such actor roles. The end nodes/leaves may not be filled; some of the leaves may be empty.

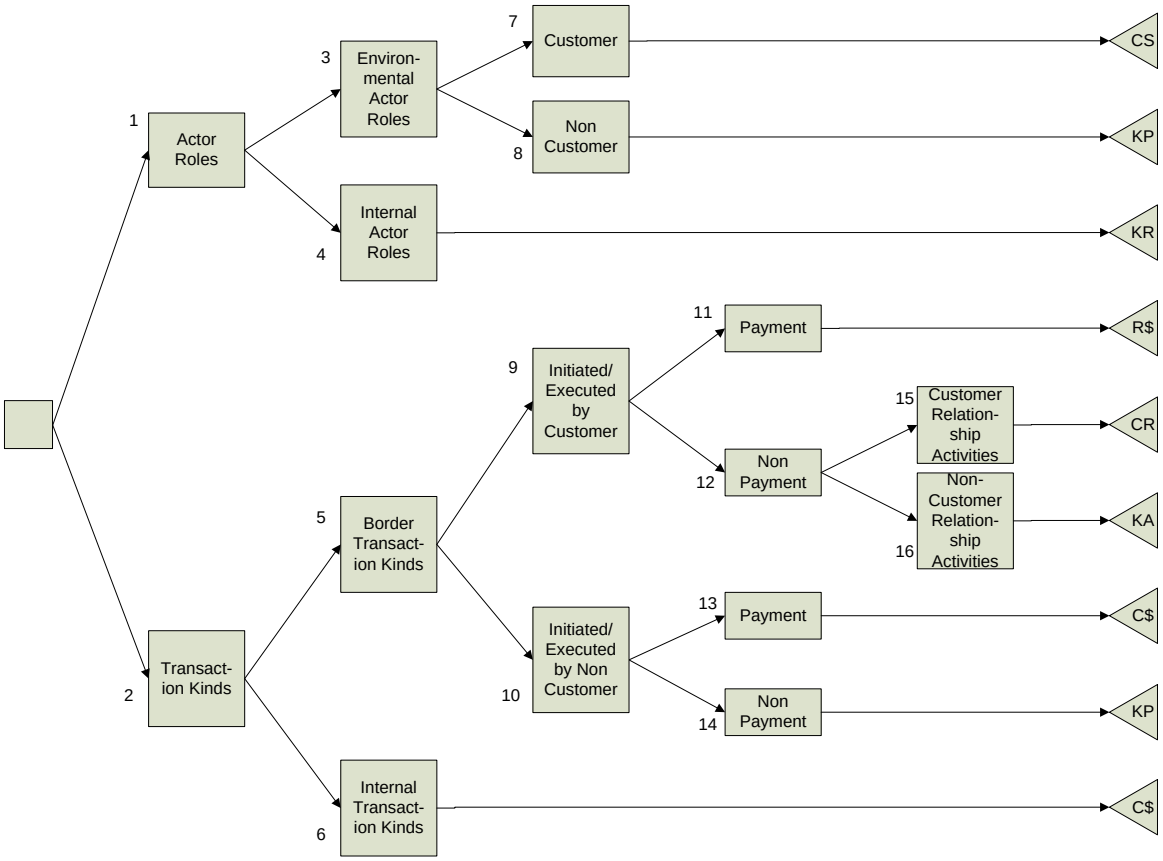


Figure 6.1 Business Model Canvas Synthesis Decision Tree

For example, I apply Decision Tree in Figure 6.1 to generate BMC of EU-Rent. These elements of DEMO CM are identified: renter, driver, payer, rental starter, rental ender, rental start, rental end, car pick-up, car drop-off, and rental payment. Allocated to Node 1 are renter, driver, payer, rental starter, and rental ender; rental start, rental end, car pick-up, car drop-off, and rental payment went to Node 2. From Node 1, **renter**, **driver**, and **payer** went to Node 3 and continued to Node 7, and become **Customer Segments**; Node 8 is empty, meanwhile rental **starter** and **rental ender** entered Node 4 and become **Key Resources**. At Node 2, rental start, rental end, car pick-up, car drop-off, and rental payment continued to Node 5 all the way to Node 9; implied Node 6, Node10, Node 13, and Node 14 is empty. From Node 9, **rental payment** entered Node 11 and becomes **Revenue Streams**; **rental start**, **rental end**, **car pick-up**, and **car drop-off** allocated to Node 12 continued to Node 16, become **Key Activities**.

6.1.2 Pre-Business Model Canvas

The generated BMC from this process is incomplete, as there might be some building blocks that are empty. It is similar to prototype of a model that needs to be finalized. I call it Pre-Business Model Canvas (Pre-BMC), the Pre-BMC Generation is considered intermediate process. To refine Pre-BMC into a completed BMC, we need additional information regarding the business. The contents of Pre-BMC also can be altered or modified to better represent the business or to avoid redundancy that may occur, although some of the building blocks may left unchanged.. This refinement process is conducted by the stakeholders of the company as data collection process using each building block description as a guide (Osterwalder and Pigneur, 2010). There are many possibilities of

the resulting completed BMC; the additional information is uniquely determined. Therefore this process cannot be done automatically.

The process of adding additional information explains as follows. First, determine whether each building block has sufficient information regarding the content of each block. If additional information is necessary, proceed to determine the additional information for all necessary blocks. Then check the contents of each building block, apply modification if necessary.

Some key questions (Osterwalder and Pigneur, 2010) can help in determining additional information:

1) **Customer Segments (CS)**
    - Who is the target customer of the business?
    - Which class or segment of customer is the business creating values for?
2) **Value Propositions (VP)**
    - What core value does the business deliver?
    - Which customer needs is fulfilled by the business?
3) **Channels (CH)**
    - Through which channels that the customers reached by the company?
    - What are ways of transmission and transfer of product/service to customer?
4) **Customer Relationships (CR)**
    - What relationship established between the target customer and the company?
    - What are business activities representing the relationship between customer and company?
5) **Revenue Streams (R$)**

- What and how do the customers pay?
- What are business activities that includes payment from customer to company?

6) Key Resources (KR)

- What resources required in running the business?
- What are internal influencers within the company?

7) Key Activities (KA)

- What are business activities required to deliver the value?
- What are business activities that deliver the product/service of the company?

8) Key Partners (KP)

- Who are business partners/suppliers required in running the business?
- What are external influencers of the business?

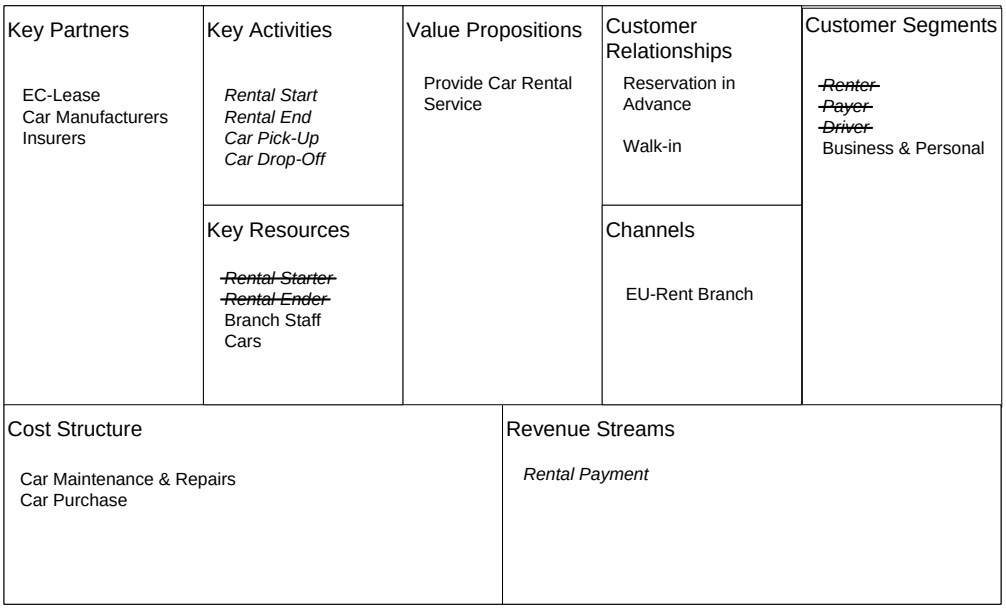
9) Cost Structure (C$)

- What are the costs necessary to run the business?
- What are business activities that incurred costs that the company has to cover?

We can examine existing documents as one of data collection techniques (Bowen, 2009). By analyzing patterns of each building blocks found in the documents, the contents of building blocks can be synthesized.

Continuing the example of EU-Rent, from the result of decision tree, it is determined that Revenue Streams and Key Activities has sufficient information, while the rest of building blocks required additional information. The authors examine documents from BMM (The Business Rules Group, 2010) and Business Rules (BR) (The Business Rules

Group, 2000) of EU-Rent as additional information to produce completed BMC, as data collection process to answer the key questions. Figure 6.2 illustrates the completed BMC.



Note: italic the component of Pre-BMC, some of them showed strikethrough indicating modification done to those components.

Figure 6.2 Completed BMC of EU-Rent

The result will be explained for each building block:

1) Customer Segments (CS)

The Mission Statement of EU-Rent mentioned in BMM is *"Provide car rental service across Europe and North America for both business and personal customers."* Target customer is mentioned in customer part (…*for both business and personal customers*). Renter, Payer, and Driver are actor roles representing customer of EU-Rent, so all of them integrated into Business and Personal to avoid redundancy. Therefore this building block consists of: Business and Personal.

2) Value Propositions (VP)

Also using the mentioned Mission Statement, the action part (*Provide*) and product or service part (*car rental service*) of Mission Statements composed the value proposition. This represents the core value and the customer needs. Therefore this building block consists of: Provide Car Rental Service.

3) Channels (CH)

The channel that the customer reached by the company is EU-Rent Branch and the way of transmission and transfer of rental car service to customer is via EU-Rent Branch. Therefore this building block consists of: EU-Rent Branch.

4) Customer Relationships (CR)

The relationship established between the target customer and the company is explained in business description. In the business description, it is mentioned that "*A car may be rented by a reservation in advance or by a 'walk-in' customer on the day of renting."* This sentence represents the business activities of relationship between customer and EU-Rent. Therefore this building block consists of: Reservation in Advance, Walk-in.

5) Revenue Streams (R$)

The existing component Rental Payment is enough to represent revenue streams of EU-Rent, so no change is necessary. Therefore this building block consists of: Rental Payment.

6) Key Resources (KR)

In BMM, Resource of EU-Rent consists of *Cars* and *Branch staff*, and is mentioned as *internal influencer*. Both Rental Starter and Rental Ender are actor roles represent staff of EU-Rent in EU-Rent Branch, so they are integrated into Branch Staff to avoid redundancy. Therefore this building block consists of: Branch Staff, Cars.

7) Key Activities (KA)

The existing components Rental Start, Rental End, Car Pick-Up, and Car Drop-Off are enough to represent key activities of EU-Rent, so no change is necessary. Therefore this building block consists of: Rental Start, Rental End, Car Pick-Up, Car Drop-Off.

8) Key Partners (KP)

In BMM, Business Partner consists of *EC-Lease*; meanwhile Supplier consists of *Car manufacturers* and *Insurers*, and is mentioned as *external influencer*. Therefore this building block consists of: EC-Lease, Car Manufacturers, Insurers.

9) Cost Structure (C$)

In BR, the business activities that incurred costs that EU-Rent has to cover are *Car maintenance & repairs* and *Car purchase*. Therefore this building block consists of: Car Maintenance & Repairs, Car Purchase.

6.2 Transformation from New DEMO Construction Model of Indonesian Telecommunication Industry to New Business Model Canvas

I used Decision Tree provided in (Pratama and Iijima, 2018b) to generate Pre-BMC of the proposed new model. In this section, I will explain the transformation process of Portable Internet Device. The resulting new BMC of other models are illustrated in Appendix 2.

Application of Decision Tree can be seen in Figure 6.3. These elements of DEMO CM are identified: Mobile User, Device Provider, Service Manager, Partner Manager, Service Activation, Service Payment, Device Providing, and Device Payment. Allocated to Node 1 are Mobile User, Device Provider, Service Manager, and Partner Manager; Service Activation, Service Payment, Device Providing, and Device Payment went to Node 2. From Node 1, Mobile User and Device Provider went to Node 3; meanwhile, Service

Manager and Partner Manager entered Node 4 and become Key Resources. From Node 3, Mobile User went to Node 7 and become Customer Segments; Device Provider entered Node 8 and become Key Partners. At Node 2, Service Activation, Service Payment, Device Providing, and Device Payment all continued to Node 5; implied Node 6 is empty. From Node 5, Service Activation and Service Payment went to Node 9; meanwhile, Device Providing and Device Payment continued to Node 10. From Node 9, Service Payment entered Node 11 and becomes Revenue Streams; Service Activation allocated to Node 12 continued to Node 16, become Key Activities, and Node 15 is empty. From Node 10, Device Payment entered Node 13 and becomes Cost Structure; Device Providing instead went to Node 14 and becomes Key Partners. Figure 6.4 illustrates the resulting Pre-BMC.

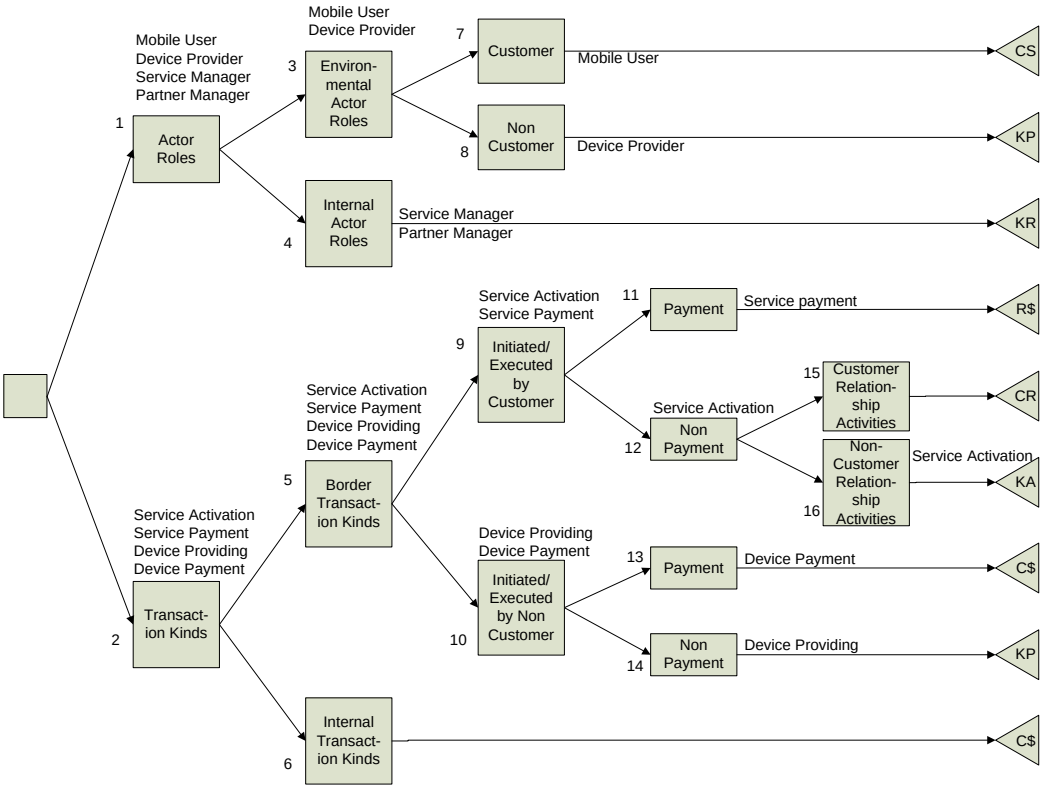


Figure 6.3 Decision Tree of Portable Internet Device

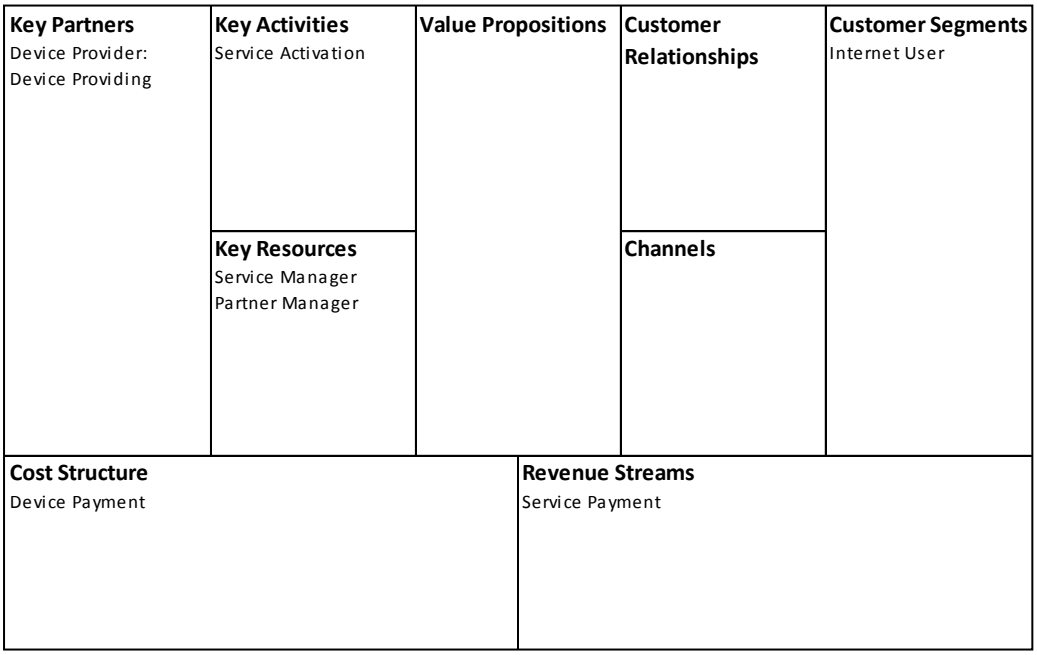


Figure 6.4 Pre-BMC of Portable Internet Device

In this case study, the process of adding additional information will be explained in next chapter, after Value Operation is completed. It will be included in the section of completion of the New BMC.

6.3 Chapter summary

This chapter proposed a methodology to synthesize Business Model Canvas from DEMO Construction Model. Based on the correspondence between building blocks in BMC and DEMO CM found in Chapter 4, I propose a Decision Tree to generate Pre-BMC as an intermediate process to create completed BMC. This chapter visualized the connection between BMC as a function and DEMO CM as a construction, similar to Chapter 4 but in different direction. I found the transformation from DEMO CM to BMC in the form of Decision Tree based on correspondence between them. Using Decision Tree, one can transform the elements of CM into elements of BMC to form a Pre-BMC, then add some

additional information to synthesize a completed BMC. The case study of Telecommunication Industry in Indonesia illustrates the transformation. The introduction of Decision Tree can help the transformation process, in particular, the Pre-BMC generation by automatically generating contents in Pre-BMC building blocks. This Pre-BMC serves as a baseline to refine and complete the BMC.

7 VALUE OPERATION AND BMC COMPLETION

This chapter consists of two parts: first part (Section 7.1 and 7.2) discuss Value Operation, completed with the case study; and second part (Section 7.3 and 7.4) provide the completion of BMC, and provide a discussion to analyze the overall results. The works in first part is Phase 4 of the New Business Model Creation Process and focused on the Value Operation part of the framework. The works in first part is already done in (Pratama and Iijima, 2019). Section 7.1 discusses about the Value Operation with the example, Section 7.2 discusses about the case study of Telecommunication Industry in Indonesia and summary of the works, Section 7.3 discusses about the completion of BMC, and Section 7.4 provides the discussion of the result of the proposed New Business Model Creation Process.

7.1 Value Operation of BMC Value Proposition

Value Operation is a process of value creation based on platform of e3value using modular operators, with Value Proposition as input and output. Value Operation process is conducted after the new pre-BMC is created, therefore the initial BMCs and its Value Proposition are already given. The steps are described below:

7.1.1 Transform Value Proposition of Existing BMC into Value Interface of e3Value

To generate the Value Proposition for new BMC, I transform the initial Value Propositions into Value Interface of e3value, with the Value Proposition components transformed into Value Object within Value Interface. First, I identify the Value

Proposition Components that corresponds to Value Object; that is services or products. The identified components then treated as Value Objects of outgoing Value Transmissions within Value Interface. After that, I draw the initial Value Interface of e3value for each initial BMC. Value Objects in ongoing Value Transmissions corresponds to services or products from Value Propositions, meanwhile Value Objects in ingoing Value Transmissions corresponds to money.

Using the previous example, we can transform the Value Proposition into Value Interface, as shown in Figure 7.1:

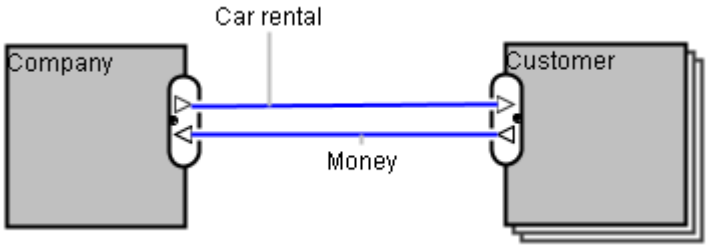


Figure 7.1 Value Interface of EU-Rent

7.1.2 Value Interface Manipulation Operation

Using Modular Operators of Business Model Manipulation, I conduct operation on Value Interface to form a new Value Interface. I perform modular operation on Value Objects using appropriate modular operators. It depends on which Value Objects that is decided to be retained or removed in the new Value Interface by the stakeholders. The result then drawn to illustrate new Value Interface of e3value to be used in new BMC. The resulted Value Objects in previous steps are placed in their appropriate Value Transmissions.

7.1.3 Generate New Value Proposition

The last phase is the generation of new Value Proposition from the transformation of new Value Interface. The resulting Value Proposition then combined with Pre-BMC to form a new BMC.

7.2 Value Operation of Indonesian Telecommunication Industry

As described in previous section, I used Modular Operation and e3value to conduct Value Operation. From Chapter 5.2.3, we can see that Portable Internet Device results from the submodel of Mobile Internet Package (S_α) and IoT Vending Machine Controller (S_δ). The Value Proposition is *Provide guaranteed mobile internet service with fair and affordable tariff* for S_α, and *Provide stock control device for Vending Machine* for S_δ. Figure 7.2 shows the e3value model of Value Interface of both initial models, and Figure 7.3 illustrates the Value Interface of Mobile Internet Package after conducting manipulation operation.

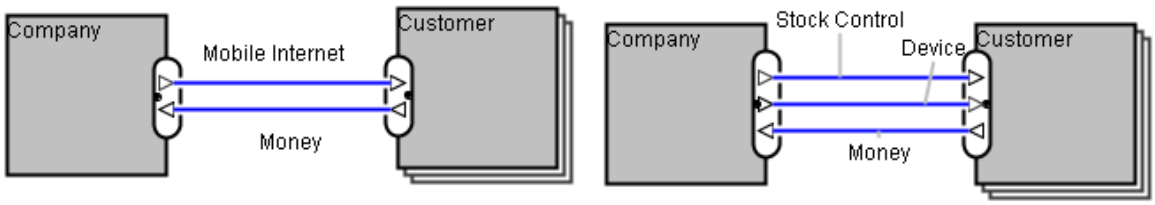


Figure 7.2 Value Interface of Mobile Internet Package and IoT Vending Machine Controller respectively

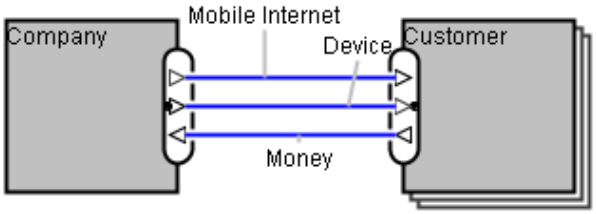


Figure 7.3 Value Interface of Portable Internet Device

From the resulting Value Interface of Portable Internet Device, we can generate the Value Proposition of Portable Internet Device. The Value Proposition is the combination of *Mobile Internet* service and *Device* product. We can write it as follows:

"Provide Mobile Internet service with a Device"

This works demonstrated Value Operation process using e3value and modular operators. This section also provides a case of Telecommunication Industry in Indonesia. I conduct transformation of Value Proposition in initial BMCs into Value Transmissions of e3value to clearly illustrate the value exchange. Then I conduct modular operation in one of the Value Transmission, in this case porting and excluding. Then I generate new Value Proposition from the new Value Transmission.

7.3 Completion of New Business Model Canvas of Indonesian Telecommunication Industry

I provide these Pre-BMC to the interviewee, and ask them for feedback and completes the BMC. Using key questions (Pratama and Iijima, 2018b), additional information can be obtained. The completed BMC can be seen in Figure 7.4.

<table>
<tr><td rowspan="2">Key Partners
Device Provider:
Device Providing</td><td>Key Activities
Service Activation</td><td rowspan="2">Value Propositions
Provide Mobile Internet service with a Device</td><td>Customer Relationships
Account Manager

Service Center</td><td rowspan="2">Customer Segments
Internet User</td></tr>
<tr><td>Key Resources
Service Manager
Partner Manager</td><td>Channels
Outlet</td></tr>
<tr><td colspan="3">Cost Structure
Device Payment</td><td colspan="2">Revenue Streams
Service Payment</td></tr>
</table>

Figure 7.4 Completed BMC of Portable Internet Device

The feedback result is described below:

1) Customer Segments (CS)

- Who is the target customer of the business?

  The target customer is Internet User who needs internet for their entire portable device in one package. Therefore this building block consists of: Internet User.

2) Value Propositions (VP)

The Value Proposition component is obtained from Value Operation in the previous subsection. Therefore this building block consists of: Provide Mobile Internet service with a Device.

3) Channels (CH)

- What are ways of transmission and transfer of product/service to the customer?

  The device is sold in electronic store outlet. Therefore this building block consists of: Outlet.

4) Customer Relationships (CR)

- What relationship established between the target customer and the company?

  Relationship established via account manager and service center. Therefore this building block consists of: Account Manager and Service Center.

5) Revenue Streams (R$)

The existing component Service Payment is enough to represent revenue streams of Portable Internet Device, so no change is necessary.

6) ey Resources (KR)

The existing component Service Manager and Partner Manager are enough to represent key resources of Portable Internet Device (human resource part), so no change is necessary.

7) Key Activities (KA)

The existing component Service Activation is enough to represent key activities of Portable Internet Device, so no change is necessary.

8) Key Partners (KP)

The existing component Device Provider is enough to represent key partners of Portable Internet Device, so no change is necessary. Device Providing is the activity conducted by Device Provider.

9) Cost Structure (C$)

The existing component Device Payment is enough to represent the cost structure of Portable Internet Device, so no change is necessary.

7.4 Discussion

This research proposed the New Business Model Creation Process, as a method to synthesize a new business model. Business Model Canvas is used as a framework of business model, DEMO Construction model is used to show the construction model, and e3value is used to conduct value operation. Functional/constructional transformation concept is applied to them. I applied this framework in a case study of Telecommunication Industry in Indonesia.

The results of this study answered my research questions. First, I explained my proposed framework of New Business Model Creation Process, as a framework to produce a new business model from the existing models using rigorous manipulation, closer to enterprise engineering concept of design and engineering, rather than craftsmanship. Second, I demonstrated Value Operation as a means to create a new Value Proposition by keeping some of the initial Value Propositions. Third, I thoroughly explain the case study of Telecommunication Industry to illustrate the New Business Model Creation Process of Telecommunication Industry detailed down to each step in each phase.

The contribution of this study is related to information systems development; in particular business model generation, model manipulation of business model, and transformation between business (function) model and construction model. I proposed correspondence between business model and construction model, in particular, Business

Model Canvas and DEMO Construction Model. The important finding of this research is that I found the correspondence links between BMC as a function design and DEMO CM as a construction design. This correspondence link is very important to conduct manipulation of Business Model to create a new model. Adding Value Operation to the framework makes the generation of new BMC from initial BMC more complete, as in transformation between BMC and DEMO CM the concept of value is lost. Using the New Business Model Creation Process, this study contributes to the idea that we can gather many BMCs, transform them into CMs and then modify those CMs to create a new CM and transform it into new BMC to create a new business model.

The resulting new business proved to be meaningful, and new to some extent. I discussed the result of new business models with practitioners in Telecommunication Industry, and getting feedback from them.

- Portable Internet Device: This business model is getting more relevant, seeing that the current multi-device needs of the customer. They actually had 1 number multi-SIM product. However, it is not getting buy-in by the market, because in Indonesia it was very easy to get a SIM Card prepaid starter pack, you can even get it from small kiosk and register your data online after activating it.
- Bank-integrated Mobile Cash: This business model is actually already formulated, but not yet implemented. This model is very close to the captured model of Mobile Cash, with added value of linking mobile cash features with a bank account. From mobile cash Apps, user can top up mobile cash balance with top up menu from user's bank account. Transferring money from one bank account to another is also possible using this app.

- Home Theatre: This business model was included in their ideation. It is very good to customer in their opinion. They can expand the captured model of Home Theatre, with Movie Service as an additional option. However they need to survey the market, whether there is a demand for home internet + movie package.

From the feedback, we can see that the resulting new models are relevant to the industry and can be applied to the business in Telecommunication Industry. Therefore it can be said that the framework is successful to create a new business model from the existing business models. However, there are limitations regarding the newness of the models. Using the criteria in Chapter 5.1 I avoid any possible recurrence of the initial models, however, there is still no way to avoid recurrence of business models outside of the captured models. Therefore to minimize this "fake" newness, existing business models in an industry have to be captured as many as possible. This way we can also expand the pool of submodels, therefore the possibility of new, meaningful models can be improved.

Another limitation can be observed in terms of new model selection. Currently, there is no syntactical way to determine which models are meaningful, as the criteria of meaningful model highly depend on the business context. It is difficult to determine that a model (resulted from merge operation) is meaningful and can be implemented. A cluster analysis can be conducted in future studies to reduce the number of non-meaningful merged models. Future studies can also cover another type of industry to check the consistency of the framework. A case study of telecommunication industry in a developed country can also be conducted as a comparative study, and possibly to expand the pool of submodels.

Table 7.1 shows the comparison of BM Manipulation approach; BMC only (Chapter 2.1.5), DEMO CM only (Chapter 5), and my proposed approach, New Business Model Creation Process combining BMC and DEMO CM. BMC only approach do not use formal method, highly dependent on the designers and their interpretation on the business model. DEMO CM only approach developed a split and merge operation to manipulate a construction model, however as the nature of construction model, it does not contain value aspect, one of the necessary elements to create a new business model. New Business Model Creation Process has some advantages of not only able to semi-automatically manipulate the existing business models to generate a new model in a form of BMC (one of the most popular business model representations), it still retains the value aspect from the existing business models, either in original or modified form.

Table 7.1 Comparison of BM Manipulation approach

	BMC only	DEMO CM only	New Business Model Creation Process
Input	BMC	DEMO CM	BMC
Output	New BMC	New DEMO CM	New BMC
Formal Method	No	Yes (Split and Merge Operation)	Yes (BMC-DEMO Transformation, Split and Merge Operation)
Value Aspect	Yes	No	Yes

We can see that using DEMO as an intermediary in business model manipulation has its merit and demerit. The advantage of DEMO is to provide the construction of the given business model that can be easily manipulated using algebraic notation. The linking of

function and construction of the enterprise can act as an enhancement of model interchangeability to support the information systems development process. The disadvantage is, as mentioned, that the value of initial business model cannot be retained in DEMO, making it necessary to introduce another modeling concept that has value notion if the initial value of business model needs to be retained. As we did in this research, we added Value Operation using e3value to retain the value aspect in the transformation.

Regarding the Value Operation, some advantages can be provided. First, the Value Proposition of initial business model can be preserved in manipulation process. Using Value Operation as an extension can keep the initial Value Proposition in manipulation process. Second, using e3value to illustrate Value Transmission helps in clearly visualize the Value Exchange to make manipulation easier. By using modular operation on Value Transmissions we can create a new Value Transmission, which then becomes new Value Proposition. Despite the potential advantage, it is not without limitations. This research only demonstrates manipulation of Value Transmission manually, although transformation between Value Proposition and Value Transmission can be done automatically. Manipulation of Value Transmission seems possible, by creating pool of Value Transmissions from several business models. However determining appropriate Value Transmission still needs decision making from the stakeholders.

By using the proposed methodology in this research and future studies, I expect that we can gather several business models, generate construction models from them and create a pool of submodels, modify them to create a new construction model, and generate a new business model to create a new business in a certain industry.

8 CONCLUSIONS

This research produced a New Business Model Creation Process framework, as a method to synthesize a new business model, using Telecommunication Industry in Indonesia as a case study.

In Chapter two, I reviewed the literature related to the research, mainly Business Model, Construction Model, and Function, Construction, and Transformation. I discussed the concept and development of Business Model, including Business Model Manipulation and Business Model Representative, also Business Model Canvas as an example of Business Model Representative. Construction Model, specifically DEMO Construction Model were also be explained. The relationship between Business Model as a function, Construction Model as a construction, and transformation between them were reviewed, complemented with value aspect in the discussion.

In chapter three to seven, I presented New Business Model Creation Process as a framework to manipulate the existing business models to create a new, meaningful business model. Each phases of the framework were explained one by one, completed with some conditions and assumptions.

In chapter three, I mentioned the overview of New Business Model Creation Process and the case study of Telecommunication Industry in Indonesia. I captured 8 existing Business Models as Business Model Canvas.

In chapter four, I explained the transformation from Business Model Canvas into DEMO Construction Model, and conduct the case study. I proposed DEMO-Oriented Business Model Canvas as an intermediary process to aid the transformation.

In chapter five, I explained the process of new DEMO Construction Model Generation using split and merge operation, and conduct the case study. I found 3 new, meaningful models as DEMO Construction Model.

In chapter six, I explained the transformation from new DEMO Construction Model into new Business Model Canvas, and conduct the case study. I utilized Decision Tree to conduct the transformation.

In Chapter seven, I explained Value Operation as a means to create a new Value Proposition by keeping some of the initial Value Propositions, and conduct the case study. I then complete the Business Model Canvas using key questions, and form new business models that are meaningful and applicable in Telecommunication Industry.

I looked back to my research questions and see if they are answered:

RQ1: How can we generate a new Business Model by rigorous manipulation?

I explained my proposed framework of New Business Model Creation Process, as a framework to produce a new business model from the existing models using rigorous manipulation, closer to enterprise engineering concept of design and engineering, rather than craftsmanship. I combined several processes in this framework, which made out the phases: Transformation from existing Business Model Canvas to Construction Model, New Construction Model generation using split and merge operation, Transformation from new Construction Model to new Business Model Canvas, and Value Operation.

RQ2: How can we create a new Value Proposition by conducting Value Operation?

I demonstrated Value Operation as a means to create a new Value Proposition by keeping some of the initial Value Propositions. The limitation of DEMO Construction

Model is that the value of initial business model cannot be retained in DEMO, making it necessary to introduce another modelling concept that has value notion if the initial value of business model needs to be retained. Therefore I added Value Operation using e3value to retain the value aspect in the transformation, to create a new Value Proposition based on the initial Value Propositions.

RQ3: How can we create a new Business Model of Telecommunication industry?

I thoroughly explained the case study of Telecommunication Industry to illustrate the New Business Model Creation Process of Telecommunication Industry detailed down to each step in each phase. I captured 8 existing Business Models as Business Model Canvas, then transform them into DEMO Construction Model. I conduct split and merge operation of those models, and I found 3 new, meaningful models as DEMO Construction Model. I transform them into Business Model Canvas as a new business model that is meaningful and applicable in Telecommunication Industry.

Findings of this research are found as useful contributions in business modelling and system development; in particular business model generation, model manipulation of business model, and transformation between business (function) model and construction model. However, there are also remaining areas to be answered in the future.

- Validating by working on business models in other kinds of industries

This research is the first attempt to develop framework of New Business Model Creation Process. To further validate the framework and to check the consistency of the framework, future studies can also cover another type of industry. A case study of telecommunication industry in a developed country can also be conducted as a comparative study.

- Capture more business models to improve accuracy

As mentioned in Chapter 7, there are limitations regarding the newness of the models. To maximize the pool of submodels and increase the number of possible new models, existing business models in an industry have to be captured as many as possible. Besides expanding the pool of submodels and therefore improving the possibility of new, meaningful models, we can detect patterns of business model combinations. This is related to the next proposed future research.

- Develop a method to detect meaningful business model

Another limitation can be observed in terms of new model selection. Currently, there is no syntactical way to determine which models are meaningful, as the criteria of meaningful model highly depend on the business context. It is difficult to determine that a model (resulted from merge operation) is meaningful and can be implemented. A cluster analysis can be conducted in future studies to reduce the number of non-meaningful merged models.

By using this methodology, I expect that we can gather several business models, generate construction models from them and create a pool of submodels, modify them to create a new construction model, and generate a new business model to create a new business while keeping the value aspect of the model.

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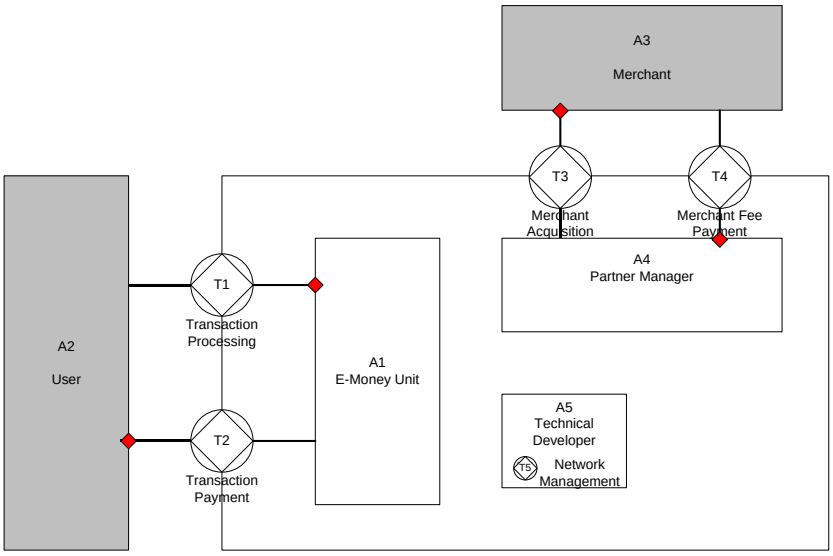
APPENDIX 1: DEMO CONSTRUCTION MODEL

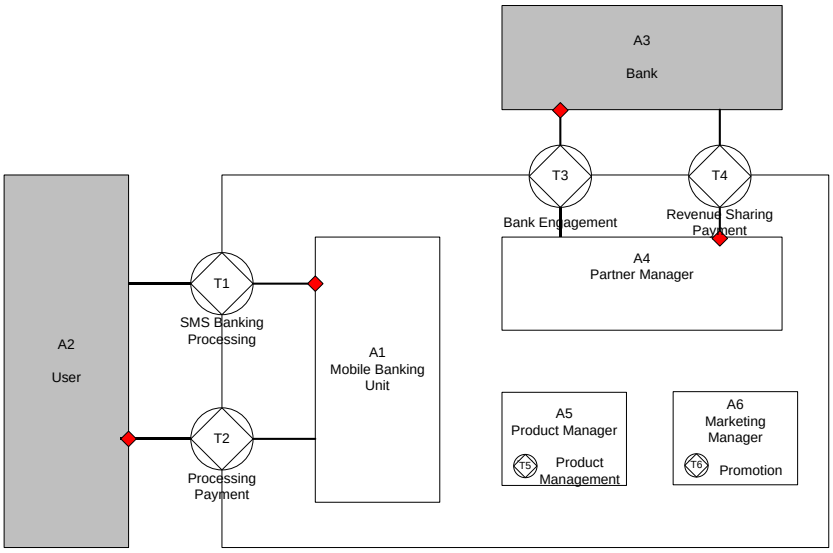
This appendix shows the DEMO Construction Model of Telecommunication Industry in Indonesia, aside from Mobile Internet Package.

Mobile Cash ($\mathcal{M}_\beta$)



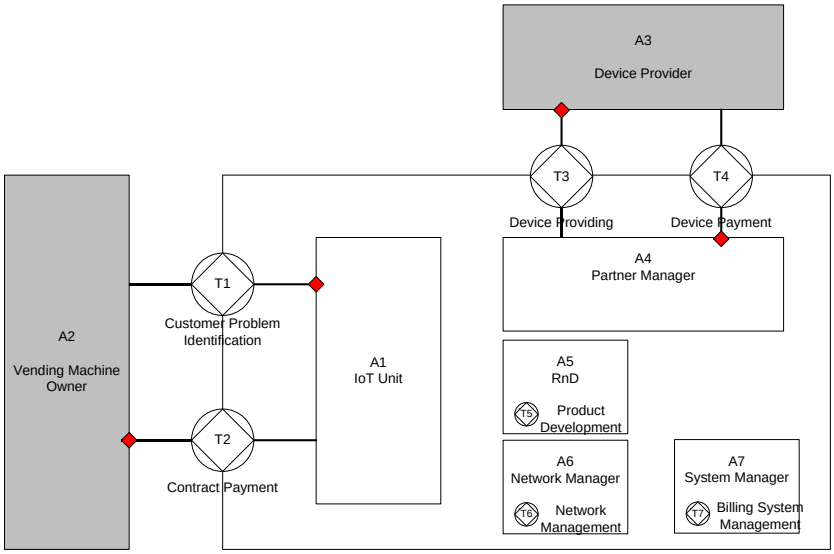
Submodels of Mobile Cash
$\mathcal{M}_{\beta 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in β (**p-type** submodel)
$\mathcal{M}_{\beta 2} = \langle\{A_3,A_4\},\{T_3,T_4\}\rangle$ in β (**q-type** submodel)
$\mathcal{M}_{\beta 3} = \langle\{A_5\},\{T_5\}\rangle$ in β (**r-type** submodel)

SMS Banking ($\mathcal{M}_\gamma$)



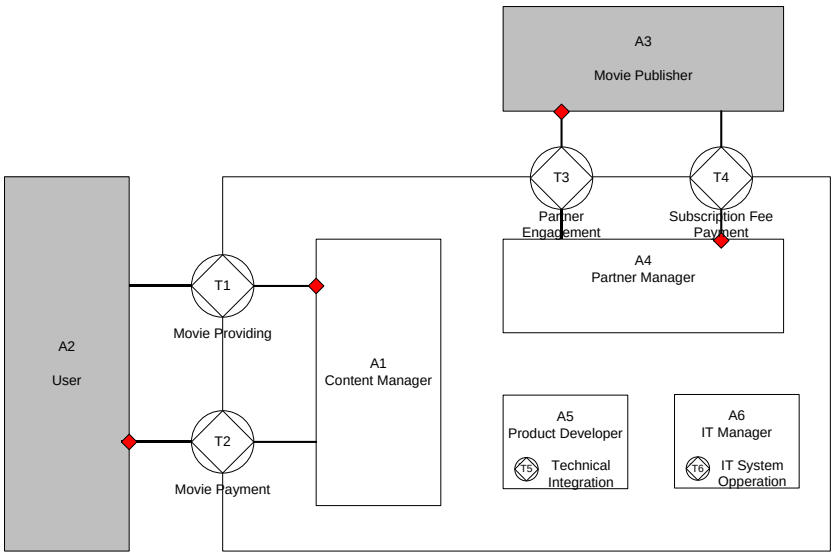
Submodels of SMS Banking
$\mathcal{M}_{\gamma 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in γ (**p-type** submodel)
$\mathcal{M}_{\gamma 2} = \langle\{A_3,A_4\},\{T_3,T_4\}\rangle$ in γ (**q-type** submodel)
$\mathcal{M}_{\gamma 3} = \langle\{A_5\},\{T_5\}\rangle$ in γ (**r-type** submodel)
$\mathcal{M}_{\gamma 4} = \langle\{A_6\},\{T_6\}\rangle$ in γ (**r-type** submodel)

IoT Vending Machine Controller ($\mathcal{M}_{\delta}$)



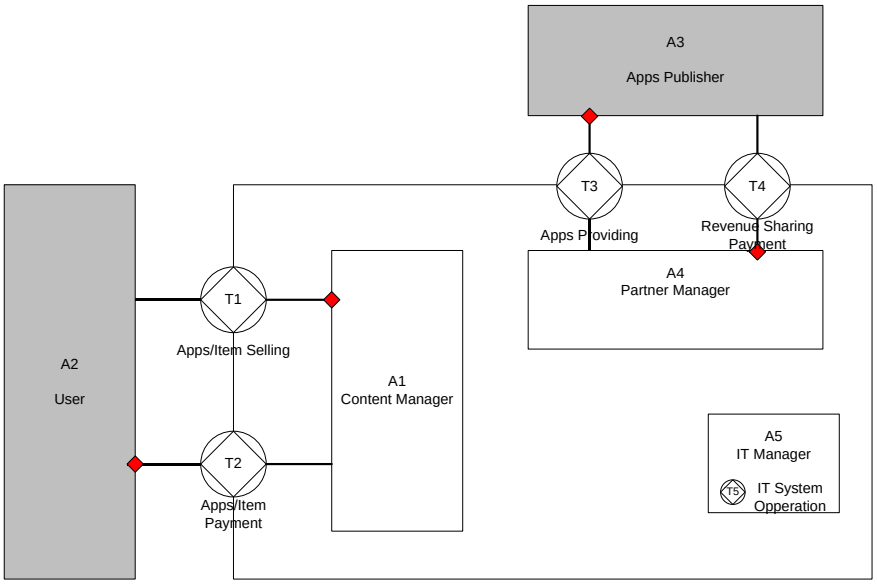
Submodels of IoT Vending Machine Controller
$\mathcal{M}_{\delta 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in δ (**p-type** submodel)
$\mathcal{M}_{\delta 2} = \langle\{A_3,A_4\},\{T_3,T_4\}\rangle$ in δ (**q-type** submodel)
$\mathcal{M}_{\delta 3} = \langle\{A_5\},\{T_5\}\rangle$ in δ (**r-type** submodel)
$\mathcal{M}_{\delta 4} = \langle\{A_6\},\{T_6\}\rangle$ in δ (**r-type** submodel)
$\mathcal{M}_{\delta 5} = \langle\{A_7\},\{T_7\}\rangle$ in δ (**r-type** submodel)

Video Package ($\mathcal{M}_{\varepsilon}$)



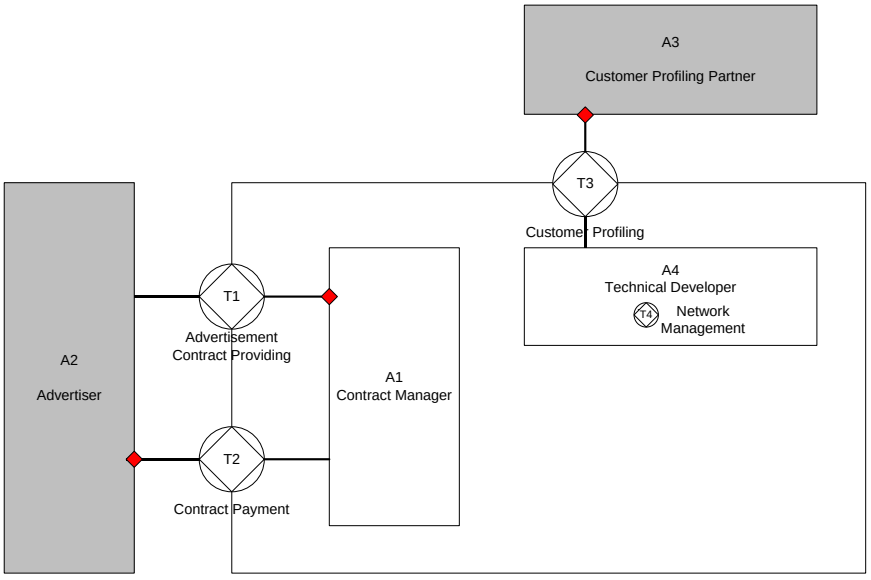
Submodels of Video Package
$\mathcal{M}_{\varepsilon 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in ε (**p-type** submodel)
$\mathcal{M}_{\varepsilon 2} = \langle\{A_3,A_4\},\{T_3,T_4\}\rangle$ in ε (**q-type** submodel)
$\mathcal{M}_{\varepsilon 3} = \langle\{A_5\},\{T_5\}\rangle$ in ε (**r-type** submodel)
$\mathcal{M}_{\varepsilon 4} = \langle\{A_6\},\{T_6\}\rangle$ in ε (**r-type** submodel)

In-apps Purchase ($\mathcal{M}_{\zeta}$)



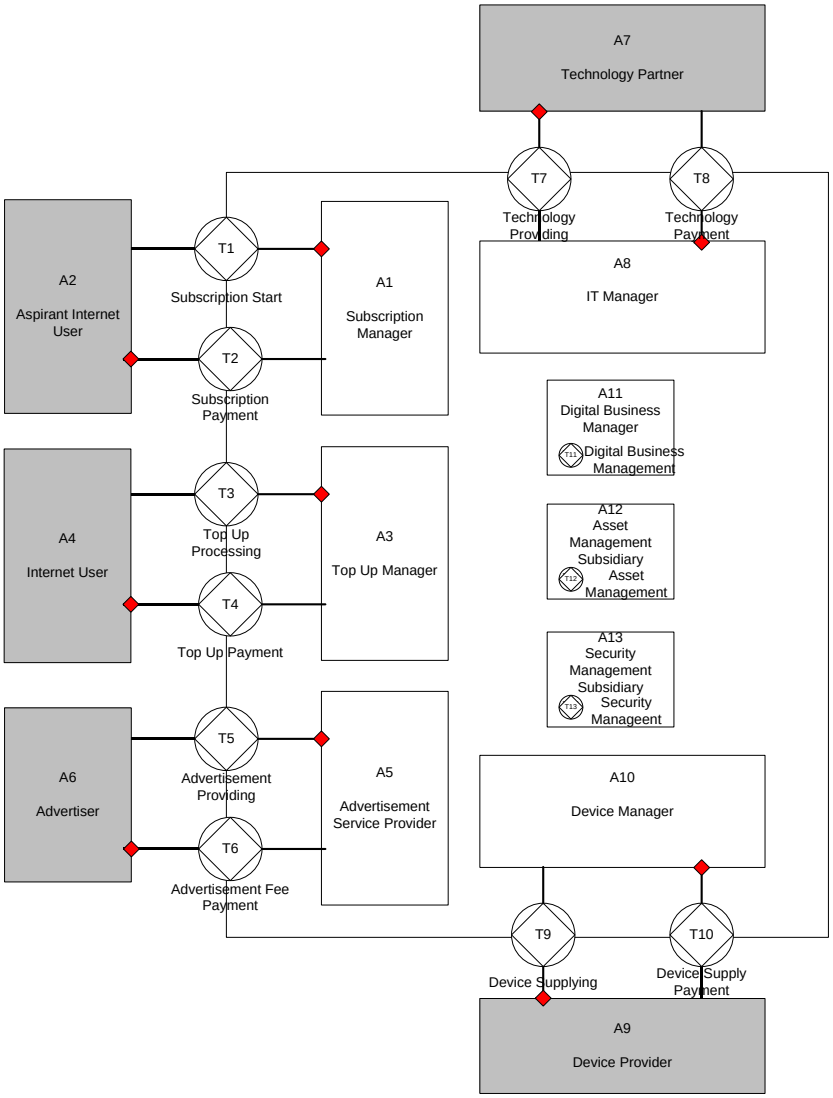
Submodels of In-apps Purchase
$\mathcal{M}_{\zeta 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in ζ (**p-type** submodel)
$\mathcal{M}_{\zeta 2} = \langle\{A_3,A_4\},\{T_3,T_4\}\rangle$ in ζ (**q-type** submodel)
$\mathcal{M}_{\zeta 3} = \langle\{A_5\},\{T_5\}\rangle$ in ζ (**r-type** submodel)

Location-Based Advertisement ($\mathcal{M}_{\eta}$)



Submodels of Location-Based Advertisement
$\mathcal{M}_{\eta 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in η (**p-type** submodel)
$\mathcal{M}_{\eta 2} = \langle\{A_3,A_4\},\{T_3\}\rangle$ in η (**q-type** submodel)
$\mathcal{M}_{\eta 3} = \langle\{A_4\},\{T_4\}\rangle$ in η (**r-type** submodel)

Home Internet ($\mathcal{M}_\theta$)



Submodels of Home Internet
$\mathcal{M}_{\theta 1} = \langle\{A_1,A_2\},\{T_1,T_2\}\rangle$ in θ (**p-type** submodel)
$\mathcal{M}_{\theta 2} = \langle\{A_3,A_4\},\{T_3,T_4\}\rangle$ in θ (**p-type** submodel)
$\mathcal{M}_{\theta 3} = \langle\{A_5,A_6\},\{T_5,T_6\}\rangle$ in θ (**p-type** submodel)
$\mathcal{M}_{\theta 4} = \langle\{A_7,A_8\},\{T_7,T_8\}\rangle$ in θ (**q-type** submodel)
$\mathcal{M}_{\theta 5} = \langle\{A_9,A_{10}\},\{T_9,T_{10}\}\rangle$ in θ (**q-type** submodel)
$\mathcal{M}_{\theta 6} = \langle\{A_{11}\},\{T_{11}\}\rangle$ in θ (**r-type** submodel)
$\mathcal{M}_{\theta 7} = \langle\{A_{12}\},\{T_{12}\}\rangle$ in θ (**r-type** submodel)
$\mathcal{M}_{\theta 8} = \langle\{A_{13}\},\{T_{13}\}\rangle$ in θ (**r-type** submodel)

APPENDIX 2: NEW BUSINESS MODEL CANVAS

This appendix shows the new Business Model Canvas, aside from Portable Internet Device.

Bank-integrated Mobile Cash

The company provide the integration platform of mobile balance and bank account, as alternative payment through mobile. A customer can link mobile cash to their bank account or debit card, making it easier to top up mobile cash.

<table>
<tr>
<td rowspan="2">Key Partners
Bank</td>
<td>Key Activities
Transaction Processing</td>
<td rowspan="2">Value Propositions
Provide alternative payment through Mobile Banking (transfer payment, enquiry, etc)</td>
<td>Customer Relationships
Contact center</td>
<td rowspan="2">Customer Segments
e-money user

Cashless society</td>
</tr>
<tr>
<td>Key Resources
E-Money Unit
Partner Manager</td>
<td>Channels
Mobile Cash apps

Self Service (USSD)</td>
</tr>
<tr>
<td colspan="3">Cost Structure
Revenue Sharing Payment</td>
<td colspan="2">Revenue Streams
Transaction Payment</td>
</tr>
</table>

Home Theatre

The company provide an in-house movie or “home theatre” an additional service to home internet subscriber. A customer can watch movie provided by internet service provider. A device to enhance the movie experience can be added.

<table>
<tr>
<td rowspan="2">Key Partners
Movie Publisher:
Partner Engagement
Device Provider:
Device Providing</td>
<td>Key Activities
Subscription Start</td>
<td rowspan="2">Value Propositions
Provide home movie video and internet</td>
<td>Customer Relationships
Account manager

Call center</td>
<td rowspan="2">Customer Segments
Movie enthusiasts

Home internet user</td>
</tr>
<tr>
<td>Key Resources
Subscription Manager
Partner Manager
Device Manager

Digital business

Infrastructure</td>
<td>Channels
Phone, email

Self Service</td>
</tr>
<tr>
<td colspan="3">Cost Structure
Subcription Fee Payment
Device Supply Payment</td>
<td colspan="2">Revenue Streams
Subscription Payment</td>
</tr>
</table>