



Article

The Dynamic Business Model Framework—Illustrated with Renewable Energy Company Cases from Indonesia

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Abstract: It is important for companies to be able to make their business models dynamic. This enables them to adapt to changing circumstances and remain viable. The aim of this paper is to combine insights from the literature on business models and business model dynamics into a comprehensive dynamic business model framework. The framework that is developed in this paper takes into account various origins of changes in business models (internal or external to the company) and various types of changes in business models (primary or secondary changes and forced changes or strategic choices) and also includes the issue of business model consistency. In order to combine different origins and different types of business model change into one dynamic business model framework, some simplifications of reality were needed. The framework is described in text and shown in a comprehensive picture. The application of the framework to two cases of renewable energy companies in Indonesia shows that the framework is able to capture business model dynamics in a simplified and comprehensive way and that it allows for case study comparison. In a thorough discussion, it is shown how the framework can be adapted to make it better able to represent more complex dynamics.



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1. Introduction

The dynamic capabilities of companies to adapt their business models over time are vital to ensuring profits for business in the long term [1,2]. Companies need to respond to different environmental changes with different means of organizational change, such as open innovation and business model innovation [3–5]. Therefore, their business models cannot be static [6]. Especially in the context of bottom of the pyramid (BoP) markets, in which customers generally only have a few dollars of income per day, the adaptability of businesses to their environment and the awareness of their impact on their environment is crucial [7].

Understanding these dynamics is important [8], both for companies and for scientists. Important questions related to business model dynamics, both for companies and for scientists, are, for example, ‘how can companies react to changes in their environment?’ and ‘what is the degree of freedom that companies have?’ For analyzing and evaluating these dynamics one has to look at different aspects of business models, all of which are important to business model theory as a whole. These different aspects are completeness, interrelationships, and changes over time [9]. These aspects can be seen as three subsequent levels of capturing dynamics.

The first level, completeness, can be seen as the foundation for the analysis of business model dynamics. It looks at the internal components of the business model and the external factors that influence these components. The second level, interrelationships, looks at the interrelationships between these internal components and external factors. It is important to know how the business shapes its environment and is shaped by it [10]. The third level is

what is usually considered to be business model dynamics in a narrow sense: the changes to the business model over time. This is the culmination of the two previous levels: it is impossible to properly assess changes over time without them. Indeed, without a proper understanding of the internal components of the business model, and of the external factors that affect them and of how all of these are interrelated, it would be impossible to explain the changes to the business model over time.

Having looked into the levels that subsequently have to be taken into account when analyzing or evaluating business model dynamics, the next step is to combine them into one conceptual framework that can be used to analyze or evaluate the business model dynamics of a certain company over time. Being able to perform such an analysis with a conceptual framework provides both companies and scientists with a better understanding of which aspects to take into account when trying to better understand business model dynamics and how these aspects influence each other. This leads to the research question for this paper: *How can business model change be conceptualized in a dynamic business model framework?*

The method used in this paper to create a dynamic business model framework is mainly conceptual. Literature on business models and their dynamics will be combined to form a framework that can be used to represent and analyze the business model dynamics of a singular case, being either an entrepreneurial start-up company or an entrepreneurial business unit in a larger corporation that focuses on one main product category. Such a business unit or start-up company will be referred to in short as 'company'. The paper will show how business model changes can either emerge from inside the company or from outside the company. In many cases, such changes have an initial impact on one business model aspect and then, because business models need to be a consistent combination of several aspects, inevitably affect the other business model aspects too. While building up the framework, examples will be used. The resulting framework will be illustrated by applying it to two cases of renewable energy companies in Indonesia. Subsequently, it will be shown how the data from multiple case studies can be combined in a cross-case analysis.

The paper is structured into five sections. The next section will lay the foundation for the framework by presenting the main business model elements, the origin of change of such elements, and the subsequent mechanism by which the business model elements are adapted over time to keep the model consistent. Section 3 will then build up and present the framework. In Section 4, the utility of the framework will be illustrated using two cases of renewable energy companies in Indonesia. Discussion and conclusions can be found in the fifth and final section.

2. Conceptualization of Business Model Change

In order to develop a framework representing business model dynamics, several things have to be considered. Based on a thorough literature review, this section will first describe what a business model consists of and how its internal components can be represented. Then, the dynamic aspects of business models are addressed through an investigation into the origins of change and different types of changes.

2.1. Business Model Elements

The business model has a long history of definitions and descriptions going back to 1998 [11,12]. One of these definitions asserts that the business model consists of the content, structure, and governance of transactions with the intent of creating value [13,14], while others separate the business model into more elements [15–19]. For example, Shafera et al. [18] separate the business model into strategic choices, value creation, value capture, and the value network. Some common points can be found between the different representations of the business model. For example, in all these publications, one or more business model components address the network within which the company functions. Another commonality is a component addressing value capture.

The various ways in which the business model can be subdivided into components brings up the question as to what subdivision is most appropriate for the analysis of

business model dynamics. One main aspect to consider is that increasing the number of components leads to both increased completeness and increased complexity when analyzing dynamics [9]. In this paper, the focus will be on a limited number of key overarching components of the business model, because in this way business model dynamics can already be illustrated and explained while limiting complexity.

The value proposition is one of these key components [15], appearing in one of the earliest versions of the business model [1] and subsequently appearing in most business model representations [10,14,17,20,21]. Another major component addresses the network of partners and channels that the company works with to create value. This component can be further subdivided into different parts, such as in the business model canvas [19], but can also be represented by one overarching component [1,14,15,18,20–23]. The cost and revenue structure is another major component, often represented as a single component [15,20–22].

To keep the representation of the business model clear, as well as to represent internal dynamics with a reasonable degree of complexity, a representation following these common themes of the business model, as used by Bohnsack, Pinkse, and Kolk [24], will be used in this paper. In this representation, the key elements of the business model are condensed into three main components: (1) the value proposition, (2) the value network, and (3) the cost and revenue structure.

By comparing the representation of the business model across these three main components with the elements that are represented in the business model canvas (BMC) [19], the BMC elements can be grouped into the three main components, as shown in Figure 1. Firstly, the ‘customer segment’, ‘value proposition’, ‘key activities’, and ‘resources’ elements of the BMC are integrated into the ‘value proposition’ component, as they all pertain to what must be kept in mind whilst creating the value proposition. The ‘value proposition’ component is represented by the white-colored blocks in Figure 1. A value proposition has to address a specific customer first [20,25], while the company also needs to have the necessary resources and activities to create their value proposition, which explains why the key resources and key activities can also be grouped together with the value proposition. Secondly, costs and revenues are combined into one element. This component, ‘cost and revenue structure’, is represented by the dark-gray-colored blocks in Figure 1. Thirdly, ‘channels’, ‘key partners’, and ‘customer relationships’ are contained in the ‘value network’ component, as they all pertain to the actors who form the value network, their relationships, and how they interact. The ‘value network’ component is represented by the light-gray-colored blocks in Figure 1. A similar subdivision of components can also be found in a paper by Tikkanen et al. [23], where ‘key partners’, ‘customer relationships’, and ‘channels’ are included in a component called ‘network’, and ‘key activities’, ‘key resources’, and ‘value proposition’ are combined in a component called ‘operations’.

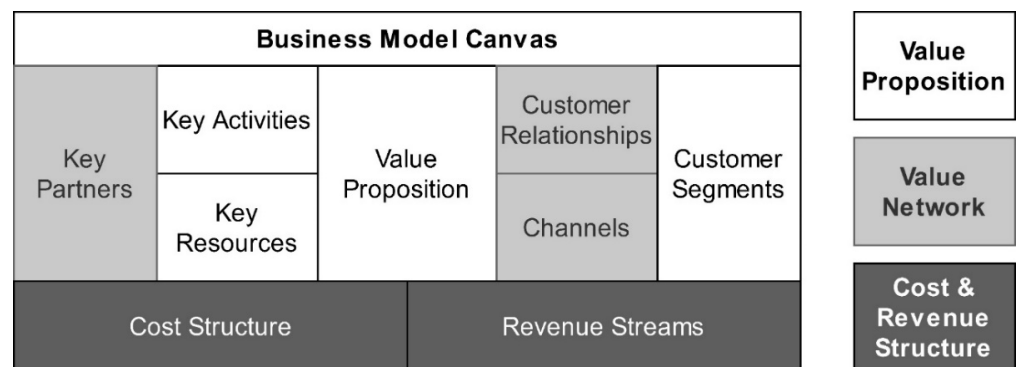


Figure 1. The three business model components distinguished in this paper, represented as part of the business model canvas.

2.2. Different Types of Business Model Change and the Role of Consistency

As a natural starting point for the representation of business model change, it is important to look at the origin of change. Broadly speaking, this origin can be separated into origins internal to the company and origins external to the company [9,26]. When conceptualizing business model dynamics, the distinction between these origins is relevant, because internal factors can be influenced more easily by the company than external factors.

Business model changes with an internal origin can be guided, for example, by a need from within the company to develop something new [1]. On the other hand, external origins of change can, for example, be sudden changes in stakeholder demands, changes in the competitive environment, and changes brought about by new technology, laws, or policies [27], or the rise of new types of products or services, such as smart and networked products and services [8,28,29].

Of course, the decision to change the business model is always internal to the company, as it relates to its own development. The distinction here happens before that, in the origin of that very decision. In that sense, a change with an external origin can be defined through the decision for this change being imposed by external conditions.

2.2.1. Primary and Secondary Business Model Changes

When conceptualizing business model dynamics, it is important to take a closer look at the sequence of changes. Changes in business models tend to originate in one or a subset of the three components outlined above: the value proposition, the value network, or the cost and revenue structure [30]. These initial changes rarely remain isolated to their component though: changes originating in one component will have a tendency to affect the other components too [31]. This can be best exemplified by the creation of a new value proposition, as this will change the cost and revenue structure too by creating new revenue streams and by changing the cost requirements [32]. The creation of the new value proposition can also affect the value network by requiring new partners and suppliers [33]. In the framework, the initial change in the first business model component is labelled as the primary change, whereas subsequent changes in other business model components are labelled as secondary changes.

An important reason why changes in one business model component have a tendency to affect other components is the need to keep the business model consistent [31,34–37]. For example, if a new product is added to the value proposition without adding a new supplier who can supply this product to the value network, this may lead to an inconsistent business model, and, as a consequence, worse company performance [31,38]. Amit and Zott [39] write that managers tend to ask themselves several questions when considering business model innovation. In this sequence of questions, the necessity of keeping the different elements of the business model consistent becomes clear. The first of these questions addresses what kind of new value proposition can be offered, another question addresses how the value network should be adapted to create this new value proposition, and a final question addresses how revenues should be adapted to this new value proposition.

However, the example in the previous paragraph also shows that secondary changes are not always necessary. If one of the suppliers that was already present in the value network can supply the new product to the company, then the value network does not need to be changed. Moreover, a secondary business model change does not necessarily have to be later in time than the primary business model change. Following the previous example, adding the supplier to the value network must be performed before the company can add the new product to its value proposition. For the sake of clarity, in the framework, primary and secondary business model changes are assumed to take place at the same point in time.

2.2.2. Forced Change and Strategic Choice

Both primary changes and secondary changes to other business model elements can either be a forced change or a strategic choice [30]. The distinction between a forced change

and a strategic choice is relevant because it shows the degree of freedom an entrepreneur or manager has when making the business model change. An example of a forced primary change is a change in the value proposition of a company because a product gets prohibited by law. An example of a primary change induced by strategic choice is when a company chooses to expand its value proposition because a competing company increases the price of its products. A forced secondary change can be seen as realignment of business model components to maintain coherence between them [1,39,40]. For example, a company may have to change its value proposition because a crucial supplier goes bankrupt. In the case of a strategic choice secondary change, improvements in one component of the business model allow for improvements in other components, but changes in other components are not strictly enforced; the company can choose to either change them or not. For example, when a new value proposition is added to the business model and one of the existing suppliers is already able to supply it, the company can still make the strategic choice to attract another supplier that can supply the product cheaper or faster.

3. The Dynamic Business Model Framework

In summary, the conceptualization of business model change proposed in this paper consists of six main considerations which together form the dynamic business model framework. These six main considerations follow from the literature review described in the previous section. As the goal of this paper is to make a first version of a dynamic business model framework and to show its working graphically, the choice was made to limit the number of main considerations and the number of distinguished business model elements, origins of change, and types of change. The six main considerations are the following:

1. The business model is subdivided into three main components: the value proposition, the value network, and the cost and revenue structure;
2. The origin of change can lie inside or outside the company;
3. The initial change in the business model refers to one particular business model element;
4. Business model consistency mostly requires follow-up changes in one or more of the other business model elements;
5. The initial changes are called primary changes and the possible follow-up changes are called secondary changes;
6. Business model changes can either be forced changes or strategic choices.

These six main considerations are compiled into a single framework, as exemplified in Figures 2 and 3. The three components of the business model, which are the value proposition, the value network, and the cost and revenue structure, are represented along a time axis, with each modification to a component represented by an arrow. A modification can be a forced change (represented by an arrow with a solid line) or a strategic choice (represented by an arrow with a dashed line). The origin of change is represented graphically as well, where a double-lined circle shows that the change has an internal origin, while a circle with a small arrow attached to it shows that the change has an external origin. Furthermore, these changes can either be a primary change within the business model (represented by a black-tipped arrow), or a secondary change (represented by a white-tipped arrow). This simple visualization represents the changes occurring within a business model over time, as well as the interactions between the three business model components.

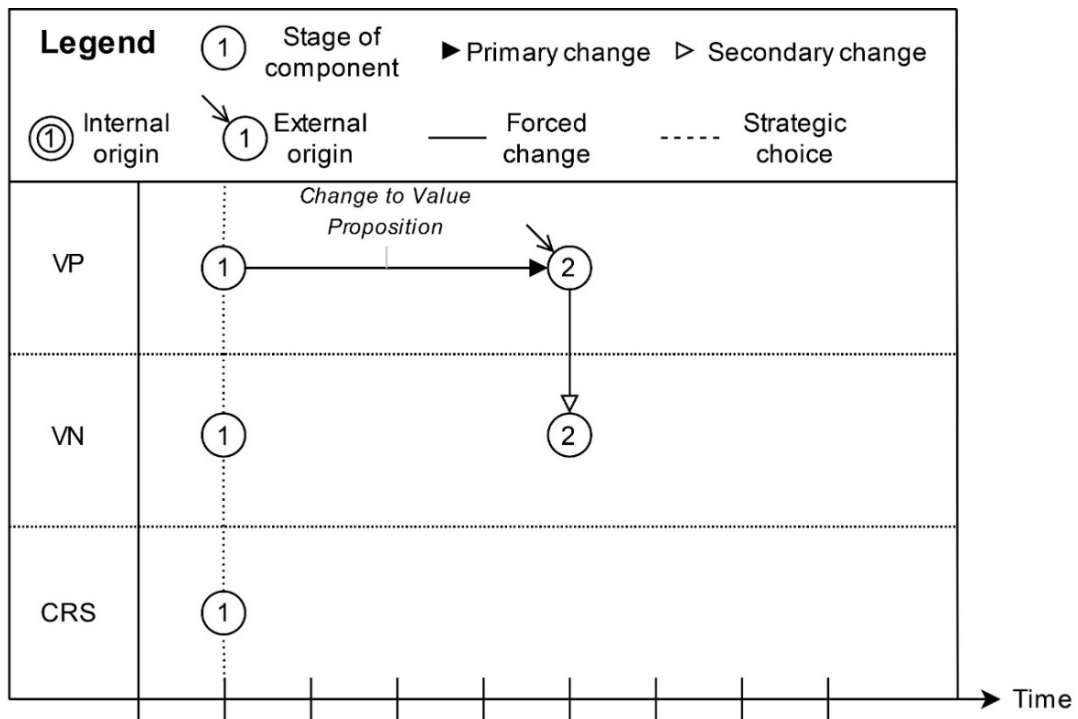


Figure 2. The dynamic business model framework: example 1—value proposition (VP) change with external origin leading to forced value network (VN) change.

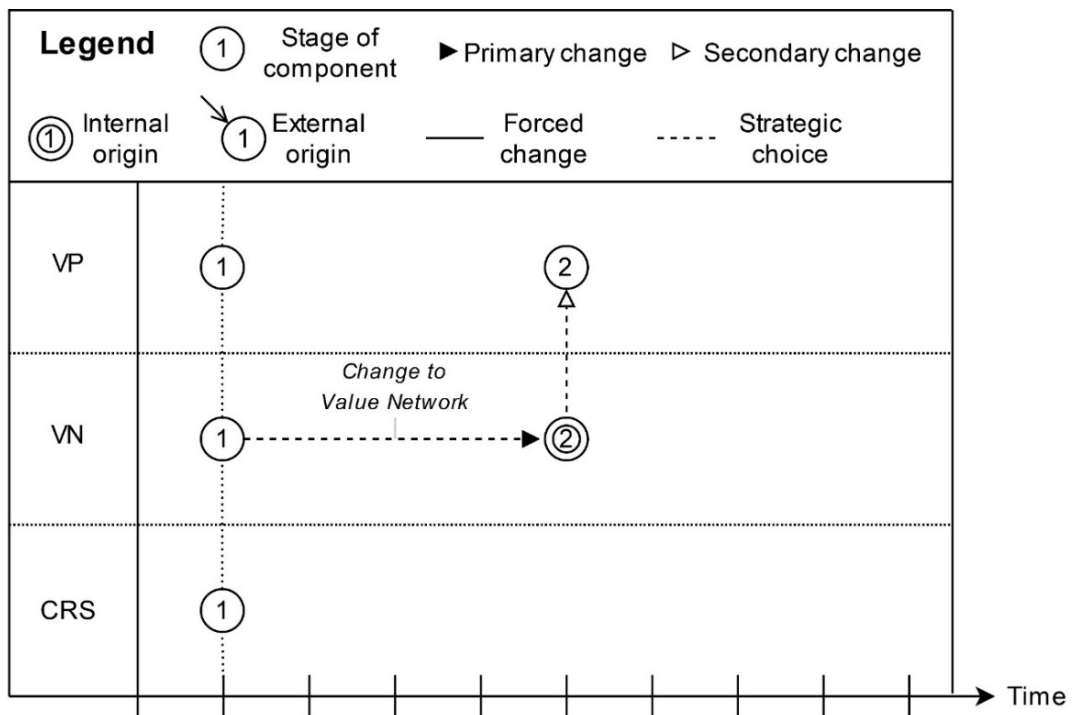


Figure 3. The dynamic business model framework: example 2—strategic choice value network (VN) change with internal origin leading to strategic choice value proposition (VP) change.

Figure 2 shows how the framework can be visualized to represent a change in the value proposition (with an external origin) that leads to a change in the value network. The solid lines of the arrows representing these changes show how, after the initial forced

change in the value proposition (VP), the value network (VN) is forced to change as well. In Figure 2, it can be seen that the change VP1 to VP2 leads to the change VN1 to VN2.

This can be exemplified in the context of the renewable energy industry, where different value propositions have distinct actors in their value network. For example, a paper by Strupeit [33] shows how, in the case of renewable energy deployment in Germany, an increase in the complexity of PV projects led to an increase in collaboration between network actors. This is a change to the value proposition with a direct effect on the value network. In this case, both the initial change and the resulting change are forced. The value proposition is forced to change because the increasingly complex projects evolve from the customer needs (external origin), while the value network is forced to change in order to maintain consistency within the business model. So, the value network changes in order to allow for the creation of the improved value proposition.

Another example can be given in the other direction, namely a change in the value network leading to a change in the value proposition, as represented in Figure 3. This can also be exemplified in the context of renewable energy projects, in the case of including new actors into the value network to obtain new customers and respond more rapidly and efficiently to their needs [41,42]. In this case, the primary change—the addition of actors to the value network—is not a forced change to establish consistency, but rather a strategic choice. Indeed, actions such as adding new actors to the value network can be seen as strategic actions which increase the range of possible changes in other aspects of the business model. For example, adding a supplier with a wider range of products can allow for more freedom in the types of value propositions that can be developed from said products.

In Figure 3, the framework represents a change to the value network (VN1 to VN2, with an internal origin) leading to a change in the value proposition (VP1 to VP2). For reasons of clarity, changes in the cost and revenue structure (CRS) are left out in both Figures 2 and 3. Furthermore, as already explained in Section 2.2.1, for the sake of simplicity, the subsequent change in VP after the change in VN is shown as taking place at the same point in time.

The framework, represented in a graphical form, can be used to track and analyze business model changes over time. Since the goal in this paper is to present a first version of the framework and illustrate its functionality, several simplifications were deliberately adopted, such as the representation of the business model with three main elements only, and locating the origins of change either within or outside the company. It is important to realize that such simplifications can be removed one by one. It is possible, for example, in Figures 2 and 3 to adopt a more detailed representation of the business model by distinguishing between more than three business model elements. If more elements are distinguished, then more complex (multi-factor) interactions between these elements and the environment can be tracked over time. Such refinements of the framework will be discussed later on in Section 5. The next section will show how the simplified framework can be practically applied to two real-world cases.

4. Illustration of the Dynamic Business Model with Two Cases

To give some more elaborate examples of the dynamics that can be represented by the previously explained framework, two case studies are described here, based on Meslin [43]. The cases focus on renewable energy companies in Indonesia. The case study material was collected via semi-structured face-to-face interviews in the period July–September 2019.

4.1. The Case of Solar Power Indonesia

Solar Power Indonesia is a renewable energy company based in Indonesia, founded in 2007. This company has changed its business model several times, starting with its value proposition by removing wind turbines as a product offering in 2012. This was due to PV being a more compact and efficient solution for most regions where transportation was a main concern. This change in the value proposition was followed by a change to the value network in the form of partnerships with PV producers in 2014, and subsequently with

battery producers between 2014 and 2015. These two changes were due to the company’s wish to have a better relationship with suppliers. The next change was the replacement of its batteries with lead–carbon batteries in 2016–2017 to further add to the value proposition of providing clean and safe energy. This change was driven by increasing consumer concerns regarding the lifecycle of renewable energy systems, pushing the company towards safer and cleaner battery types. Finally, the last change to their business model was the addition of a buyback scheme for solar panels in 2017, which was developed to assuage certain customers’ fears that the panels would quickly become obsolete.

With the help of the dynamic business model framework, all business model changes over time found in this case study can be represented in one comprehensive picture, which is shown in Figure 4. It also includes the (external or internal) origins of these changes and the types of change (primary or secondary change and forced or strategic choice). In this figure, the initial change in the value proposition (VP1 to VP2), the removal of wind from the value offering, is followed by a change in the value network (VN1 to VN2) due to the removal of wind related suppliers, and a change in the cost and revenue structure (CRS1 to CRS2) due to the removal of costs associated with wind energy-related components. The initial change is seen as a strategic choice, as the company was not forced to remove wind energy as a product offering, but the subsequent changes are forced by a need for business model consistency. Considering the initial reason for the change was internal to the company, this is classified as a change with internal origins.

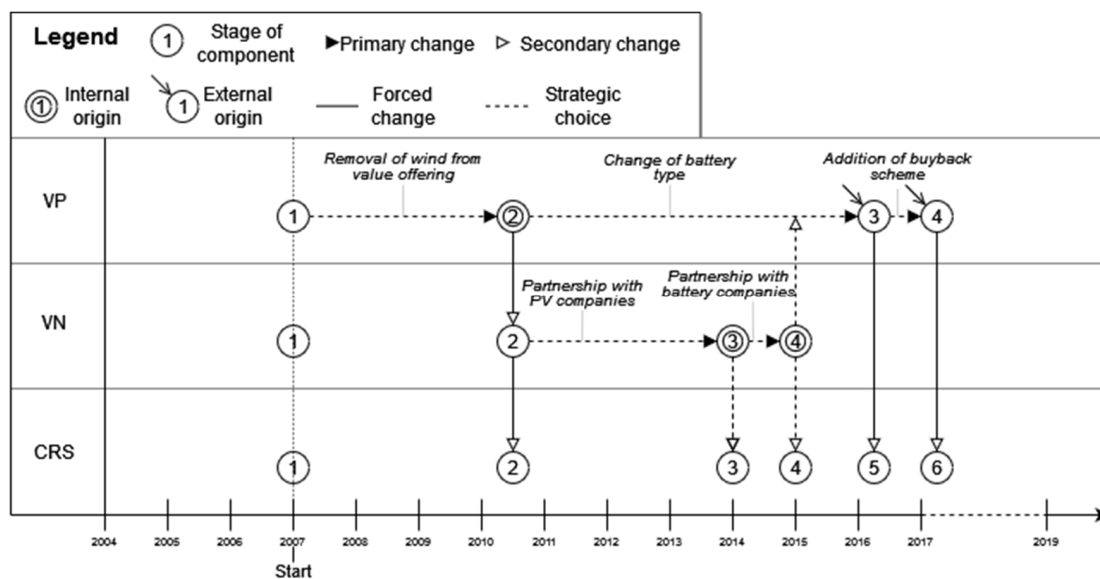


Figure 4. The dynamic business model framework: Solar Power Indonesia’s business model dynamics.

The next change, occurring in the value network (VN2 to VN3), was the partnership with PV companies, has an impact on the cost and revenue structure (CRS2 to CRS3) due to the changes in the costs associated with PV panels through the partnership with PV companies. Both of these changes are strategic choices, as neither one is forced. The origin of this change is internal, as the change was driven by the focal company’s wish to partner with said PV companies.

The next change in the value network (VN3 to VN4), the partnership with battery companies, not only has the same effect on the cost and revenue structure (CRS3 to CRS4), but it also affects the next change in the value proposition (VP2 to VP3). This is because the use of lead–carbon batteries was encouraged by the partnership with battery manufacturers. Again, like the previous change to the value network, this one also consists of strategic choices, and has internal origins.

The change to the value proposition that follows (VP2 to VP3), the change of battery type, is a strategic choice, but with an effect on the cost and revenue structure (CRS4 to

CRS5) that was forced by a need for consistency (the price of the new batteries). The origin of this change was external, since it was driven by consumer concerns. Notice the arrow pointing towards this change from step 4 of the value network. It is used to indicate that the previous change in the value network (the partnership with a battery company) influenced the subsequent change to the focal company's battery type of choice, without being the primary driver.

The last change to the value proposition (VP3 to VP4), is the addition of a buyback scheme for old solar panels. This change has external origins, namely, the consumer fear of solar panels becoming obsolete quickly. This change in value proposition directly affected the cost and revenue structure through a need for consistency, and so even if the initial change in the value proposition is a strategic choice, the resulting change in the cost and revenue structure (CRS5 to CRS6) is a forced change.

In this picture, subsequent states of a certain business model element have subsequent numbers. This means that, for example, in the year 2014, the value network and the cost and revenue structure can change from CRS2 to CRS3, while the value proposition does not change and therefore keeps number VP2. This explains why in the final situation in the year 2017, the value proposition and the value network have numbers VP4 and VN4 while the cost and revenue structure has number CRS6. The time axis is partly represented by a dotted line because, although the order of events is certain, the exact years in which the events took place could not be revealed with full certainty.

4.2. The Case of Contained Energy

Contained Energy is one of the oldest renewable energy companies in Indonesia, founded in 2004 in the wake of the tsunami in Aceh as a renewable energy-based relief group. The first change to their business model was the addition of reverse osmosis systems powered by renewable energy around the year 2007. The system was meant to produce clean water. The need for clean water became apparent during natural disasters, such as the 2004 tsunami in Aceh, and became urgent in poor, isolated regions in arid climates that were disconnected from the grid. As a consequence of adding the reverse osmosis system to the value proposition, the value network and the cost and revenue structure of the company changed too. This business model change was followed by two more similar additions to their value proposition: the development of PV cold storage systems for fishing villages and other refrigeration applications, and of PV hybrid systems for regions still relying on diesel generators, both around the year 2012. Additionally in this case, the changes in value proposition were followed by changes in the value network and the cost and revenue structure. The next two business model changes were caused by the company's experience with projects in extreme weather or terrain. The first, where an inverter was damaged by lightning and the company had to rethink and improve their lightning protection for such subsystems, was a change in the value proposition, followed by a change in the cost and revenue structure. The second was the improvement of packaging to prevent damage during transportation through rough terrain. The next change was the hiring of different boat drivers from different communities for material transportation to isolated islands in order to prevent conflicts within communities. This change primarily affected the value network. The next change was also to the value network, in the form of increased collaboration with local communities, training and employing them for various jobs, as well as educating the general population. This change was caused by the company's understanding that better results could be achieved by including members of the community in their projects. Finally, the last change was a partnership with a finance company because of the company's desire for expert advice on financial matters.

Figure 5 shows how these changes can be visualized with the framework. Beginning with the first change in the value proposition (VP1 to VP2), this addition of reverse osmosis in the value offering is a strategic choice, but the consequences on the value network (VN1 to VN2) and cost and revenue structure (CRS1 to CRS2) are both a result of forced change

because of business model consistency. As this change was caused by a desperate local need for clean water, it has an external origin.

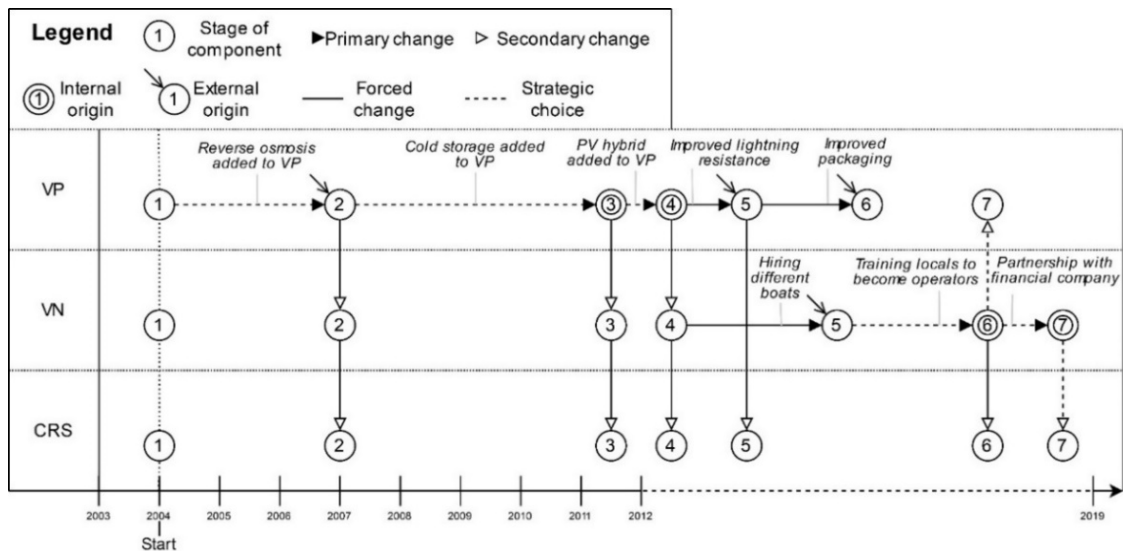


Figure 5. The dynamic business model framework: Contained Energy’s business model dynamics.

The next two additions (cold storage and PV hybrid systems) to the value proposition (VP2 to VP3 and VP3 to VP4) both start with a strategic choice to change the value proposition, followed by a forced change in the value network and cost and revenue structure due to consistency. Although these two changes were also implemented in relation to an opportunity existing outside of the company, there was no external pressure to implement these changes, making their origins internal.

The next change, more rigorous lightning protection, is a forced adaptation to the extreme weather conditions of some regions. In this sense, both the initial change in the value proposition (VP4 to VP5) and the resulting change in the cost and revenue structure (CRS4 to CRS5) are forced.

The next two changes are improving packaging (change VP5 to VP6 in the value proposition) and hiring different boats (change VN4 to VN5 in the value network). Both of these changes are also examples of forced changes. In the first case, insufficient adaptation to rough terrain would cause constant damage or would make the company stop servicing those isolated regions. As for hiring different boats, the presence of the company in a region was the cause of conflict within communities, which could result in significant financial and social costs. Both changes are forced due to external circumstances and have external origins.

The next change in the value network (VN5 to VN6), training of locals and increasing collaboration with communities in the region, are strategic choices, but the resulting effects on the value proposition (VP6 to VP7) and on the cost and revenue structure (CRS5 to CRS6) are different. Modifying the value proposition on the basis of this change in the value network is a matter of choice, whereas the change in the cost and revenue structure is a direct result of the added costs incurred by the training and educating of locals, a consistency-based change. This change was mainly driven internally by the company’s decision to add more value to the communities it was serving, making it a change with internal origins.

Finally, the last change to the company’s business model was the addition of a finance company as a partner in their value network. This is also an interesting case to look at, as both the initial change in the value network (VN6 to VN7) and the subsequent changes in the cost and revenue structure (CRS6 to CRS7) are strategic choices. Indeed, a financial adviser does not force you to follow their advice, because it is up to the focal company to

make that choice. This final change is also of internal origin as it was not initiated by the financial company but by the focal company itself.

4.3. Case Study Comparison

Looking at the overall result of these two case studies and their representations through the framework, several things can be noted. It must first be mentioned that such observations made regarding the data obtained from the case studies is not an attempt to justify conclusions regarding the tendencies of business model changes. Rather, it is a demonstration of the utility of the framework and the type of data and analysis that results from its use.

To start with, the business model changes can simply be counted. In total, 29 changes took place in the business models of these two cases. The case of Solar Power Indonesia shows 11 changes, among which are five primary changes and six secondary changes. The case of Contained Energy shows 18 changes, among which are eight primary changes and 10 secondary changes.

Regarding primary and secondary changes in the two cases, a number of things can be noticed. Firstly, in these two cases, a majority of business model changes start in the value proposition, with three out of five changes in the case of Solar Power Indonesia and five out of eight changes in the case of Contained Energy. Changes starting in the value network are the second most frequent type of change. It is also noticeable that in these cases, no changes start with the cost and revenue structure. However, a change in another business model component is usually followed by a secondary change in the cost and revenue structure. Indeed, out of all 13 primary changes, only two did not have an effect on the cost and revenue structure. Regarding business model consistency, the cases reveal that although consistency is important, it does not imply that every component needs to change after a change in one component. Changes can sometimes be contained within one or two components.

Regarding forced change versus strategic choice, it can be said that, irrespective of whether the initial change is forced or strategic, the resulting changes can be of both types. A forced initial change does not necessarily lead to a forced change in other components, and the same goes for strategic choices. Comparisons between the companies are also possible, such as the fact that Solar Power Indonesia has all of its changes starting as strategic choices, while Contained Energy has three of its eight changes starting as forced changes.

Regarding the origins of change, in these two cases, there is almost the same number of external as internal origins. Indeed, in the case of Solar Power Indonesia, three out of five primary changes had internal origins, and in the case of Contained Energy, four out of eight primary changes were internal, so a total of seven out of 13 primary changes had internal origins. These findings differ from the paper by Bucherer, Eisert, and Gassmann [44], where it was found that most drivers for business model change were external. This can be explained by differences in definitions. For example, Bucherer et al. [44] classify changes to the value proposition as having internal origins if and only if the focal company is the first one to create such a value proposition. In the present paper, origins are classified according to the location of the dominant driving force behind the change relative to the focal company.

Of course, two cases are not nearly enough for firm conclusions, but, as mentioned above, this was not the intention. What the case studies do show is that the framework allows for an easier interpretation and comparison across multiple cases. It reveals information about the origins and types of changes in business model components. The framework also provides an overview of the frequency and location of business model changes.

5. Discussion and Conclusions

By combining insights from the literature, this paper presents a comprehensive framework that conceptualizes business model dynamics and proposes a picture to illustrate this. The framework includes different origins of business model change and different types

of business model change. Two case studies of renewable energy companies in Indonesia show that it can be used to get a quick overview of various aspects of business model dynamics, also in a quantitative way, and that it enables comparison between cases. The paper contributes to the extant literature by combining insights into business models and business model dynamics into one comprehensive business model dynamics framework.

To be able to grasp the complex reality of business model dynamics in one comprehensive framework and to be able to show this framework in one picture, some simplifications were necessary. These simplifications result in more clarity and facilitate drawing conclusions from case studies and case comparisons, but they do not always do justice to the complexities within the cases. Some issues will be dealt with below.

First, forced change and strategic choice are not just a dichotomy; instead, they represent opposite sides of a continuum. A change can be forced to some extent but can also leave room for strategic choice by a company. In addition, in this paper, two different things are labelled as a forced change: (1) a business model change that is forced upon a company, such as a new law or a supplier going bankrupt, and (2) a secondary business model change that has to follow a primary change because of business model consistency, for example, a change in cost and revenue structure because of a change in value proposition. Although both changes leave little or no room for strategic choice by the company, they are definitely different in nature.

Then, there is the definition of external versus internal. While the definitions of internal and external origins of business model change were given relative to the focal company, it can be argued that there are additional distinctions that could be made. The most relevant additional distinction would be the one between the business model of the focal company and components external to it, such as government policies, natural disasters, technological innovations, or even competitors. This allows for a more nuanced gradation of external and internal factors, for example, by defining factors within the company as internal and factors outside of the business model as external, while considering factors within the business model but outside the focal company as a sort of intermediate. Furthermore, business model change can be caused by more than one driver. In that case, how should we decide whether the origin is internal or external? Is the most important driver the decisive one? Or should the influence of each driver be allowed to play a role? Moreover, how do we represent such multi-factor changes caused by more than one driver graphically using the proposed framework? One possibility is to use a combination of the symbols for internal and external drivers and then provide an explanation of the various causes associated with the given change; another possibility is to represent each driver separately.

Internal and external drivers could be further divided into opportunities and threats [44]. This distinction could help broaden the analysis of business model dynamics by further defining its origin while also allowing for a more in-depth analysis of the cause and effect relationship of business model change. However, applying this appears not to be so straightforward and therefore it is not included in the framework. Do all forced changes fall under the threat category, whereas all the opportunities lie within the realm of strategic choices? Then there would be no real added value since forced changes and strategic choices are already part of the framework. In addition, some business model changes appear to be neither caused by an opportunity nor by a threat, but rather they are just strategically convenient. This is demonstrated, for example, in the case of the company, Contained Energy, where local people were trained in order to improve cooperation with the community. Furthermore, changes can be made in order to open up future opportunities or avoid future threats. For example, in the same case, where different boats were hired in order to avoid problems with local communities.

This paper raises some interesting questions regarding the freedom entrepreneurs and managers have in changing their business model. It appears that consistency is a major constraint which always needs to be considered during business model innovation. Awareness of other components affected by the change in one component is crucial. In the case of primary changes, forced changes demonstrate that a company is not always in

control of what they would like to change. Some changes may not be wanted but imposed, or necessary. However, given good awareness of possible threats, managers can mostly turn what would otherwise have been forced changes into strategic choices if they act early enough and thereby anticipate upcoming changes. Of course, some changes, such as those due to policy or regulations, can be forced and completely unavoidable.

Further research is needed to determine under which circumstances and in which way more aspects of complex reality should be included in a dynamic business model framework, for example, by further subdividing the business model elements and also including the dynamics between these. This will depend on the research goals. A balance is required between increased realism for higher validity versus simplification for usability and overview. The framework presented in this paper can also be used when distinguishing between more elements within a business model.

More elements in the framework will enable tracking and measuring of more complex multi-factor changes. Just condensing all relevant business model aspects into three elements may be a simplification that is too crude to render the intricacies of various complex multi-factor effects. If, for example, a change in all three elements of the business model is observed in the simple representation used in this paper, then it seems as if the entire business model is changed. However, if each of these elements in fact is comprised of three sub-elements, only one of which has changed, then in practice a multi-factor change happens while major parts of the business model remain the same. Therefore, depending on the goal of using the framework, more detail and hence larger numbers of business model elements may have to be distinguished, for example the nine elements in the business model canvas. The framework representation can simply reflect these additions by replacing the three business model elements in the picture by a larger number of elements. Another addition that would reveal more complex multi-factor interactions would be to track more precisely in each episode the interaction of business model elements with external factors. These interactions can also be shown in a bi-directional way. In addition, dynamics that occur shortly after each other can also be represented as subsequent changes instead of both occurring at the same time. It is important to realize that each of these refinements can be added quite easily to the simple representation of the framework that is described. However, it would result in a more complex framework and a more complex graphical representation.

Another interesting avenue for further research is to develop deeper knowledge on the role of business model consistency within the context of business model dynamics. Finally, the framework would also benefit from applying it to a large number and variety of cases, relating to different types of companies, value propositions, and countries.

The dynamic business model framework presented in this paper is a first, simplified step. As such, it is a contribution to the scientific field and it provides entrepreneurs, managers, and public policy makers with a simplified tool to better understand the origins and types of changes in business models, compare cases and get more insights into the degree of freedom that entrepreneurs and managers have to make changes to their business model.

The framework can be used by researchers for several purposes. For example, it can help in consistently comparing and analyzing data regarding the origins and types of changes in business models. The framework represents these origins and types of change in a graphical manner, which allows for more effective information transfer. This enables researchers to test hypotheses that are related to business model dynamics more easily and more rapidly than through textual description. For companies, the framework can be used to analyze in a schematic way their own tendencies in modifying their business model. Their business model dynamics can be more easily compared to those of other companies. The use of this framework by researchers would further its application by businesses, as relevant and comparable data would emerge in the literature. This can then create a feedback loop effect between business and research. An example of this is the business model canvas [19], which, through its simple and efficient representation, became familiar to both researchers and businesses, with the two applications reinforcing one another.

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