

Pornparnomchai, Montiean; Rajchamaha, Kittichai

Article

Sharing knowledge on the sustainable business model \$san aquaculture start-up case in Thailand

Cogent Business & Management

Provided in Cooperation with:

Taylor & Francis Group

Suggested Citation: Pornparnomchai, Montiean; Rajchamaha, Kittichai (2021) : Sharing knowledge on the sustainable business model\$san aquaculture start-up case in Thailand, Cogent Business & Management, ISSN 2331-1975, Taylor & Francis, Abingdon, Vol. 8, Iss. 1, pp. 1-19, <https://doi.org/10.1080/23311975.2021.1924932>

This Version is available at:

<https://hdl.handle.net/10419/245033>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Sharing knowledge on the sustainable business model: An aquaculture start-up case in Thailand

Montiean Pornparnomchai & Kittichai Rajchamaha |

To cite this article: Montiean Pornparnomchai & Kittichai Rajchamaha | (2021) Sharing knowledge on the sustainable business model: An aquaculture start-up case in Thailand, Cogent Business & Management, 8:1, 1924932, DOI: [10.1080/23311975.2021.1924932](https://doi.org/10.1080/23311975.2021.1924932)

To link to this article: <https://doi.org/10.1080/23311975.2021.1924932>



© 2021 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



Published online: 30 May 2021.



Submit your article to this journal [↗](#)



Article views: 780



View related articles [↗](#)



View Crossmark data [↗](#)



Received: 23 January 2021
Accepted: 16 April 2021

*Corresponding author: Kittichai Rajchamaha, Agricultural-based Entrepreneur, Alumni of Mahidol University, Bangkok, Thailand
E-mail: kittichai.raj@mahidol.ac.th

Reviewing editor:
Nor Shaipah Abdul Wahab, Taylor's University, Malaysia

Additional information is available at the end of the article

MANAGEMENT | RESEARCH ARTICLE

Sharing knowledge on the sustainable business model: An aquaculture start-up case in Thailand

Montiean Pornparnomchai¹ and Kittichai Rajchamaha^{2*}

Abstract: Given the growing population and consumption, coupled with limited resources, sustainable ways of living are gaining importance in the modern world. This study aims to share knowledge regarding practices for transitioning from traditional business model (TBM) to sustainable business model (SBM) based on design thinking process and sustainability. An early-stage fish-cage aquaculture start-up (FCAS) in Thailand is used as our case study. The study adopts the descriptive qualitative case study approach. Design thinking, sustainability, and lean business model canvas (LBMC) are used as well. Data are collected from 15 participants including customers and stakeholders, using semi-structured interviews, field interviews, focus group discussions, and pilot testing. Direct content method is used to analyse data at the firm-level. Data triangulation helped improve completeness of findings. The results highlight that SBM, adapted from the LBMC, and its contributions can be used to share and reflect new knowledge on understanding of FCASs in Thailand.

Subjects: Business, Management and Accounting; Management of Technology & Innovation; Entrepreneurship and Small Business Management



Dr. Kittichai Rajchamaha

ABOUT THE AUTHORS

Mr. Montiean Pornparnomchai studied entrepreneurship and innovation at the College of Management, Mahidol University, Thailand. He currently runs an innovative Agri-Food startup that has received government funding.

Dr. Kittichai Rajchamaha is a full-time lecturer teaching entrepreneurship and innovation at the College of Management, Mahidol University, Thailand. His research interests are entrepreneurial business strategy, entrepreneurial education, and start-up funding. Furthermore, he is the co-founder of a consulting and accounting service firm in Thailand.

PUBLIC INTEREST STATEMENT

Agriculture, including the forestry and fisheries sectors, needs to adapt to the impacts of climate change and improve the resilience of food production systems in order to sustain a growing population and consumption, coupled with limited resources, sustainable ways of living are achieving significance in the contemporary world. Thailand, there is evidence that the Aquaculture industry is one of vital fisheries sectors and has also been encountered with unsustainable challenges. This study aims to share knowledge regarding practices for transitioning from traditional business model to sustainable business model (SBM) based on the design thinking process and sustainability. The paper highlights that the SBM, adapted from the Lean Business Model Canvas, and its contributions can be used to share and reflect new knowledge on the understanding of fish-cage aquaculture start-ups in Thailand or even become one of leading case studies to identify sustainable development pathways of aquaculture start-ups in Thailand.

Keywords: Business model; sustainability; aquaculture start-up; entrepreneurship; design thinking

1. Introduction

Aquatic animals, especially fish, are protein foods that provide good nutritional value and are inexpensive in Asian countries, particularly Thailand. Fish has complemented rice since the time of their ancestors until now, and aquatic animals continue to be exported, earning tens of millions of baht per year as income to Thailand. In the past, the natural water sources were rivers, canals, reservoirs, swamps, or the sea, where aquatic life was abundant because of lower population and consequently, better environmental conditions. Nowadays, however, the natural catch is uncertain and has been declining. The destruction of the environment, especially watersheds, has limited the fishing area, and sole reliance on wild-caught fish is unsustainable, given the significant growth in population. From social, environmental, and economic perspectives, the aquaculture business therefore plays an important role for human beings, such as ensuring food security. Both freshwater and coastal aquaculture businesses reportedly witness annual growth in the total farm production volume and the value of the product. Moreover, with an increasing population, a growing middle class, and increased resource use, our current ways of living and doing business are becoming unsustainable. The fish-cage aquaculture start-up (FCAS) is a vital industry and is expected to play a key role in facilitating the transition towards greater sustainability with regard to dynamic changes (FAO 2018).

Currently, Thailand is facing the problem of steady decline in farm sizes because of the rapidly growing population and limited availability of land for agricultural production. Given the lack of efficiency in operations and poor management, the development of the aquaculture sector has been slow, in terms of productivity and income growth. Therefore, there is a need for improving the management of aquaculture businesses with the goal of ensuring steady operations, increasing productivity, and enhancing the livelihood of farmers. To achieve these goals, it is crucial to develop farmers' aquaculture business management competencies despite their limited resources. The adoption of modern technology and integration of agricultural business models, which are essential for management in the traditional business model, can ensure the sustainability of all aquaculture farms.

However, transitioning to the sustainable business model (SBM) from the traditional business model (TBM) is likely to be challenging for FCASs in Thailand because the possible harms are encountered from unsustainable resource use, climate change, social movement, which affect commercial FCASs, constituted as private concerns, which by design are relatively closed to direct control by external customers and stakeholders other than owners (Weber & Soderstrom, 2012, p. 249). Although many Thai FCASs are interested in investing in fish-cage aquaculture businesses, most of them still operate under TBMs. Thai FCASs operate their business models focusing on TBMs. Many problems have been encountered among Thai FCASs caused from their TBMs' operations. Hence, they face major economic, social, and environmental challenges. Furthermore, current "understanding of sustainable business models and how sustainable development is operationalized in firms, is weak" (Stubbs & Cocklin, 2008, p. 103), but several clues in academic literature indicate that further understanding of these aspects may be of great academic and practical value. Despite this, the academic literature seems lacking in this regard, especially in the context of start-up firms. Thus, the purpose of this paper is to present the way in which a FCAS can transition to the SBM. The study helps provide an understanding of the concept of SBM by using Maurya's lean business model configuration (Fauvel & Ching, 2013; Maurya, 2012) and attending to environmental and social aspects; however, design thinking and sustainability are challenges and reflect on the transition to the SBM. This paper intends to fill the above mentioned gap by answering the following research question as: **"How can the fish-cage aquaculture start-up (FCAS), at the early stage in Thailand, develop a sustainable business model (SBM) with regard to design thinking?"**

The paper is organized as follows: In Section 2, we present the literature reviews including design thinking, lean business model canvas, sustainable business model, and sustainable value. Section 3 describes research methodological principles. The Results are explained in Section 4 followed by Discussions and Conclusions in Section 5. Implications and Contributions are presented in Section 6.

2. Literature review

2.1. Design thinking and customer-centred orientation

Design thinking is an iterative method for the development of innovative ideas to solve complex problems. The focus lies on innovation and the development of novel concepts. The aim is to test multiple possible solutions to arrive at an optimal one. Furthermore, Brown and Katz (2019) introduces the “Design Thinking” model based on customer orientation. Entrepreneurs build up their journey empathizing with customers’ needs, identifying and ideating how to satisfy their needs with an innovation that will be prototyped and tested. This represents an iterative cycle where ongoing feedback is provided (Müller & Thoring, 2012). As with the Design Thinking model, the “Lean Start-up model” is also customer—centre oriented (Ries, 2011). This kind of model was designed for labour-intensive firms like high—tech and electronics businesses. In order to develop innovative solutions in a climate of uncertainty new business ventures or existing firms need to have a deep knowledge of their consumers (Blank, 2020). The idea behind this approach relies substantially on user-centred orientation. Consumers are intensively involved in the whole innovation development process. Here innovations are pre- and post-tested creating a constant, ongoing feedback loop (Maurya, 2012; Murray & Scuotto, 2016). Thus, design thinking has qualities that could benefit a business modelling process and could be a potential alternative to the entire or parts of current sustainable business modelling processes because of the broad and generic applicability of the concept (Brown, 2008). According to a value-mapping tool, it was developed by Bocken et al. (2015) to support businesses in sustainable business modelling. By assisting both start-ups and incumbent organizations in formulating or modifying their value proposition to incorporate economic, social, and ecologic value, “sustainability” is integrated with the core of the business model. The tool provides companies with different stakeholder perspectives and a network rather than a firm centric view on value and facilitates an analysis of the current value proposition, the value currently destroyed, wasted, and missed, as well as new value opportunities for a range of possible units of analysis. The value-mapping tool has a circular shape, where stakeholders each represent a slice of the “pie” and the different forms of value (like missed or destroyed) are represented by a separate “ring”. The objective of the tool is to enable organizations to create sustainable value within their business models (Bocken et al., 2015). Thus, design thinking and the value-mapping tool can be incorporated into the design of an SBM in the context of the FCAS to answer the research question for the study.

2.2. Lean start-up management and business model canvas

The lean startup management methodology developed by Blank (2020) relies on three principles. Firstly, search and execution are different. Most startups try to execute on their plan once they obtain funding, never realizing that search and execution are different. For sustaining innovations, a business plan is typically written at the close of the concept that moves into development and commercialization. That plan describes the execution steps for product development and maps the overall value proposition of the innovation. Secondly, Startups are not smaller versions of large companies. Most startups begin by envisioning themselves as having customers, sales, and a complete business model, that is then developed into a business plan that guides the search for startup funding. The business plan describes the execution process needed to develop the envisioned business. However, it relies on lots of assumptions, which are usually found to be mostly incorrect when the startup team visits its first set of customers. Finally, search requires a temporary organization designed to search for a repeatable, scalable business model. The real output of the search activity is a repeatable, scalable business model that can serve as a guide for sales and commercialization. Each of these principles can be reframed to fit the context of innovation in enterprises.

The lean start-up process involves four parts. Three were described by Blank (2020) in his explication of the model: the business model, customer development, agile development, and the minimum viable prototype (MVP). The process involves continuous iterations of customer development, MVP, and business model changes, repeating until a scalable, repeatable business model emerges. The value of the lean startup approach is that the business model, which is schematized using the business model canvases, is the principle convergence point of the process.

The Business Model Canvas (BMC) was introduced by Osterwalder et al. (2011), addresses this confusion by providing a much-needed visual encapsulation of the business model and a clear vernacular, which facilitates discussion and debate without sacrificing the complexities of the business. Osterwalder et al. (2011) present a BMC framework including nine components: key partners, key activities, key resources, cost structure, value proposition, customer relationship, channels, revenue streams and customer segments. According to the Design Thinking and BMC based on customer orientation (Brown & Katz, 2019; Maurya, 2012; Murray & Scuotto, 2016; Osterwalder et al., 2011), Kim et al. (2006) used three dimensions, current value, potential value and customer loyalty, to consider the customer segments. The current value becomes a measure of customers' past profitability, potential value becomes a measure of the possibilities of additional sales and the customer loyalty can be a measure of customer retention. Similarly, the study focuses on the SBM based on customer values; thus, it performs customer segmentation by using the values.

The BMC allows the development team to evaluate all nine elements first separately and then together, thereby facilitating new insights that would not have been possible without this holistic perspective. As part of a lean startup approach, the Business Model Canvas helps the team validate business model hypotheses until it finds one that is repeatable and scalable. The layout of the canvas helps make sure the team is not overlooking key elements. Most startups, for instance, tend to focus too much on the solution and the customers, neglecting channels, the value proposition, and the resources they need. Although the BMC can help answer certain questions, but it may not be designed to conform to the business model of the early-stage start-ups, which need to apply lean management focusing on the development of their effective business models to solve customer problems and create customer values, and it does not allow for this extension to the extent that Maurya's (2012) Lean Canvas does. The Lean Business Model Canvas (LBMC) was specifically developed for the startup entrepreneur and is intended to better capture the uncertainty and risk of the start-up.

Consequently, Maurya (2012) further developed the framework titled as "the lean business model canvas" (LBMC), which was adapted and extended from BMC initiated by Osterwalder et al. (2011). The LBMC focuses on problems, solutions, key metrics, and competitive advantages; thus, it fits the early-stage start-ups and proposes to address the four issues including key activities, key resources, customer relationships, and key partner. Finally, the "key partners" was removed, which was the difficult part according to the developer. Certainly, there are products, which need key partners right from the beginning, but it claims that most products do not fall in that category. Thus, LBMC is an appropriate model for developing innovative business model for innovative start-ups at the early stage (Fauvel & Ching, 2013; Maurya, 2012). Therefore, LBMC is the most suitable tool to propose the sustainable business model (SBM) in this study.

2.3. Sustainable business model and sustainable value

The core of business model innovation is rethinking the value proposition that is the product/service the firm offers to its stakeholders. Traditional business model innovation has been about creating new forms of customer value, focusing on customer benefits such as functionality, convenience, and well-being, which are often intangible; it also focuses on how the firm captures value through economic or exchange value, paid by the buyer to the producer, generally defined financially, although it may also include intangible benefits such as market access (Bowman & Ambrosini, 2000). The concepts of value captured and value uncaptured offer a framework to investigate where and how value is captured in the business model and where additional value

might be created and captured. Recognizing value captured and value uncaptured, as well as identifying the opportunities represented by value uncaptured, is an effective approach to sustainability-focused business model innovation (Yang et al., 2017).

As to the sustainable business model (SBM), it is not necessarily achieved through technology, products or service innovation alone, but also through the business model itself (Girotra & Netessine, 2013). Additionally, in making the transition to a sustainable industrial system, businesses can create economic, social, and environmental benefits for a multitude of stakeholders. Moreover, encompassing economic, environmental, and social aspects while considering the needs of all stakeholders, rather than giving priority to shareholders' expectations (Stubbs & Cocklin, 2008), and aligning the interests of all stakeholder groups, are seen as key aspects of SBM (Basly & Hammouda, 2020; Evans et al., 2017; Torri, 2012). This implies changes in the way business models are conceptualized as regards their exchanges and relations with stakeholders. Thus, a key aspect, in this transformation to SBM, is the adoption of a sustainable value proposition that explicitly considers multiple-stakeholder value creation and particularly considers "society" and "environment" as stakeholders (Bocken et al., 2015). Similarly, Lüdeke-Freund (2010, pp. 32–33) states that "organizations, adopting the SBM, must develop internal structural and cultural capabilities to achieve firm-level sustainability and collaborate with key stakeholders to achieve sustainability for the system that an organization is part of. In one word, the SBM is a model where sustainability concepts shape the driving force of the firm and its decision making." This recognizes that the core of sustainable value of SBM is not just creating and delivering customer value, but also a model in which the environmental and social benefits are embedded (Chesbrough, 2010; Osterwalder et al., 2011; Teece, 2010; Zott et al., 2011). As to the sustainable value of the SBM, it represents not only environmental sustainability but also social and economic value (Ueda et al., 2009).

Sustainability is crucial to create long-term high value in manufacturing system. Sustainable value creation requires systems thinking in order to maximize total value captured. There is a need to better understand how companies can improve sustainable value creation. Value is commonly understood as monetary value; however, sustainability requires a more comprehensive view of value that includes social and environmental benefits. This is what is denoted by sustainable value (Evans et al., 2017). Sustainable value includes economic, social, and environmental value. Sustainable value captured is the benefit delivered to the company and its stakeholders; it includes not only monetary value but also the wider value provided to the environment and society. Therefore, sustainable value forms are captured through economic, environmental, and social value. Economic value captures profit, return on investments, financial resilience, long-term viability and business stability (Basly & Hammouda, 2020; Bocken et al., 2015; Evans et al., 2017; Torri, 2012; Ueda et al., 2009). Improved resource efficiency, low waste, biodiversity, pollution prevention (air, water, land), energy efficiency, clean farming system, and renewable resources are all elements of value captured for the environment value (Bocken et al., 2015; Evans et al., 2017; Ueda et al., 2009). While well-being, community development, secure livelihood, labour standards, health and safety, and equality and diversity are defined as social value (Bocken et al., 2015; Evans et al., 2017; Ueda et al., 2009).

3. Methodology

3.1. Research design

Qualitative research with the case study approach (Cresswell, 1998; Yin, 2003, 2013, 2017), design thinking (Bocken et al., 2015; Brown, 2008), and LBMC (Maurya, 2012; Osterwalder et al., 2011) are used in the study. The purposive sampling technique is used in ethnobotanical study as a tool for informant selection to specific knowledge in practices through a case study (Tongco, 2007). This is because it represents a deliberate choice of an informant due to the qualities the informant possesses and is a non-random technique that does not need underlying theories or a set number of informants. Although in simple terms, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Tongco, 2007). Moreover, purposive sampling is especially exemplified through the selection of key informant

techniques (Garcia, 2006). Moreover, the reasons for adopting a purposive strategy are based on the assumption that, given the aims and objectives of the study, specific kinds of people may hold different and important views about the ideas and issues at question and therefore need to be included in the sample. The stratified form is used as a form of purposive sampling. The sample is then stratified by the characteristics of the participant or group, with a specific number allocated to each stratification. Categories are considered as types of customer segments and stakeholders' roles engaged with FCASs. Types of customer segments are divided into two segments, including Segment I (regular customers at existing market segment—Merchants at Fish Markets) and Segment II (new customers at new market segment—Other FCASs). Another is stakeholders' roles engaged with FCASs including a Government representative, a supplier, a technical Expert, and a business Expert, etc. However, and importantly, there needs to be a clear reason linked to the aims and objectives of the study to show why each group is different. Moreover, in terms of interviews, they must have something to add to the study (Campbell et al., 2020). As to the objective to share knowledge in practices for transitioning to SBM of a case study, the study also relied on other data sources. Thus, the data collection consisted of several primary and secondary data sources, semi-structured interviews (McFoy, 2004), field interviews (McFoy, 2004), and focus group discussions (Addis et al., 2005). Population was sampled from informants chosen based on customers and stakeholders (15 informants) involved in a case study. Sample size was justified as sufficient and relevant based on knowledge collected from experienced key informants. Data analysis used through the direct content analysis method (Hsieh & Shannon, 2005) was linked with relevant theories under the unit of analysis at the firm level. The data triangulation helped us improve the completeness of the information (Eisenhardt, 1989) and the accuracy of the study's findings (Jick, 1979). Finally, we analysed all the data gathered with specific regard to the LBMC (Maurya, 2012), which served as a structure to show the findings.

3.2. Design thinking process

We now present the design thinking and value-mapping steps, to address the research question and develop the intended data collection design.

The first step was to set the questions for developing the SBM based on several rounds of literature reviews.

The second step developed the preliminary questions for developing the SBM based on several rounds of literature reviews and in-depth interviews of customers and a few experts, including technological and business experts. Subsequently, we developed the initial SBM, in which LBMC framework and a prototype was applied. The in-depth interviews and data collection used semi-structured questionnaires to develop initial questions on purpose and potential configuration of a possible combination of value mapping and design thinking. Based on the gained insights, the preliminary questions are:

What principle of design thinking should be addressed?

At which stage of the SBM development process should they be addressed?

Based on the LBMC framework, who are the target customers?

What are customer problems; what are customer expectations?

What are the existing solutions provided to customers?

What are the gaps or opportunities to improve SBM?

What channels are suitable?

What are value propositions?

What are unfair advantages?

What are revenue streams and cost structures?

After having answered these questions, the initial SBM and a prototype was developed.

The last step required the design of a refining workshop for the pilot programme for test and reconfiguration of the SBM concept. Further, prototype refinement was required with data collected from several rounds of literature reviews, in-depth interviews, and focus group discussions via the refining workshop with 15 key informants including 4 regular customers (Segment I as Existing Market Segment—Merchants at Fish Markets), 3 new customers (Segment II as New Market Segment—Other FCASs), a government representative, a supplier, a technical expert, and a business expert. Based on the gained insights, a workshop design was developed, piloted, and refined. By testing the resulting design with customer and relevant stakeholders, potential improvements were identified and incorporated in the process. However, the workshop participants were free to decide the selection criteria to evaluate the ideas. To improve the workshop flow, however, the criteria were determined as “feasibility” and “impact”. This and other improvements led to further processes for developing the output based on the LBMC for the initial SBM and refining the FCAS prototype.

3.3. Case study selection and description

The holistic case study is a type of case study that involves the examination of a single unit of analysis (Yin, 1984). The researcher selects a single organization as a single unit of analysis and examines every process, aspect, and relationship with its industry/market. Choosing this study design implies the use of a single case study because the amount of information obtained from the case is limited and can be processed to consider the specific instance of interest. The uniqueness of the study context also suggested that a single case would be useful in evaluating current theory in a “new” context (Eisenhardt, 1989). However, use of a single case study has been criticized and viewed as a significant limitation of this study. For example, according to Rowley (2002), when employing case study methodology, replication logic through analysis of multiple case studies is essential to establish external validity and rigor.

As to the description of the case study, “Firm A” is a start-up firm (fewer than 10 employees), which was founded to provide quality products including qualified tilapia fish and innovative feeding machines with the adoption of operating systems and technology transfer services free-of-charge. The firm was selected as the start-up case study due to its role as the first mover and as the innovation-driven entrepreneur requiring transition to SBM from TBM. Moreover, the firm received grants from the Technology and Innovation-based enterprises development fund of the Thai Government.

The rationale for such a case selection is relevant to influential entrepreneurial characters and the pathway that they are somehow unique or incomparable to their peers. Regarding the entrepreneurial individuals and the pathway of the CEO of the firm selected as a case study. Based on the in-depth interviews conducted for the study, the CEO holds an undergraduate qualification in agribusiness industry and a post-graduate degree in entrepreneurship and innovation management from a leading university in Thailand. The CEO is extroverted, more intuitive and thinking oriented. In terms of character, the person is motivated by a strong need for achievement, power, and affiliation. Coupled with a strong orientation towards a desire for independence, that is, to be his own boss, the CEO is driven by the need to seek new and bolder challenges for the business model enhanced by the desire for innovative management. Consequently, the CEO believes that good agribusiness ecosystems can promote and support the FCAS to survive and grow and not only for financial gains, but also to create business sustainability among environment and social perspectives.

The study uses only one case because it was not possible to obtain information on other firms operating in a similar context, related to the SBM. On the other hand, the FCAS selected as a case study is the first mover of FCASs in Thailand, pursuing implementation of the SBM through the entire entrepreneurial life cycle.

4. Results

Key findings and relevant quotations are presented in this section to answer all research questions based on nine components of the LBMC framework, consisting of customer problems, solutions, value propositions, channels, unfair advantages, cost structure, revenue streams, and key metrics related to “Firm A” shown below.

4.1. Problem and customer segment

With regard to the design thinking process and preliminary research study as per the research method identified, findings indicate that Firm A’s target customers under SBM differed from TBM. This is because customers’ pain-points turned out to be business opportunities and this was seen in two segments—segment I and segment II. Segment I focuses on regular customers at the existing market as well as the TBM, whereas Firm A’s SBM aims to search for new solutions to solve the problems of merchants as customers, who need qualified fish. Segment II indicates to seek new business opportunities and challenges, is focused on new target customers who are other FCASs in the same industry, but still operate their businesses based on the TBM. These customers need new solutions to improve their fish farming and are unable to source new ideas or solve their problems or are limited by innovation resources. The findings show problems, divided into each of customer segments, are importantly encountered by an FCAS as a case studied in Thailand as followings:

4.1.1 Unqualified fish delivered to customer segment I, merchants at fish market, caused by ineffective fish farming management.

4.1.2 Ineffective fish farming of other FCASs as entrepreneurial society, caused by leftover fish food effected to wastewater, fish diseases, different fish sizes, longer farming time, lack of skilled labour, and limited capital.

Some of the key quotations can be collected to define customers’ problems shown below:

Currently, FCASs are still unable to deliver qualified Nile-tilapia fish that meet our criteria on quantity, quality, time, and price (**Customer segment I—Merchants at Fish Markets**).

We face problems related to fish feeding by unskilled workers, which leads to leftover fish foods, occurrence of waste-water, infectious diseases in fishes, different fish sizes, and longer farming process time. Hence, we cannot deliver qualified Nile-tilapia fish at present. However, we need to improve our TBM, but are still unable to solve the problem (**Customer segment II—Other FCASs**).

4.2. Solutions

Regarding the aforementioned problems and customer segments, Firm A’s SBM has developed and proposed key two solutions, Solutions I and II, to solve pain-points of customer segments I and II.

Solution I involves improving and transforming from TBM to SBM with three key strategies: using new feeding machines for reducing waste from feed and increasing accuracy of feeding volume and time instead of labour-intensive, using an application named “Tilapia version 4.0” as a controlling and monitoring system for process quality and processing of fish farming management system, and improving labourers’ skills and awareness to conform to working under SBM.

Solution II is a product package, based on three key incremental innovation technologies including application “Tilapia 4.0, sensor, and feed dispenser technology”, which is proposed to cater to customer segment II (Other FCASs). A product package is designed and developed to

resolve the pain-points of customer segment II, who currently manage ineffective fish farming resulting in leftover fish feed disposed in wastewater, fish diseases, different fish sizes, longer farming time, and who possess insufficient skills to develop and improve incremental technologies to solve the problem by themselves; moreover, they have limited capital to invest in research and development costs.

Firm A's SBM includes rethinking based on the design thinking process and the proposed new solutions I and II, to solve target customers' pain-points as described below:

Solution I: To solve the issues faced by customer segment I (merchants at fish markets), Firm A's SBM proposes a new solution by reshaping the TBM to SBM. It finds that key pain-points occurred from ineffective fish feeding process; thus, it has developed, tested, and adapted new feeding machines based on three key technologies, and included them into its TBM to improve farming management and obtain merchants' commitments (those merchants who need qualified fish). The key quotation is shown below:

My teams and I have designed and proposed a prototype of a new feeding machine based on three key technologies. After pilot run tests, the prototype's performance shows valid test results and that it is well adapted to our existing business model. This allows to deliver qualified fish to merchants, our customers. (CEO)

Solution II: To solve the pains of customer segment II (Other FCASs), Firm A's SBM proposes a product package based on three key incremental innovation technologies including application "Tilapia 4.0, sensor, and feed dispenser technology" to other FCASs for improving their farming. The key quotations are shown below:

My business experts and I have found other FACs, who still have pain-points. This leads to big opportunities to propose the new feeding machine as our product package. We intend to share it as intellectual property. The design is based on an easy-to-use tool with affordable prices to new customers. (CEO)

Three key technological components constitute the mobile application named 'Tilapia 4.0, sensor technology, and feed dispenser technology'. Technology development is based on incremental innovation founded on easy-to-use and reasonable price characteristics. Further the technology should be able to help design calculation systems to find the suitable amount of fish food to solve the problem of leftover fish feed disposed in wastewater, design water-oxygen sensors, camera sensors, and image processing systems for data collection to calculate useful information for suitable feeding time and volume, design operating systems via application on mobile phones to operate the feeding machine (technological expert).

4.3. Unique value proposition

We conclude that SBM offers the benefits of unique value propositions (UVPs), helps Firm A address customer's needs and distinguishes Firm A from the competition. The findings are divided into product and customer value perspectives. Primarily, firm A's SBM proposes unique product value based on the feeding machine package designed and developed through three key technological components consisting of the mobile application named "Tilapia 4.0, sensor technology, and feed dispenser technology". This is done in the context of the three key technologies with incremental, rather than radical, innovation concept. Moreover, as to pilot testing results, the product value delivery to customers in segments I and II, including costs of leftover fish feed, reduced by 25%, processing time per batch of the fish-cage aquaculture farming decreased by two weeks, and transition from unskilled to skilled labour was facilitated (the below excerpt sheds additional light on this last point).

Based on the problems highlighted by the design thinking process and research data, I have new ideas to disrupt the business model and solve the problems of both customer groups and stakeholders. This can be achieved by designing feeding machines based on incremental

innovation with affordable price and reconfiguring the business model for sustainability regarding economic, environment, and social aspects. **(CEO)**

The three key technological components consist of the mobile application named 'Tilapia 4.0, sensor technology, and feed dispenser technology'. Technology development thinking is based on incremental innovation concepts. It includes developing easy-to-use functions, designing calculation systems to determine the suitable amount of fish food to solve the problem of the leftover fish feed disposed in wastewater, designing water-oxygen sensors, camera sensors, and image processing system for data collection to calculate useful information for suitable feeding time and volume, designing operating systems via an application on the mobile phone used to operate the feeding machine. **(Technological Expert)**

Additionally, Firm A's SBM also proposes unique customer value based on product design thinking regarding what customers need and how much they are willing to pay. Moreover, Firm A's SBM designs solve the issues of not only existing customer segment I, but also focus on customer segment II and other FCASs as new target customers, which help them become smart farmers and strengthen FCASs' community and society in future. As to customer values, Firm A's SBM can deliver qualified fish as per the contractual agreement and meet quality, quantity, time, and price requirements. It can also deliver product packages designed to be easy-to-use, convenient, inexpensive, and cheap. This helps create value for customer segment II.

We need qualified Nile tilapia fish of a certain quantity, fair price, on-time delivery, appropriate weight and size, and free of diseases. **(Customer segment I)**

We also need to improve our farming management in order to get qualified fish as per customers' demands and reduce water-waste caused from over feeding. However, we have limited investment and lack the experience of using advanced technology. **(Customer segment II)**

4.4. Channel

Firm A's SBM has redesigned its channels conforming to target customers' insights and behaviours based on data collected from design thinking process and research design. Channels are divided into two types including direct and indirect market channels. The direct marketing channels, such as salespeople, trade show releases, telephone, email and social media, are designed to serve customers' needs in segment I and others, including indirect marketing channels, are used to respond to customers' needs in segment II through trade distributors.

Normally, we directly purchase Nile tilapia fish from fish-cage aquaculture farmers who are selected with qualified profiles. **(Merchants at fish market as customer segment I)**

We buy either equipment or machines based on reliable and experienced trade distributors who can share technical knowledge with pilot testing results, offer flexible payment terms, experienced customer knowledge, and are experienced with regard to the industry. **(Other FCASs as customer segment II)**

4.5. Unfair advantage

As firm A's SBM focuses on reshaping its business model based on innovation and sustainability, it has planned to rethink business strategies and methods to address the unfair advantage between itself and its competitors. Nevertheless, being truly the first to market is not an unfair advantage. Firm A's strategies have been designed to create a competitive advantage based on three key strategies: intellectual property, partnership or networking, and knowledge management.

The intellectual property strategy is used to protect the FCAS's knowledge assets related to feeding machine components by registering a petty patent for feeding machine processing, the design patent for the feeding machine, and notifying the copyright of the "Tilapia 4.0" application".

The partnership or networking strategy is used to strengthen FCAS's SBM to seek new opportunities in accessing market, funding, and research and technology development.

The knowledge management strategy is used to retain FCAS's talent workers and tacit knowledge through the management system with the conditional personnel contracting agreement including a non-disclosure statement in the section note or remark. FCAS's knowledge management strategy is formulated and implemented to innovate in the SBM for business survival and future growth.

Some of the key quotations can be collected to define the unfair advantages shown below:

When I rethink and reshape my business model based on innovation, my expert teams and I have also planned to formulate three strategies to create unfair advantages to protect firms' unique value from competitors. This includes intellectual property, partnership, and knowledge management in the firm. **(CEO)**

I requested IP law protections related to IP types including the copyright (for our unique software application (Tilapia 4.0) and the petty patent for feeding machine based on incremental innovation. **(Technical Expert)**

I targeted collaborations and strategic partnerships with leading universities and professional producers. To continue as a learning organization, we design and implement knowledge management systems within the firm. For instance, we include the conditional personnel contracting agreement with the non-disclosure statement in the section note or remark. **(Business Expert)**

4.6. Revenue streams

Revenue Streams are the cash flow that a firm generates from the customer segment. This turns into earnings after the costs are deducted. It is focused on the value of the service or products and the willingness of the customers to pay. Firm A has redesigned its revenue streams for the SBM aligned with its customers' insights and behaviours. The revenue streams are divided into two pricing mechanisms, including direct selling method for physical products and product subscription or leasing method for the product package to the customers.

Direct selling method is used to directly sell physical products, qualified fishes, delivered to existing customers (segment I), who are merchants at the fish market. This method is considered to combine cost-plus pricing with market-based pricing because Firm A considers relevant factors among customer willingness to pay, the market situation, qualified product qualification, and relevant value chain costs to set its price.

Subscription or leasing method is used as the revenue stream of a product package proposed to cater to customers (segment II), who are other FCASs, who continue to operate their businesses with TBM and also have limited capital investment and lack of skills in technology development. Firm A's SBM provides Customer segment II with a monthly subscription or leasing payment method. The subscription-based method allows farmers to lease the product packages they need when they need it. Moreover, subscription or leasing frees them from the expense of buying and selling the product packages on a regular basis; they are able to upgrade at little cost as more sophisticated models come on the market.

I plan to redesign revenue streams in order to conform with reshaping Firm A's SBM and customers' insights and behaviours. We propose two methods as revenue streams, including direct selling method for physical products and subscription or leasing for product packages. While Firm A's TBM only has direct selling method, it now uses both offline and online channels. **(Business Expert)**

Normally, we directly purchase Nile tilapia fish from fish-cage aquaculture farmers through direct selling method. **(Merchants at fish market as customer segment I)**

We prefer acquiring services from the feeding machine packages from the FCAS with either a product monthly subscription or a leasing method. **(Other FCASs as customer segment II)**

4.7. Cost structure

Cost structures of Firm A as a case study have been reshaped through lean management in order to get suitable cost elements aligned with business model strategies and activities conforming to the SBM. As to the cost categories of cost structures, there are two main categories: value-driven and cost-driven. However, regarding Firm A's SBM, it designs cost structure categories based on the value-driven business model. Moreover, considering the SBM's cost structure attributes, they are divided into two cost elements segmented by cost behaviours including fixed and variable costs. Variable costs are technological material and variable conversion costs, marketing and sales commission costs. Fixed costs include fixed conversion costs, personal expenses, depreciation expenses, amortization costs of intangible assets, fixed marketing and operation costs. Relevant quotations, related to developing the SBM's cost structures, are shown as follows:

Our SBM is developed through LBMC framework and fits the firm at the early stage. Thus cost structure categories of the SBM align with value-driven business models because firms focus on disrupting business models based on technology innovation to create sustainable value; thus, this causes changes to our relevant cost structures. **(CEO)**

SBM's cost structures comprise of both variable and fixed costs. Variable costs are technological material and variable conversion costs, marketing and sales commission costs. Fixed costs include fixed conversion costs, personal expenses, depreciation expenses, amortization costs of intangible assets, fixed marketing and operation costs. **(Business Expert)**

4.8. Key metric

The firm A's SBM proposes some parameters regarding financial and non-financial measures based on its metrics including 12 key metrics. Four financial measures consist of cash burn rate, saving non-value-added farming costs, decreasing failure costs caused from wastewater and return on equity. The others include eight non-financial measures comprising of runway (time period), market share percentages, number of both new and old customers, customer satisfaction from sustainable image and product percentages, decreasing unqualified, decreasing farming process time, increasing innovation by talented employees and increasing engagement of FCASs' community. Relevant quotations are shown as follows:

Firm A's SBM has designed key metrics regarding financial and non-financial measures aligned to our firm's objectives for 3 sustainable aspects, including economic, environmental, and social aspects. **(CEO)**

SBM contains 12 twelve key metrics. Four financial measures include cash burn rate, saving non-value-added farming costs, decreasing failure costs caused from wastewater, and return on equity. Eight non-financial measures comprise of runway (time period), market share percentages, number of both new and old customers, customer satisfaction from sustainable image and product percentages, decreasing unqualified fish, decreasing farming process time, increasing innovation by talented employees, and increasing engagement of FCASs' community. **(Business Expert)**

5. Discussion and conclusion

The paper aims to share knowledge in practices involving design thinking to show transition to the SBM from the TBM based on insight information collected among customers and stakeholders of Firm A as a case study selected in Thailand. The summary of comparison between TBM and SBM is shown in Table 1. Furthermore, the discussions based on the findings reconnected with the literatures and conclusions of the study are discussed further on.

Table 1. Summary of Transitioning to the SBM from TBM		
Component	Traditional Business Model (TBM)	Sustainable Business Model (SBM)
Problems	Unqualified fish delivered to merchants at fish markets	(1) Unqualified fish delivered to customer segment I, merchants at fish market, caused by ineffective fish farming management. (2) Ineffective fish farming of other FCASs as entrepreneurial society, caused by leftover fish food effected to wastewater, fish diseases, different fish sizes, longer farming time, lack of skilled labour, and limited capital.
Customer Segment	Focus on customer segment I only	(1) Customer segment I (merchants at fish markets) still focused on regular customers at the existing market as well as the TBM, whereas Firm A's SBM aims to search for new solutions to solve the problems of merchants as customers, who need qualified fish. (2) Customer segment II (other FCASs), indicated to seek new business opportunities and challenges, is focused on new target customers who are other FCASs in the same industry, but still operate their businesses based on the TBM.
Solution	Fish-cage aquaculture farming based- labour intensive	Transitioning to SBM based on reshaping TBM with three key incremental innovations, offering a product packages to other FCASs, and sharing knowledge with the FCASs' community.
Unique Value Proposition	None	SBM shows both product value based on three key incremental innovation technologies and customer value connected to customer benefits and willingness to pay, including qualified fish for "customer segment I" and feeding machine packages for "customer segment II".
Unfair Advantage	None	The SBM is designed and divided into three key strategies including Intellectual Property, Knowledge management, and Partnership.
(Continued)		

Table 1. (Continued)

Component	Traditional Business Model (TBM)	Sustainable Business Model (SBM)
Channel	Direct marketing channels without social media (online channel)	(1) Direct marketing channels for customer segment I including salespeople, trade show releases, telephone, email, and social media. (2) Indirect marketing channel for customer segment II by selling product packages through trade distributors who have technical knowledge and relevant industrial experiences.
Revenue stream	Direct selling method for physical products to Customer segment I	(1) Direct selling method for physical products to customer segment I (2) Subscription or leasing method for product packages to customer segment II.
Cost Structure	(1) Cost structure category is based on cost-driven business model. (2) Cost structure attributes show relevant cost segmented by cost behaviours including variable and fixed costs.	(1) Cost structure category is based on value-driven business model (2) Cost structure attributes show relevant costs segmented by cost behaviours including variable and fixed costs as well as TBM. Amortization costs are added to SBM caused from intangible assets.
Key Metrics	Firm A's TBM is measured based on a key metric with a financial measure only.	Firm A's SBM is measured based on twelve key metrics including four financial and eight non-financial measures.

Source: Research Study.

As to the empirical findings of a case study based on design thinking approach, Firm A's SBM is designed and developed by talking with customers and relevant stakeholders, thinking about potential solutions and testing such solutions early on to iterate them towards a problem-solution fit. Consequently, the design thinking makes transition to the SBM vital as noted by the points in Table 1. As reported, the SBM model divides into customers into two segments- segment I and II. SBM's customer segment I is the same as TBM's. However, with regard to the design thinking process, SBM additionally targeted customer segment II, who are other FCASs facing the problem of leftover fish food causing wastewater, infectious diseases in fish, unqualified fish size, ineffective farming process times, and lack of skilled labour. Consequently, the study's research methodology approaches conform to those suggested by Bocken et al. (2015). The approaches are viewed as being circular in nature, where stakeholders each represent a slice of the "pie" and the different forms of value mapping are represented by a separate "ring". Together, they brainstorm to enable Firm A to create sustainable value within SBM. Hence, the SBM has proposed new business models to solve the root causes of the customers' problems by finding a new solution as a product package based on incremental innovation. This is related to previous research suggested by Zott et al. (2011) and Chesbrough (2010) and is not radical innovation. It contains three key components as part of the mobile application named 'Tilapia 4.0', sensor technology, and feed dispenser technology.

As stated in the new solution, it not only proposes to solve problems for customer segments I and II, but also aims to design and conform to customers' needs regarding their willingness to pay. Another factor is the ease of use in farming and stakeholders' voices related to environment and social aspects conforming to previous research studied by Bocken et al. (2015). Moreover, concerning the results of the pilot run testing under design thinking process, outcomes show sustainable value propositions comprising of product and customer value propositions to validate and reconfigure the SBM conforming to past studies suggested by Massa and Tucci (2013) and to capture value described by Franceschelli et al. (2018).

In consonance with the unique value propositions creating both product and customer values, product values point to the SBM's product package, and are regarded on incremental innovation concepts and not radical ones. They address the problems of both customer segments I and II. Second, customer values point out the empirical findings. For instance, they show that costs of leftover fish food reduced by 25%, farming process time and batch decreased by 2 weeks, and transformation from unskilled to skilled labours. This represents the turning point to discussions related to differences in value perspectives between two customer segments. Firm A can deliver Nile tilapia fishes as per the contractual agreement with customer segment I. A product package that delivers value to customer segment II includes the attributes of being easy-to-use, convenient, affordable, and flexible payment terms. All these relate to previous studies suggested by Zott et al. (2011), Chesbrough (2010), Teece (2010) and Osterwalder et al. (2011).

Although reconfiguring SBM brings in sustainable value, the SBM is aware of preserving its competitive advantages for next lifecycle stages, survival and growth stages. The unfair advantage is identified with three strategies, consisting of intellectual property strategy, knowledge management strategy, and partnership or networking strategy. Nevertheless, they are unclear in the TBM, not related to the suggestion by Osterwalder et al. (2011).

Taking the discussion, a step further, the remaining components of LBMC include channels, revenue streams, cost structures, and key metrics. In fact, channels of the SBM are designed to conform to both groups of customers (I and II). For customers of group I, the SBM focuses on both offline and online direct marketing channels including salespeople, trade show releases, telephone, email, salespeople and social media. For customer segment II only offline indirect marketing channels are used. Product packages are sold through trade distributors to earn customers trust. Nevertheless, the TBM's channels use all direct marketing channels the same way as the SBM does, except for social media. In the context of revenue streams and cost structures, the revenue

streams of the SBM are divided into two types based on pricing mechanisms. This includes direct selling as a method for physical products applied to customer segment I, just as in TBM, though subscription or leasing was applied only to customer segment II related to SBM's revenue stream. As to cost structures, Firm A's SBM categorizes cost structures based on the value-driven business model and cost structure attributes are divided into variable and fixed costs. Variable costs include material costs, direct labour costs, variable utility costs, variable marketing and commission costs. Fixed costs include processing outsource costs, salary and wage expenses, depreciation and amortization expenses, fixed utility costs, and fixed marketing and operation expenses. Nevertheless, the TBM's cost structure categorized as the cost-driven business model differed from the SBM's structure. While cost structure attributes consisted of variable and fixed costs the same way as same as SBM's, the exceptions included variable processing outsource costs, fixed salary and wage expenses, and fixed depreciation and amortization expenses. Regarding the overall discussion of the issues among channels, revenue streams, and cost structures, all are found to be related to the LBMC suggested by Maurya (2012). Moreover, the results point out specific strategies towards Firm A's context based on a qualitative case study approach suggested by some authors (Cresswell, 1998; Yin, 2003, 2013). The design thinking process is aligned with Bocken et al. (2015) and Brown (2008). It suggests empirical facts and in-depth information in line with usefulness. This helps implementation with other FCASs for transitioning to the SBM as knowledge sharing in practice.

Finally, we present discussion and conclusions regarding key metrics. Firm A's TBM proposes only a financial measure as a key metric while firm A's SBM proposes key metrics regarding financial and non-financial measures based on the SBM's 12 key metrics. These consider four financial measures and eight non-financial measures by linking performance measurement to Firm A's strategy and SBM to economic, environmental and social aspects of sustainability approach conforming to the work of Ueda et al. (2009), Bocken et al. (2015), and Evans et al. (2017).

6. Implications and contributions

The proposed new knowledge aims to act as the benchmark for practices of Firm A's Sustainable Business Model (SBM) and sustainable value related to the fish-cage aquaculture industry for early-stage startup in Thailand. The findings trigger the SBM fit to customers' needs and stakeholders' requirements among the changing economic, social and environment contexts in Thailand. Thus, this paper contributes to both practical and academic contributions in the field of Firm A's SBM as a leading first mover who has been granted support by the government agency in Thailand.

6.1. Contributions to theory

This research sheds light on the specific topics of the fish-cage aquaculture entrepreneurship at the early-stage startup business in Thailand. For new academic knowledge based on findings, it is found that the leading first mover, as a case study, has expressed changing its strategy, technology adaptability, business model innovation under redesign thinking. This differs from other traditional fish-cage aquaculture start-ups in Thailand. This reflects the understanding of new academic context related to specific entrepreneurship phenomena. The Thai fish-cage aquaculture start-up entrepreneurship, reflects the need to adapt its strategy and business model to conform to the dynamic business environment in Thailand. Moreover, it also provides valuable information for suitable design thinking and sustainable business model framework in the transition from traditional to sustainable business models adapted under digital transformation circumstances.

6.2. Contributions to practices

The research provides valuable information for suitable design thinking and sustainable business model framework in transitioning from traditional to sustainable business model of the fish-cage aquaculture entrepreneurship at the early-stage start-up business in Thailand. The study findings practically contribute to transfer of knowledge and help diffuse relevant innovation to other FCASs in Thailand. Besides, the study also provides valuable information to customers and business partners under the supply chain of FCASs' customers, other relevant industry stakeholders, and

Ministry of Higher Education, Science, Research and Innovation of Thailand and relevant government representatives in Thailand.

Acknowledgements

The authors thank the CEO and management of Firm A (used as a case study), the relevant government agency in Thailand, and also thank the informants who provided in-kind contribution with relevant information used for the study.

Funding

The authors received no financial support for the research, authorship and/or publication of this article.

Author details

Montiean Pornparnomchai¹

Kittichai Rajchamaha²

E-mail: kittichai.raj@mahidol.ac.th

ORCID ID: <http://orcid.org/0000-0003-2156-7930>

¹ Agricultural-based Entrepreneur, Alumni of Mahidol University, Bangkok, Thailand.

² College of Management, Mahidol University, Bangkok, Thailand.

Declaration of conflicting interests

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical approval

The authors received Mahidol University's Certificate of Ethical Approval that confirms that this manuscript includes a description of all necessary ethics considered and approved by Institutional Review Board of Mahidol University in Thailand.

Applicability

The paper highlights that its contributions can be used to share and reflect new knowledge on the understanding of fish-cage aquaculture start-ups in Thailand or even become one of leading case studies to identify sustainable development pathways of aquaculture start-ups in Thailand.

Citation information

Cite this article as: Sharing knowledge on the sustainable business model: An aquaculture start-up case in Thailand, Montiean Pornparnomchai & Kittichai Rajchamaha, *Cogent Business & Management* (2021), 8: 1924932.

References

- Addis, G., Urga, K., & Dikassol, D. (2005). Ethnobotanical study of edible wild plants in some selected districts of Ethiopia. *Human Ecology*, 33(1), 83–118. <https://doi.org/10.1007/s10745-005-1656-0>
- Basly, S., & Hammouda, A. (2020). Family businesses and digital entrepreneurship adoption: A conceptual model. *The Journal of Entrepreneurship*, 29(2), 326–364. <https://doi.org/10.1177/0971355720930573>
- Blank, S. (2020). *The four steps to the epiphany: Successful strategies for products that win*. John Wiley & Sons.
- Bocken, N. M. P., Rana, P., & Short, S. W. (2015). Value mapping for sustainable business thinking. *Journal of Industrial and Production Engineering*, 32(1), 67–81. <https://doi.org/10.1080/21681015.2014.1000399>
- Bowman, C., & Ambrosini, V. (2000). Value creation versus value capture: Towards a coherent definition of value in strategy. *British Journal of Management*, 11(1), 1–15. <https://doi.org/10.1111/1467-8551.00147>
- Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84.
- Brown, T., & Katz, B. (2019). *Change by design: How design thinking transforms organizations and inspires innovation* (Vol. 20091). Harper Business.
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/10.1177/1744987120927206>
- Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning*, 43(2–3), 354–363. <https://doi.org/10.1016/j.lrp.2009.07.010>
- Cresswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Sage.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550. <https://doi.org/10.5465/amr.1989.4308385>
- Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E. A., & Barlow, C. Y. (2017). Business model innovation for sustainability: Towards a unified perspective for creation of sustainable business models. *Business Strategy and the Environment*, 26(5), 597–608. <https://doi.org/10.1002/bse.1939>
- FAO. (2018). The global status of seaweed production, trade and utilization. Globefish Research Programme, 124, 120. Rome, Italy: FAO.
- Fauvel, C., & Ching, H. Y. (2013). Criticisms, variations and experiences with business model canvas. *European Journal of Agriculture and Forestry Research*, 1(2), 26–37. <https://doi.org/10.1.1.452.1207>
- Franceschelli, M. V., Santoro, G., & Candelo, E. (2018). Business model innovation for sustainability: A food start-up case study. *British Food Journal*, 120(10), 2483–2494. <https://doi.org/10.1108/bfj-01-2018-0049>
- Garcia, G. S. C. (2006). The mother–child nexus: Knowledge and valuation of wild food plants in Wayanad, Western Ghats, India. *Journal of Ethnobiology and Ethnomedicine*, 2(1), 39. <https://doi.org/10.1186/1746-4269-2-39>
- Girotra, K., & Netessine, S. (2013). OM forum—business model innovation for sustainability. *Manufacturing & Service Operations Management*, 15(4), 537–544. <https://doi.org/10.1287/msom.2013.0451>
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>
- Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602–611. <https://doi.org/10.2307/2392366>
- Kim, S. Y., Jung, T. S., Suh, E. H., & Hwang, H. S. (2006). Customer segmentation and strategy development based on customer lifetime value: A case study. *Expert Systems with Applications*, 31(1), 101–107. <https://doi.org/10.1016/j.eswa.2005.09.004>
- Lüdeke-Freund, F. (2010). Towards a conceptual framework of 'business models for sustainability' (September 19, 2010). Knowledge collaboration & learning for sustainable innovation. In R. Wever, J. Quist, A. Tukker, J. Woudstra, F. Boons, & N. Beute (Eds.), Delft, 2010, ERSCP-EMSU Conference 2010, The

- Netherlands, October 25–29, 2010, 25–29. Available at SSRN <https://ssrn.com/abstract=2189922>
- Massa, L., & Tucci, C. L. (2013). Business model innovation. *The Oxford Handbook of Innovation Management*, 20(18), 420–441.
- Maurya, A. (2012). *Running lean: Iterate from plan A to a plan that works*. O'Reilly Media, Inc.
- McFoy, C. (2004). Ethnobotany and sustainable utilization of natural dye plants in Sierra Leone. *Economic Botany*, 58(sp1), S66–S76. [https://doi.org/10.1663/0013-0001\(2004\)58\[S66:EASUON\]2.0.CO;2](https://doi.org/10.1663/0013-0001(2004)58[S66:EASUON]2.0.CO;2)
- Müller, R. M., & Thoring, K. (2012). Design thinking vs. lean startup: A comparison of two user-driven innovation strategies. *Leading through Design*, 151, 91–106.
- Murray, A., & Scuotto, V. (2016). The business model canvas. *Symphony. Emerging Issues in Management*, 24(3), 94–109. <http://dx.doi.org/10.4468/2015.3.13murray.scuotto>
- Osterwalder, A., Pigneur, Y., Oliveira, M. A. Y., & Ferreira, J. J. P. (2011). Business model generation: A handbook for visionaries, game changers and challengers. *African Journal of Business Management*, 5(7), 22–30. Available online at <http://www.academicjournals.org/AJBM>
- Ries, E. (2011). How today's entrepreneurs use continuous innovation to create radically successful businesses. *The lean startup*.
- Rowley, J. (2002). Using case studies in research. *Management Research News*, 25(1), 16–27. <https://doi.org/10.1108/01409170210782990>
- Stubbs, W., & Cocklin, C. (2008). Conceptualizing a “sustainability business model”. *Organization & Environment*, 21(2), 103–127. <https://doi.org/10.1177/1086026608318042>
- Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2–3), 172–194. <https://doi.org/10.1016/j.lrp.2009.07.003>
- Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and Applications*, 5, 147–158. <https://doi.org/10.17348/era.5.0.147-158>
- Torri, M. C. (2012). Innovative farmer institutions and market imperfections: New opportunities and challenges for the ayurvedic sector and small-scale enterprises in India. *The Journal of Entrepreneurship*, 21(1), 59–90. <https://doi.org/10.1177/097135571102100103>
- Ueda, K., Takenaka, T., Váncza, J., & Monostori, L. (2009). Value creation and decision-making in sustainable society. *CIRP Annals*, 58(2), 681–700. <https://doi.org/10.1016/j.cirp.2009.09.010>
- Weber, K., & Soderstrom, S. B. (2012). *Social movements, business, and the environment*. In *The Oxford handbook of business and the natural environment* (pp. 248–265). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199584451.003.0014>
- Yang, M., Vladimirova, D., & Evans, S. (2017). Creating and capturing value through sustainability: The sustainable value analysis tool. *Research-Technology Management*, 60(3), 30–39. <https://doi.org/10.1080/08956308.2017.1301001>
- Yin, R. K. (1984). *Case Study Research - Design and Methods*. Beverly Hills: Sage Publications
- Yin, R. K. (2003). *Case study research design and methods* third edition. *Applied Social Research Methods Series*, 5.
- Yin, R. K. (2013). Validity and generalization in future case study evaluations. *Evaluation*, 19(3), 321–332. <https://doi.org/10.1177/1356389013497081>
- Yin, R. K. (2017). *Case study research and applications: Design and methods*. Sage publications.
- Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management*, 37(4), 1019–1042. <https://doi.org/10.1177/0149206311406265>



© 2021 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



You are free to:

Share — copy and redistribute the material in any medium or format.

Adapt — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

***Cogent Business & Management* (ISSN: 2331-1975) is published by Cogent OA, part of Taylor & Francis Group.**

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com

