Business model identification in vannamei shrimp (*Litopenaeus vannamei*) mariculture commodity (Case study: Sea farming project in Semak Daun Island, Indonesia)

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Abstract. The success of the development of vaname shrimp mariculture technology has a positive impact on the community and the environment. The existence of sea shrimp farming involving the community can be the alternative livelihood for the local fishermen. These activities can be managed by several groups of fishermen in order to improve the joint economic welfare. Given the magnitude of the benefits received by the community, this program can be developed as a community-based business that is environmentally friendly. The business model can be a tool for making business guides that are easy to understand, designed and redesigned quickly. The business model approach that can be used to accommodate this is the Business Model Canvas (BMC), as a tool to identify the business components in detail with nine element attributes. The research on the development of the vaname sea shrimp cultivation business model (*Litopenaeus vannamei*) is intended to obtain a description of the vaname shrimp mariculture busines model that can be used to transfer ideas, knowledge and ideas from a research action (non-profit) to a business that can be managed independently by the community (profit oriented).

1. Introduction

Shrimp is one of the aquaculture products whose demand continues to increase. FAO [1] shows that imports of shrimp farming throughout the world have increased. The importing countries and the increase percentages include Japan at 7%, European Union at 17.8%, Russia at 44%, Australia at 4%, and South Africa at 15%. While the largest shrimp exporting countries in the world include Ecuador, India, Thailand, China, and Indonesia. Indonesia’s five man markets are the United States of America, Japan, the European Union, Vietnam, and Malaysia.

The high demand for the world shrimp demands an effort to increase the national shrimp production. The vaname shrimp (*Litopenaeus vannamei*) is a type of shrimp that is easily cultivated on land (pond) both traditionally, semi-intensively, and intensively. Almost all vaname shrimps that circulate in the national market are the results of the aquaculture ponds. The rise of the vaname shrimp cultivation business in the pond has not only had a positive impact on increasing the shrimp productivity. Hidayatillah [2] said that the increasing shrimp productivity through a pond industrialization system can cause the environmental pollution. To avoid this, Indonesia’s sea area which is larger than the land area can be an alternative solution.
The utilization of the sea as a place for the vaname shrimp cultivation is a breakthrough that has been made by Center for Coastal and Marine Resource Studies (PKSPL) IPB. According to Effendi [3], the sea has an advantage in the cultivation, which is a very large development potential, has a high dissolved oxygen, so it does not need to use the windmills, has a large carrying capacity, and can be directed to the intensification of cultivation, and produces the premium quality shrimp meat quality. The development of the technology of mariculture is one of the solutions to restore the natural function of the sea.

PKSPL IPB has succeeded in conducting the vaname shrimp aquaculture action research starting from the aspects of the location and cultivation systems, the benur stocking technology, the feed and feeding technology, the water quality management, the shrimp health management, the shrimp quality characteristics, the live shrimp transport technology, the shrimp agribusiness, and the development of the marine aquaculture groups. The pilot plan scale research is carried out for three years (2015-2017). The location of selected shrimp farming is Semak Daun Island, Kepulauan Seribu, Province of DKI Jakarta which is in the form of the shallow marine waters. The activities that have been carried out since 2015 are the form of contribution to the coastal communities, especially in Kepulauan Seribu. The success of PKSPL in developing the sea shrimp cultivation technology that involves the community can be an alternative livelihood for the local fishermen. These activities can be managed by several groups of fishermen in order to improve the joint economic welfare.

The business management plan can be a guide or blue print of the vaname cultivation business in the sea. The guide must be able to help the community groups as the business people in conducting business. The business model can be a tool for making business guides that are easy to understand, designed and redesigned quickly [4]. One approach to the business model that can be used to accommodate this is the Business Model Canvas (BMC). According to Osterwalder and Pigneur [5], BMC is a business model concept that can be applied to profit and non-profit organizations. The use of BMC as a tool to develop a community-based shrimp farming business model (social entrepreneur) can help identify and develop business components in more detail by dividing them into nine elements. The implementation of BMC is expected to facilitate the business groups in understanding the rationale, recognizing the potential, and developing the business capacity of vaname shrimp farming, so that it is easily applied and duplicated in other regions in the future. The ease of the transfer of knowledge of the shrimp farming systems and the social entrepreneur-based systems is expected to help increase the income and spur the economic growth in the coastal communities that are balanced by the enviromental sustainability.

2. Material and Methods

2.1. Time and place
The study was conducted in Semak Daun Island, Kepulauan Seribu, in February – October 2018. Map of the study object given in Fig. 1. Semak Daun Island located in the Noth of Seribu island, part of the Pulau Panggang village, which is used as an area of forest protection and nature conservation. Semak Daun Island has a characteristic that is a shallow sea waters. Based on the principle of protection of shallow marine waters around the island, the area has high potential as a cultural area. Semak Daun Island is an uninhabited island. Based on the characteristics of the region, this island is used for collaborative management efforts that are able to enhance and restore marine ecosystems.
2.2. Research approach
The research is conducted out by the descriptive method, namely the research method in a group of humans, an object, a set of conditions, a set of thoughts or a class of events \[6\]. The location of the object of research is determined as a case study to provide a comprehensive picture of the problems of the object under study \[7\]. The research approach is done through the direct observation, the interview, and the questionnaires as nine BMC block analysis tools. In this case, in-depth interviews with experts are needed to assess the opinions, the beliefs, the motivations, the feelings, and the projections of a group toward the future.

The data used are the primary data and the secondary data. The primary data are the data obtained directly in the field based on the results of the observations, the interviews, and the questionnaires. The secondary data are obtained by accessing the information/data from various relevant agencies and literature studies. Some of the data used include those published by the Central Bureau of Statistics, Ministry of Industry, Ministry of Trade, Ministry of Marine Affairs and Fisheries, the research data of PKSPL-IPB, and other data sources relevant to the research topics such as scientific journals, books, proceedings, and working papers.

2.3. Sampling technique
The sampling technique is done on a non probability sampling with a purposive technique, namely the sampling procedures that are not possible to calculate the chances of choosing members of the population into the samples. The selection of examples (respondents) is done by considering the characteristics that match the needs in answering the research objectives. The respondents consist of internal and external parties (experts). The internal party is someone who has or has done vaname shrimp cultivation on Semak Daun Island (business actor). The experts are respondents who have expertise and in-depth experience on the research topics. The expert respondents used consist of practitioners and academics/researchers. The practitioners are the respondents who know the ins and outs of the social entrepreneur business and various factors that can influence it. While the academics/researchers are the...
expert respondents who understand and follow the development of the vaname shrimp farming business or have an understanding of the social entrepreneur from the academic side.

3. Results and Discussion

3.1. Development of Vannamei Shrimp Mariculture

Since 2005, PKSPL IPB conducts a study on the development of the economic sector and the restoration of the marine ecosystem. One of the areas developed is Kepulauan Seribu. The idea arose because of the emergence of the issue of the ecosystem damage in the waters of the Seribu island due to the industrial activities and the activities of fishermen in carrying out the economic activities. In an effort to restore the ecosystem, in 2006 it is carried out the action plan and the launching of the sea farming program (a program of farming at sea). The sea farming is a blend of the concept of utilizing the marine waters between the marine culture and conservation of the marine environment (environment conservation), where the aquaculture production is an intermediate target, business people get the main income from the utilization of the environmental management in the area.

The coral reef waters of Semak Daun Island have the conformity to the development of the sea farming, that is, the mariculture with the floating net cage/cageculture cultivation system, the pen culture, and the sea ranching. The charred waters of Semak Daun Island have the potential for the development of aquaculture covering an area of 812.27 ha. Based on the results of the planning study of Semak Daun Island management area, there are six points that can be used as an area of the marine aquaculture. Two points of 3.40 Ha and 3.86 Ha can be used as an area of pen culture (seedling cages); two points covering of 3.45 Ha and 4.07 Ha are used as the cage culture (floating cages); and two points covering an area of 3.04 Ha and 3.86 Ha are used as the conservation areas for Ekinodermata and Mollusk (Fig. 2).

![Figure 2 Potential Map of Cultivation Areas on Semak Daun Island.](image)

Currently the ongoing sea farming program in Kepulauan Seribu is a demonstration of how to manage the ideal shallow marine waters before being disseminated at other locations in Kepulauan Seribu. In the concept of the sea farming, there are several cultivation systems that work synergistically, both serially and in parallel. The cultivation system includes hatchery, sea ranching, enclosure, pen
culture, cage culture (floating and fixed), and longline (seaweed and oyster). The system actors in this case are the seed providers, the fish farmers, the collectors/transporters, and the consumers, while the system guides are the government, the cooperatives, and the researchers/NGOs/mentoring institutions. The sea farming program also receives a positive response in the community of Kepulauan Seribu. This is evidenced by the formation of the sea farming fishery group with 79 members. Various commodities such as the seaweed, the pompano, the abalone, and the grouper, are used as the trials, but it does not last long due to the limited management and resources which are still the research projects.

3.2. Identification and Mapping Business Model

The research on the development of the vaname shrimp cultivation social entrepreneur business model (*Litopenaeus vannamei*) is intended to obtain a description of the vaname shrimp mariculture business model that can be used to transfer ideas, knowledge and ideas from a research action (non-profit) to a business that can be managed independently by the community (profit oriented). The study of Ledy and Situmorang [8] make the Social Value Navigation Model based on BMC and BOS as a development strategy framework. The new model serves as a reliable strategic framework for a social organization through understanding the aspects of BMC values and modifying them according to the social needs.

The Business Model Canvas (BMC) as a simple and comprehensive business model concept can be used as an alternative business implementation plan. The development of a business model begins with an in-depth of the existing business model by dividing it into nine basic elements. The analysis is carried out by identifying and mapping nine elements of the business model, analyzing the internal and external environments, and understanding the role of relevant stakeholders. The presence of the stakeholder in the social entrepreneur can be one of the triggers of the business model to make a better transformation.

The identification of the existing business model is done to describe the extent of the pattern of activities that have been implemented using nine elements in the BMC model. This business pattern refers to the organization of the Research Institute of PKSPL IPB which acts as an innovator and an initiator, and wants to further develop the commodity of vaname shrimp. The pattern of existing activities is mapped in Fig. 3.

![Figure 3. BMC existing vaname sea shrimp.](image)

- **Customer Segments**
  
  Customer segment is the party that uses the product, in this case is the technology of vaname sea shrimp cultivation and contributes in providing input for the organization/group/community. The
customer segmentation in this case is the Seribu island coastal community, the majority of whom are the fishermen. The cultivation system is expected to provide the additional income alternatives for the coastal communities.

- **Value Proposition**

  Value propositions represent a combination of products and services that create value for customer segments. In this case, the value proposition is innovative and represents a new offer. The business value proposition of the vaname shrimp cultivation is categorized into two aspects, namely the aspects of cultivation system and product quality. In the aspect of cultivation, the value offered is environmentally friendly technology, which is the result of innovation and is considered to be the right solution for the environmental issues in the pond shrimp. The innovation in the technology of vaname sea shrimp cultivation is a breakthrough for utilizing the marine ecosystems having the potential for very large land use. In addition, the existence of such cultivation can be one of the additional income alternatives for the coastal communities. Nearly all Seribu island society are the capture fishermen and face the climate fluctuation which result in the number of captured fishes obtained. With this alternative cultivation, the fishermen are expected to get additional income to improve welfare.

  In the product aspect, in this case, the fresh vaname shrimp, is a premium shrimp that has better taste, nutrient, color, and mineral compared to pond shrimp. These shrimps can also be categorized as the organic shrimps, due to the nature of growth and the natural feed found in the sea. Based on the research of Wijaya [9], the nutritional composition of the sea shrimp proved to be two times higher than that of shrimp grown on land. The nutritional composition can be seen from the content of essential amino acids such as glutamate, serina and prolina (giving sweet taste to shrimp), oleic and linoleic acids (Omega 6 PUFA) and taurine and linonenic acid (Omega 3). Liang et al. [10] revealed that mariculture vaname has high protein content, low water content, thus making the texture of shrimp meat denser. The extracts from shrimp cultivated in seawater having high umami content which make shrimp taste more savory, have a sweet taste and does not contain off-flavor.

- **Channels**

  Channels describe how an organization/company communicates with a customer segment to provide its value proposition. The technology of sea shrimp cultivation is introduced to the island community through counseling. The results of sea shrimps which are still in the scale of the pilot plan/trial, so far the trails that have been conducted are marketed directly to the communities around the island. In addition, the shrimp is also marketed in the environment of PKSPL IPB and receives a good response. Many of the consumers who come directly to the Secretariat of Sea farming PKSPL IPB to buy the fresh vaname sea shrimp. In addition, the vaname sea shrimps are also exhibited in several educational exhibitions or agricultural products.

- **Customer Relationship**

  Customer relationship describes various types of relationships that an organization / company builds with the customer segment. In this case, the customer relationship takes the form of personal and direct relationships, through the extension programs. The extension program and the knowledge transfer to the community are provided, so that the community has the additional knowledge and skill, and the initiation of the formation of the sea farming groups.

- **Revenue Stream**

  Revenue Stream describes the benefits generated by the organization of each customer segment. The biggest revenue stream in this case is the research funding. The results of the sale of shrimps are not much, returned to the research fund. So, the system formed is project-based, especially the research.

- **Key Resources**

  Key resources describe the most important assets needed for a business model to be able to function. There are three resources that support activities, namely first, the natural resources in the form of supporting the water conditions. The area of Semak Daun Island with various characteristics of its waters is suitable to be used as an area for the cultivation of the vaname sea shrimp. Second, there are physical assets in the form of the floating net cages / cage culture, the guard houses that are used as testing laboratories and control houses, and the motorized boats as a means of inter-island transportation.
Third, the existence of human resources conducting the research, namely a team of experts, and the local fishing communities, namely a group of cultivators.

- **Key Activities**
  Key activities describe the actions that are important for the company, so that its activities can run. The key activities in this activity are the shrimp juvenile production and the production of the vaname sea shrimp. The juvenile production is carried out in the initial stage of testing on the hatchery island. However, the results obtained are not very good, and now the juvenile is obtained by buying it at a certified hatchery. The shrimp production is a core activity that wants to be developed, disseminated, duplicated in the coastal communities.

- **Key Partnership**
  Key partnership describes the partners / suppliers who make business models work. In this activity, the community of Seribu island is the main partner and target in the success of this technology innovation. The Institute for Research and Technology of Higher Education is the main partner cooperated with PKSPL IPB in the research of the vaname sea shrimp and is a source of funding for the continuity of the research. The feed and juvenile suppliers for the success in the operational processes in the field. The Local Government of Seribu island is the main partner who oversees the approach to the local community.

- **Cost Structure**
  Cost structure is a cost that describes all costs incurred to operate an activity. In this activity, the main cost structures are the investment cost and the operational cost. The investment costs are the costs incurred for assembling cage culture, guard house, motorized boat, and other costs in the construction of the sea shrimp cultivation infrastructure. The biggest operational costs are the cost of shrimp feed and the fuel cost for inter-island transportation.

4. **Conclusion**
The existing business model of vaname sea shrimp farming is a non-profit business model. The business model is driven by a value proportion that can be divided into two, namely the cultivation system and the product quality. The existence of PKSPL as the actor of the research-oriented business model is aimed at creating the vaname sea shrimp farming system with environmentally friendly technology, providing additional income alternatives to coastal communities by producing premium quality and organic shrimp. The identification of the existing business model is the basis for the development of the next business model which can be used as the reference or business pattern for the sustainable vaname sea shrimp.

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