

A partnership business model for a sustainable sea salt industry in Indonesia

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Abstract. In Indonesia, the domestic sea salt industry faces major challenges for supply and demand. Therefore, this study seeks to develop a partnership business model aimed at fostering sustainability in the Indonesian sea salt industry. Utilizing an exploratory descriptive methodology with a qualitative focus, this study incorporates the business model canvas, sustainability aspect, partnership canvas, and value innovation framework. The participants comprised 113 sea salt farmers and seven sea salt processing micro, small, and medium enterprises (MSMEs) from Java and Madura Islands. The data were analyzed using deductive content analysis. Triangulation and kappa statistical tests were performed to assess the validity and reliability. The kappa coefficient obtained was 0.83, which is an excellent agreement, surpassing the threshold of 0.75. Sea salt processing MSMEs aim to expand their market share by facilitating farmer access and providing collaborative training on jointly developed sea salt-processing methods. Conversely, smallholder sea salt farmers aim to enhance their income by participating in co-designed training programs, collaborative production and marketing initiatives, and contractual agreements for sea salt production.

Keywords: business model innovation, partnership canvas, sea salt production, sustainable business model.

Introduction. Globally, the blue economy is being promoted and implemented to harmonize economic growth with environmental and social sustainability (Mollet et al., 2026). Indonesia's extensive archipelagic landscape and long coastline present significant opportunities for developing a blue economy. According to Yusheng et al. (2024), the marine and coastal resources of a country hold the potential to yield substantial economic benefits. A key sector within this economic framework is the sea salt industry, which plays a vital role in the socioeconomic advancement of coastal communities. Sea salt ponds are distributed across coastal regions such as Madura, Java, Bali, Sulawesi, Nusa Tenggara, and Kalimantan, encompassing a total area of 32,203 ha (Ministry of Maritime Affairs and Fisheries, 2026). Specifically, Madura Island contains one-third of Indonesia's sea salt production area, earning it the moniker "salt island".

Over the past decade, Indonesia's sea salt production has fluctuated considerably. The national production of sea salt reached its zenith at 2.8 million tons in 2019, while the nadir was observed in 2016, with a production of 0.2 million tons. During this period, the demand for sea salt has steadily increased, rising from 3.5 million tons in 2016 to a projected 5 million tons by 2025. This growth signifies a 43% increase over the decade, with an average annual rise in consumption of 4.3% (Ministry of Maritime Affairs and Fisheries, 2026). The majority of this sea salt is utilized in the food and beverage sector, pharmaceutical industry, and other industries that require high NaCl content, commonly referred to as industrial sea salt.

In Indonesia, sea salt production is predominantly carried out by smallholder farmers who own plots ranging from half to one hectare. These farmers encounter

several significant challenges, such as a productivity ceiling of 100 tons per hectare and production expenses between IDR. 300,000 and IDR. 500,000 per ton. In addition, the sea salt produced often has a NaCl content below the industry benchmark of 97%, and the environmental repercussions of the current production methods are significant. Meanwhile, stakeholders in the downstream sea salt industry, including processing factories, require sea salt with a NaCl content above 97%, competitive pricing relative to imported sea salt, and environmentally sustainable production methods.

This situation underscores the importance of developing innovative sustainable partnership business models, particularly through the integration of business models of smallholder sea salt farmers and sea salt companies. This partnership should focus on exchanging values, resources, and practices that align with sustainable standards. According to Jarvi et al. (2010), such value exchanges include equitable revenue distribution, easy access, high-quality services and resources, and complementary technologies. The adoption of technology should not be confined to the main participants in the sea salt industry value chain but should also involve related institutions.

A sustainable sea salt partnership business model necessitates collaboration between farmers and sea salt companies, as well as stakeholders such as the government, civil society, and research institutions. The participation of these stakeholders is essential for advancing the adoption and implementation of sustainable sea salt production practices, thereby enhancing the socioeconomic benefits for coastal communities. The promotion of sustainable sea salt production practices is consistent with the principles of the blue economy, which aims to ensure the sustainable use and management of marine resources for economic growth and social well-being of the community.

Filser et al. (2021) identified three prospective areas for research on business model innovation: sustainability, dynamic capabilities, and small and medium enterprises. Sustainable business model innovation examines the potential positive impacts of business model innovation on the economic, social, and environmental dimensions (Bocken et al., 2020). In contrast, dynamic capabilities encompass the processes of sensing, seizing, and transformation (Teece, 2018). The final research opportunity pertains to exploring business model innovation within micro, small, and medium enterprises (MSMEs).

In scholarly discourse and case studies concerning partnerships, numerous authors have endeavored to categorize partnerships according to their organizational structures by Nunes et al. (2024) and Helble et al. (2023); technology transfer by Adomako & Nguyen (2023); collaborative advertising by Tavassoli et al. (2025) and Bauer & Johnson (2024); lease service agreements by Ojima et al. (2023); and resource venturing by Moss et al. (2022). However, researchers cannot adequately define partnerships by merely aligning the two partnering business models, as this approach does not elucidate the operational dynamics of the partnership. Consequently, Doorneweert (2014) introduced a partnership canvas to clarify the partnership entity by delineating its fundamental components. This tool facilitates the mapping of existing partnership business models, elucidates the functioning of partnerships, and aids in designing new partnership models. The partnership canvas transcends the innovation limitations inherent in a single-party business model. Benhayoune et al. (2020) incorporated this canvas into their partnership co-design models. In contrast to Raharja et al.'s (2020) method, which adapted the business model canvas to fortify farmer institutions by concentrating on the two lowest-level factors - namely, inhibiting factors and benefits - the partnership proposition canvas emphasizes the modification of several elements: partnership value proposition, compactness, deliverables, desires, assets, and usability.

This study seeks to develop a partnership business model to promote sustainability in the Indonesian sea salt industry.

Material and Method. This study employed a qualitative methodology, conducting interviews with 113 sea salt farmers and seven sea salt processing MSMEs in six sea salt producing regions in Indonesia, including Indramayu, Cirebon, Pati, Rembang, Pamekasan, and Sumenep. This study was conducted from July to December 2024. The

sample size for sea salt farmers was calculated using the Slovin formula, as shown below:

$$n = N / (1 + N \cdot e^2) \dots\dots\dots (1)$$

where: n represents the minimum sample size, N denotes the population size, and e is the margin of error. Given that there are 44,000 sea salt farmers in Indonesia and a margin of error of 10%, the minimum sample size was determined to be 100 smallholder sea salt farmers.

The data analysis in this study use content analysis involving the framework of the Business Model Canvas (BMC), sustainability, value innovation, and partnership. The BMC comprises a single page containing nine blocks, which assists in comprehending how an entrepreneur generates revenue. Sustainability serves as a tool to measure economic, environmental, and social aspects, which are subsequently used to formulate a business model. Value innovation comprises one page with four blocks for developing a sustainable sea salt-business model. In addition, partnership canvas lays the foundation for a partnership between business models.

The qualitative analysis procedure covered the phases of data condensation, presentation, and conclusion or verification.

1. Condensing the data. This phase consists of various procedures: selecting, simplifying, abstracting, and transforming the data that appear in the entire body of written field notes, interviews, transcripts, and documents;

2. Presenting the data. This step makes it easy to see the overall picture or certain parts of the elements of the business model canvas, sustainability, partnership, and value innovation;

3. Drawing conclusions or verification of the results. Data verification in qualitative research was conducted continuously throughout the study. From the beginning of entering the field and during the data collection process, the researcher tried to analyze and search for the meaning of the words collected, namely, looking for patterns, themes of relationships, things that arise, hypotheses, or so to be outlined in tentative conclusions. With the addition of data through a continuous verification process, conclusions can be drawn from the figures and narratives.

Triangulation and kappa statistical tests were performed to assess the validity and reliability. The kappa coefficient obtained was 0.83, which is an excellent agreement, surpassing the threshold of 0.75. According to Fleiss et al. (2003), a kappa value greater than 0.75 indicates excellent agreement, a kappa value between 0.40 and 0.75 indicates fair to good agreement, and a kappa value below 0.40 indicates poor agreement. Qualitative data analysis also utilizes NVIVO software, which facilitates the capture, transcription, coding, and examination of both textual and graphical data.

Results and Discussion

The existing sea salt farmers Business Model in Indonesia. Sea salt farmers in Indonesia continue to sustain and develop their operations alongside the expansion of sea salt processing MSMEs across various production centers, despite the influx of sea salt imports required to satisfy the demands of both food and non-food industries, such as healthcare. Figures 1 and 2 show the existing sea salt farmers and sea salt processing MSMEs business models. Sea salt farmers business model demonstrates the strategic mobilization of resources and activities aimed at delivering a value proposition to consumer segments, including sea salt processing companies. This is achieved through diverse channels to maintain customer relationships, which inherently influence the cost structure and revenue streams.

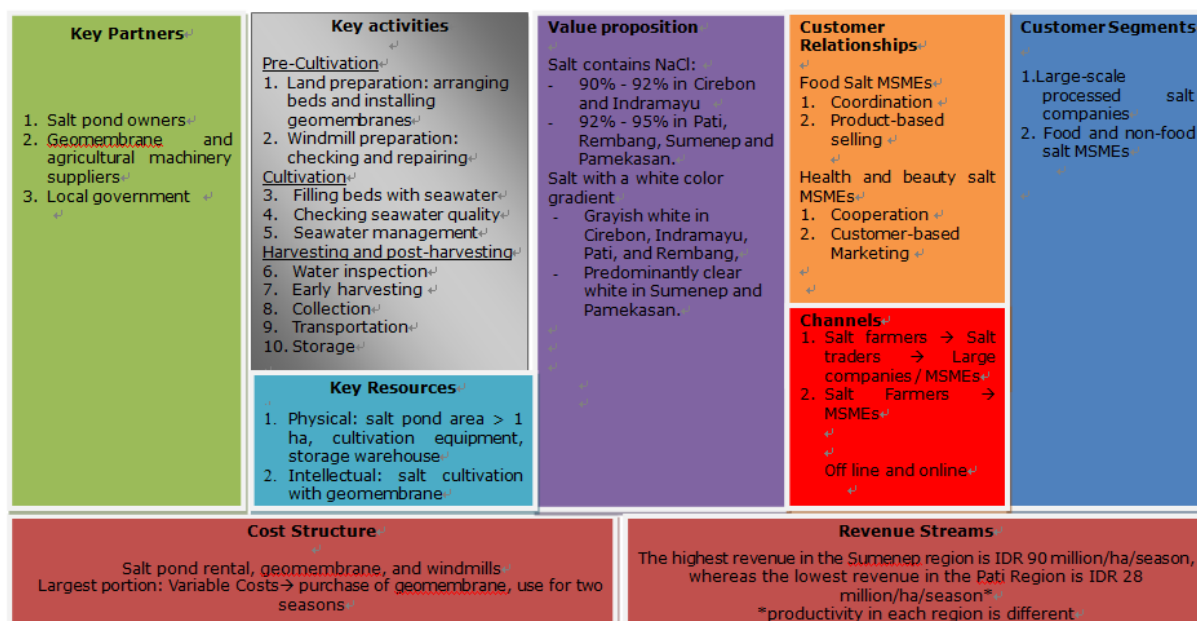


Figure 1. The existing sea salt farmers business model in Indonesia.

Value proposition. In Indonesia, farmers produce sea salt with a sodium chloride (NaCl) content below 97%, displaying a range of white shades across different regions. In West Java, specifically in Indramayu and Cirebon, the sea salt produced contains NaCl levels between 90 and 92% and is noted for its pale-white appearance. Similarly, in the Central Java regions of Pati and Rembang, the sea salt shares an NaCl content of 90 to 92% and exhibits a pale white color. In contrast, the sea salt from Sumenep and Pamekasan in East Java has a higher NaCl content, ranging from 92 to 95%, and is characterized by a clear white color.

Customer segments. Sea salt farmers engage in the sale of their sea salt to major sea salt companies and sea salt-processing MSMEs through intermediaries. There are two categories of sea salt-processing MSMEs: those focused on food, and health products. MSME specializing in sea salt processing for health purposes growing rapidly in Cirebon. Sea salt farmers from Madura Island (Sumenep and Pamekasan) supply sea salt to this MSME.

"We often sell to middlemen, we also sell to packaged sea salt factories and rarely sell directly to large factories (Interview with farmers in Indramayu or FI: FI-1, FI-2, FI-5, FI-9, FI-14, and FI-20, farmers in Cirebon or FC: FC-1, FC-3, FC-6, FC-10, and FC-15, farmers in Pati or FP: FP-1, FP-4, FP-8, FP-13, and FP-19, farmers in Rembang or FR: FR-1 and FR-5, farmers in Sumenep or FS: FS-1, FS-10, and FS-16, farmers in Pamekasan or FM: FM-1, FM-6, FM-11, and FM-18)".

Customer relationships. Griesemer & Shavit (2023) categorized the interactions between groups into three types: coordination, cooperation, and collaboration. Based on this classification, the interaction between sea salt farmers and their customers was limited to coordination. Frow & Payne (2009) identified four types of customer relationship management: product-based selling, customer-based marketing, managed service and support, and individualized customer relationship management. Sea salt farmers establish relationships with customers who fall within the product-based selling category.

"We usually contact the sea salt traders directly if the sea salt is available, if the price is cheap, we usually store it in the warehouse waiting for the price to go up (Interview with FI-2, FI-3, FI-6, FI-10, FI-11, FC-2, FC-4, FC-7, FC-11, FC-16, FP-2, FP-5, FP-9, FP-14, FP-20, FR-2, FR-6, FS-2, FS-11, FS-17, FM-2, FM-7, FM-12, and FM-19)".

Channels. In the sea salt marketing channel, farmers initially sell their products to the collectors. These collectors then distribute the sea salt to either large companies or MSMEs involved in the sea salt processing. Alternatively, collectors may sell sea salt to interregional traders, who subsequently supply it to large companies or sea salt MSMEs. In the Cirebon and Pati regions, certain farmers directly supply sea salt processing to MSMEs. The marketing channel also incorporates a hybrid approach, where initial interactions are conducted offline, followed by transactions facilitated through online platforms.

"We usually sell through wholesalers or company officials. We also sell directly to sea salt processing MSMEs (Interview with FC-3, FC-5, FC-8, FC-12, FC-17, FP-3, FP-6, FP-10, and FP-15)".

Key activities. Sea salt farmers engage in at least ten essential activities that can be categorized into three distinct phases. The first phase, pre-cultivation, involves land preparation tasks such as arranging beds and installing geomembranes, as well as preparing windmills, which includes checking and repairing them. The second phase, cultivation, encompasses activities such as filling the area with seawater, assessing seawater quality, and regulating seawater levels in the ponds. The final phase, harvesting and post-harvesting, includes monitoring water conditions, harvesting through harrowing, and subsequent activities such as collecting, transporting and storing the produce.

"In a one-hectare area of sea salt ponds, we allocated 10 plots for specific activities. Plot 1 was designated for the storage of young water. The water aging process occurred sequentially from plots 2 to 8, with each plot utilized for one day. Plots 9 and 10 are used for the storage of old water and the harvesting process, employing geomembrane technology (Interview with FI-4, FI-7, FI-12, FI-15, FC-4, FC-9, FC-13, FC-18, FP-4, FP-7, FP-11, FP-16, FR-3, FR-7, FS-3, FS-12, FS-18, FM-3, FM-8, FM-13, and FM-20)".

"Our experience in sea salt farming for over 30 years shows that the use of membranes has a significant impact on the quantity of sea salt harvested, but the quality is still better or whiter without using geomembranes (Interview with FR-4, FR-8, FR-10, FR-13, FS-4, FS-13, FS-19, FM-3, FM-9, FM-14, and FM-17)".

Key resources. One aspect influencing the sustainability of the sea salt industry is its dependence on natural resources (Fauziyah et al., 2026) and human resources (Yolandika et al., 2023). Farmers possess physical and intellectual resources, including ponds that may be leased, held under cultivation rights, or privately owned. The average pond area exceeds one hectare. Their farming equipment includes windmills, geomembranes, sea salt-harvesting tools, water meters, sea salt storage sheds, and temporary huts for resting or overnight stays during the sea salt cultivation season. In addition, farmers have substantial technical knowledge regarding sea salt cultivation using geomembranes. Some sea salt farmers store their harvests in warehouses to sell when market prices are favorable, indicating proficient management skills, particularly in stock management.

"We are from the edge of the Sumenep sea salt field and rent sea salt in Pamekasan. During the sea salt season, our family lives and cooks in this hut, occasionally returning to the edge of the sea salt field for important matters and events. We also built a similar hut when we rented land in Sidoarjo for 10 years (Interview with FS-5, FS-14, FS-20, FM-4, FM-10, FM-15, and FM-16)".

"We made our own sea salt transporter using PVC pipes because the factory-made iron ones quickly deteriorated due to the corrosive nature of sea salt (Interview with FS-6, FS-15, FS-16, FM-5, FM-11, FM-12, FM-16, FR-9, FR-11, FR-12, FP-17, and FP-18)".

Key partners. Sea salt farmers engage in partnerships with landowners through land lease agreements that include profit-sharing mechanisms. Specifically, sea salt farmers from the Pinggirpapas area of Sumenep lease sea salt fields located outside the Regency of East Java, including Pamekasan, Sidoarjo, and Gresik. In addition, partnerships are formed with district governments to facilitate the application of new sea salt fields via the Right to Cultivate mechanism. Various potential areas are being developed in mangrove regions, with the stipulation that smallholder farmers who establish new land must replant mangroves in the area. This replanting is essential to prevent seawater erosion, preserve fish and mangrove crab habitats, and absorb carbon dioxide (CO₂) emissions. Furthermore, farmers have established partnerships with geomembrane suppliers to procure geomembranes. The acquisition of geomembranes is based on specific needs, and the relationship with suppliers is open-ended. Typically, geomembrane suppliers provide equipment for other sea salt cultivation activities.

"We rent land for sea salt cultivation (Interview with FS-7, FS-13, FS-14, FI-17, FI-19, FC-5, FC-11, FC-12, and FC-16)".

"Currently, we rent land in Pamekasan. We live in these huts for six months, returning occasionally for urgent needs. We even rented land in Sidoarjo for 10 years near Juanda International Airport (Interview with FS-6, FS-15, FS-16, FM-5, FM-11, FM-12, and FM-16)".

"We generally rent it on a profit-sharing basis (Interview with FS-8, FS-11, FS-12, FI-16, FI-18, FC-6, and FC-8)".

"We opened the sea salt fields in Pragaan, Sumenep, by applying for Land Use Rights (HGU) with the local government, with an agreement to use the mangroves for the sea salt fields and replace them with mangroves around the cleared land. The clearing process involved excavators, costing up to IDR 150 million per hectare, until the land was ready for use (Interview with FS-9, FS-17, and FS-18)".

Cost structure. Sea salt farming represents a relatively low-cost agricultural venture. The primary expense involves the acquisition of a windmill, which has a lifespan of three-five years. Farmers who do not own land must also account for additional expenses related for renting land. The most significant variable cost is the procurement of a geomembrane, which is a one-time purchase with a durability of two seasons. Indirect labor costs encompass the transportation of the harvest to either the warehouse or the transportation fleet. Electricity expenses are minimal, amounting to less than 100,000 Rupiah per month, and are incurred for the occasional operation of the windmill in the absence of wind and for lighting the huts.

"We incur costs for the purchase of geomembranes, which are used for two years or two harvest seasons. We can cover this cost with two or three sea salt-harvestes. We also incur electricity costs to power the windmill when the wind is not strong. We also pay for labor costs, for water management, and transporting the sea salt to the warehouse or to the transport fleet (Interview with FS-1, FS-10, FS-16, FM-1, FM-6, FM-11, and FM-18)".

Revenue streams. In the regions of Cirebon and Pati, Java, sea salt is typically harvested in less than a week, resulting in approximately 40 harvests per season, which spans six months. The optimal harvest period was identified as four months. In these areas, sea salt farmers achieve an average yield of 28 tons per hectare per season. A yield of less than 50 tons ha⁻¹ season⁻¹ is considered low. Conversely, in Sumenep and Pamekasan, Madura, sea salt farmers conduct weekly harvests to ensure optimal quality, with an average yield of five tons per hectare per harvest. In these regions, the average seasonal yield is 80 tons per hectare, which is classified as a moderate productivity. In addition, the average price of sea salt in Indonesia is low, averaging IDR 1,000 per kg. During a single sea salt farming season, farmers in Pati and Cirebon earn IDR 28 million per

hectare, whereas those in Sumenep and Pamekasan earn IDR 90 million per hectare. According to Nuswardani (2019), low sea salt prices contribute to the reduced welfare of sea salt farmers.

"We harvest sea salt early because we are pressed for daily needs. Rather than borrowing, it is better to harvest sea salt earlier (Interview with FC-3, FC-7, FC-9, FC-11, F14, FC-18, FC-19, FC-20, FI-8, FI-13, FP-5, FP-8, and FP-12)".

The existing sea salt processing MSME business model in Indonesia. MSMEs are integral to the national economy, and numerous countries have promoted their development through diverse strategies and incentives (Zheng et al., 2021). In particular, to enhance sea salt MSMEs, the Indonesian government enacted Decree 103/Kep./M.KUM/VII/2003 through the Minister of Cooperatives and MSMEs. This decree addresses the technical aspects of strengthening sea salt MSMEs by providing capital. In addition, the government established an Indonesian National Standard (SNI) for iodized sea salt, mandating a NaCl content exceeding 94%, despite the international standard requiring a minimum NaCl content of 97%. Figure 2 shows the existing sea salt processing MSMEs in Indonesia.

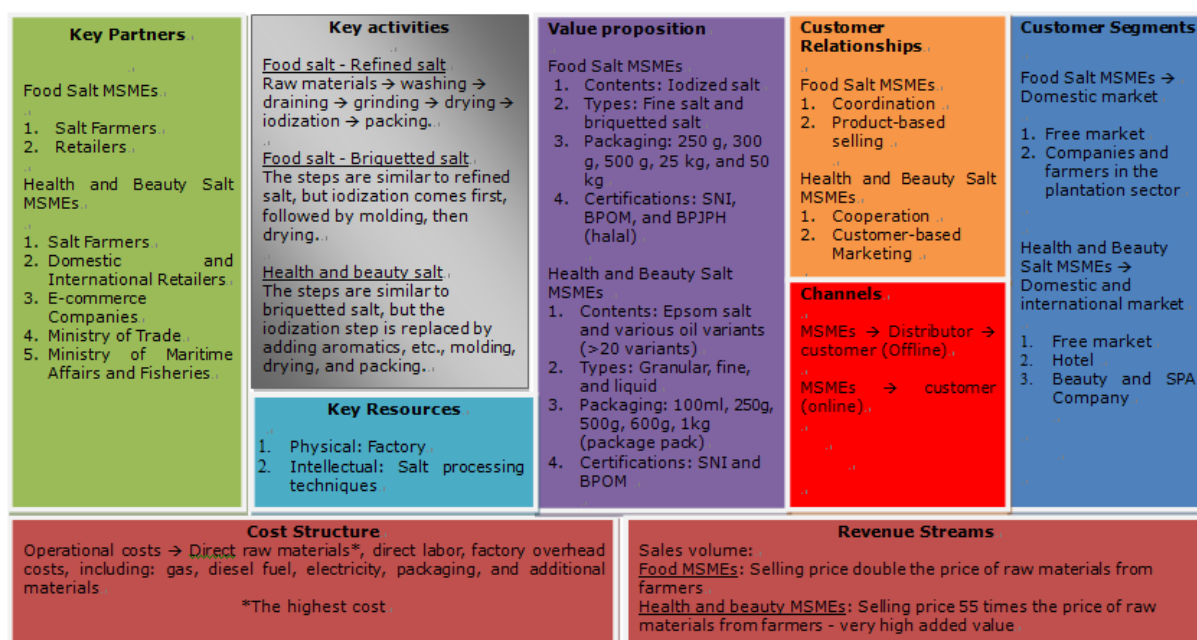


Figure 2. The existing sea salt processing MSMEs Business model in Indonesia.

Value proposition. For the food sector, sea salt processing MSbMEs supply iodized sea salt in various forms, including fine powder and briquettes, with packaging options of 250 g, 300 g, 500 g, 25 kg, and 50 kg. These products are certified by the Indonesian National Standard (SNI), Food and Drug Monitoring Agency (BPOM), and Halal Product Assurance Agency (BPJPH). According to the SNI standards, iodized table sea salt must contain 94% NaCl, a maximum water content of 7%, and a minimum KIO_3 content of 30 mg kg^{-1} . Certification from BPOM confirms that the sea salt has undergone evaluation and complies with the safety, efficacy, and quality standards established by the agency. In addition, halal certification indicates that the sea salt adheres to halal criteria, as verified by BPJPH and the Indonesian Ulema Council (MUI).

For the health sector, sea salt processing MSMEs offer a diverse range of products, including Epsom sea salt and various oil types. These products are available in over 20 different forms, including granules, fine, and liquid, and are packaged in sizes of 100 mL, 250 g, 500 g, 600 g, and 1 kg, using materials such as plastic pouches, plastic bottles, and bamboo. All variants were certified by the SNI and BPOM. These MSMEs also produce granular sea salts like herbal detox baths, sea sea salt milk baths (goat milk), stamina

sea salt, and mineral bathing sea salt. In addition, this MSME manufacture liquid products, such as sea salt sprays. The product range, categorized by function, includes beauty and health sea salt products such as face scrubs, bath sea salts, body scrubs, hair treatments, bath scrubs, stamina salts, and foot salts. Bath sea salts are traditionally used to provide a sense of freshness and fitness after a bath. Foot sea salt, infused with aromatherapy oil and other natural ingredients, is designed to enhance blood circulation in the feet, alleviate aches and pains, eliminate germs, remove unpleasant odors, and provide a relaxing effect.

Customer segments. The domestic market constitutes the primary customer base for edible sea salt products. MSMEs in the edible sea salt industry primarily cater to wholesalers and retailers, offering sea salt in packages ranging from 250 to 500 g. This distribution particularly focuses on provincial capitals such as Surabaya, Semarang, and Bandung, as well as the Greater Jakarta area (Jabodetabek). The ultimate consumers of these products are households that use sea salt as a culinary seasoning. Conversely, larger packaging options, such as 25 kg and 50 kg sacks, are designated for corporate clients or farmers engaged in the plantation sector on the island of Sumatra.

"We usually supply sea salt to wholesale customers in Bandung and Bogor through a payment-in-full-delivery system. We also supply plantation companies in Sumatra with the same payment-in-full-delivery system (Interview with MSMEs in Cirebon or MC-1, MSMEs in Indramayu or MI-1, MSMEs in Pati or MP-1, MSMEs in Rembang or MR-1, MSMEs in Pamekasan or MM-1, and MSMEs in Sumenep or MS-1)".

The health sea salt MSME is directed towards individual consumers who prioritize beauty and fitness care. The primary end users of this product are households that utilize it for beauty, fitness, and healthcare purposes. In addition, MSME targets corporate clients, such as hotels and beauty and spa companies. The customer segments for the sea salt processing product encompass both domestic and international markets, with exports specifically to Singapore and Turkey.

"We usually supply sea salt products to individual and corporate customers, such as hotels and SPA companies, both domestically and internationally, such as Singapore and Turkey (Interview with MC-2)".

Customer relationships. According to Griesemer & Shavit's (2023) classification of customer relationships, interactions among food sea salt MSMEs are categorized at the coordination level, whereas health sea salt MSMEs are classified under the cooperation category. This classification is subordinate to the collaboration level in customer relationship management. In addition, Frow & Payne (2009) delineated four types of customer relationship management: product-based sales, customer-based marketing, managed services and support, and individual customer relationship management. Food sea salt MSMEs engage in customer relationships that align with product-based sales. In contrast, health sea salt MSME adopted a customer-based marketing approach.

"We contact sea salt farmers or traders directly for procurement, and we also supply sea salt processing according to the orders of each sea salt wholesaler (Interview with MC-1, MI-1, MP-1, MR-1, MM-1, and MS-1)".

"I maintain highly customized customer relationships. For example, if a particular hotel requires sea salt for its needs in the hotel's packaging, we will fulfill it (Interview with MC-2)".

Channels. Food sea salt MSMEs engage in direct distribution to sea salt wholesalers and plantation companies that use sea salt. In additionn, these MSMEs employ hybrid distribution channels, often establishing initial offline relationships before transitioning to online interactions with customers. In contrast, health sea salt MSMEs distribute their

products directly to hotels and spas and utilize online platforms such as Shopee, Tokopedia, Bukalapak, and Lazada for sales.

"We usually make in-person visits to demonstrate sea salt samples. We generally communicate with customers online, via WhatsApp or the comments section on marketplaces (Interview with MC-1, MC-2, MI-1, MP-1, MR-1, MM-1, and MS-1)."

Key activities. Food sea salt MSMEs produce both refined and briquetted sea salt using distinct methodologies. The production of refined sea salt commences with the receipt of raw materials, which are subsequently washed and drained to remove impurities. Milling and drying were performed after draining. The subsequent step is iodization, in which iodine is added to sea salt. The process concludes with packaging according to size specifications. In contrast, the production of briquetted sea salt, although similar to that of refined sea salt, involves an initial iodization step followed by molding and drying. Health sea salt MSMEs employ a process similar to that of briquetted sea salt; however, the iodization step is substituted with the addition of aromatics and other ingredients, followed by molding and drying. The final stage involves packaging for the intended use.

Key resources. MSMEs involved in both food and non-food sea salt processing production possess several key resources, including physical infrastructure in the form of factories, legal status, and proficiency in sea salt processing techniques. In addition, they have established distribution and sales networks and financial backing. A significant resource is the skilled local workforce, which is predominantly female, highlighting the gender-neutral nature of these enterprises and the central role of women in the production process.

Key partners. Food sea salt MSMEs collaborate with small-scale sea salt farmers and sea salt retailers, particularly in the urban areas of Java. Conversely, health sea salt MSMEs develop alliances with small-scale sea salt farmers and retailers both domestically and internationally. Both types of MSMEs partner with e-commerce companies and the government, particularly trade attachés and the Ministry of Maritime Affairs and Fisheries.

Cost structure. Sea salt agribusiness represents a cost-effective venture involving the cultivation and processing of sea salt. The operational expenses include direct raw materials, direct labor, and factory overheads such as gas, electricity, packaging, supplementary materials, and depreciation of factory and machinery. The most significant expense is attributed to the direct raw materials.

"Sea salt processing costs include direct raw materials, direct labor, factory overhead costs including gas, electricity, packaging, additional materials, and factory and machinery depreciation (Interview with MC-1, MC-2, MI-1, MP-1, MR-1, MM-1, and MS-1)".

Revenue streams. Revenue is contingent on the sales volume of different product variants. The sales volume of food sea salt MSMEs surpasses that of health sea salt MSMEs; however, the profit margin per product is significantly greater for health sea salt MSMEs than for food sea salt MSMEs. The selling price per kilogram of the health sea salt products exceeds that of the food sea salt products. Consequently, based on this selling price per kg, the projected revenue for healthy sea salt MSMEs is anticipated to be higher than that for food sea salt MSMEs.

"We have small margins, so we have to focus on volume-based sales because the market price of sea salt products is measured by market value. A slight price increase will cause consumers to switch to other producers (Interview with MC-1, MI-1, MP-1, MR-1, MM-1, and MS-1)".

"We certainly have a decent margin because it's positioned for the middle and upper classes, with a higher price per product than sea salt processing for food (Interview with MC-2)".

The critical point of sea salt business sustainability. The development of agriculture, fisheries, and coastal ecosystems can achieve economic sustainability when economic performance is associated with low costs, minimal negative environmental impacts, and significant social impacts. Economic sustainability is crucial for achieving environmental sustainability. As noted by Bayramoglu et al. (2018), businesses in the agriculture, fisheries, and maritime sectors will achieve economic sustainability if each participant in the agribusiness subsystem earns added value and sufficient income to satisfy their needs. Figure 3 illustrates the various activities that promote economic sustainability of sea salt. It also depicts activities that drive costs and become inefficient if they fail to enhance value. Non-value-adding activities can be minimized or eliminated entirely. For instance, the implementation of geomembranes has increased harvest quantities at the farmer level, while the incorporation of aromatic oil has enhanced the value of sea salt processing MSME products.

Human activities exert considerable pressure on environmental resources (Boggia et al., 2018). Assessing environmental sustainability presents a challenge in the business sector, particularly as industrial activities throughout the value chain contribute to carbon footprints and seawater utilization in the sea salt industry. Figure 3 also illustrates the various activities that result in seawater waste and CO₂ emissions. For instance, premature harvesting can result in water waste among sea salt farmers, while sea salt processing MSMEs use plastic packaging extensively.

Furthermore, Zortea et al. (2018) asserted that social aspects suggest a significant potential for sustainable enhancement. A key parameter of social sustainability is employee recruitment for business activities. Figure 3 illustrates activities with potential social impact, specifically those that can generate gender-inclusive employment opportunities, such as transportation services for sea salt farmers and printing services for sea salt processing MSMEs. In the sea salt industry, the success of sea salt farming and MSMEs hinges on the availability of trained employees, irrespective of gender.

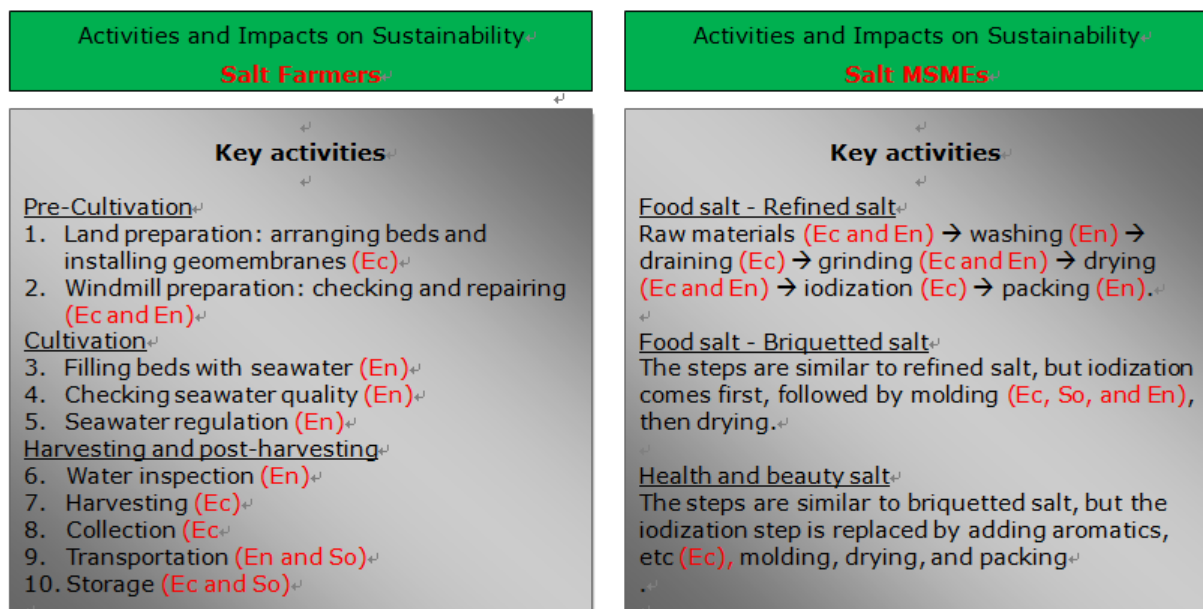


Figure 3. The critical point of sea salt business sustainability
(Ec = Economy, En =Environment, So = Social).

Sustainable business model innovation of sea salt farmers and sea salt processing MSMEs. Considering the existing sea salt business model and sustainability aspects, a sustainable business model innovation for sea salt farmers and sea salt

processing MSMEs are illustrated in Figures 4 and 5. This section aligns the nine elements of the business model with their respective priorities and sustainability influences, employing the value innovation framework. In both business models, certain aspects are eliminated, reduced, raised, or created.

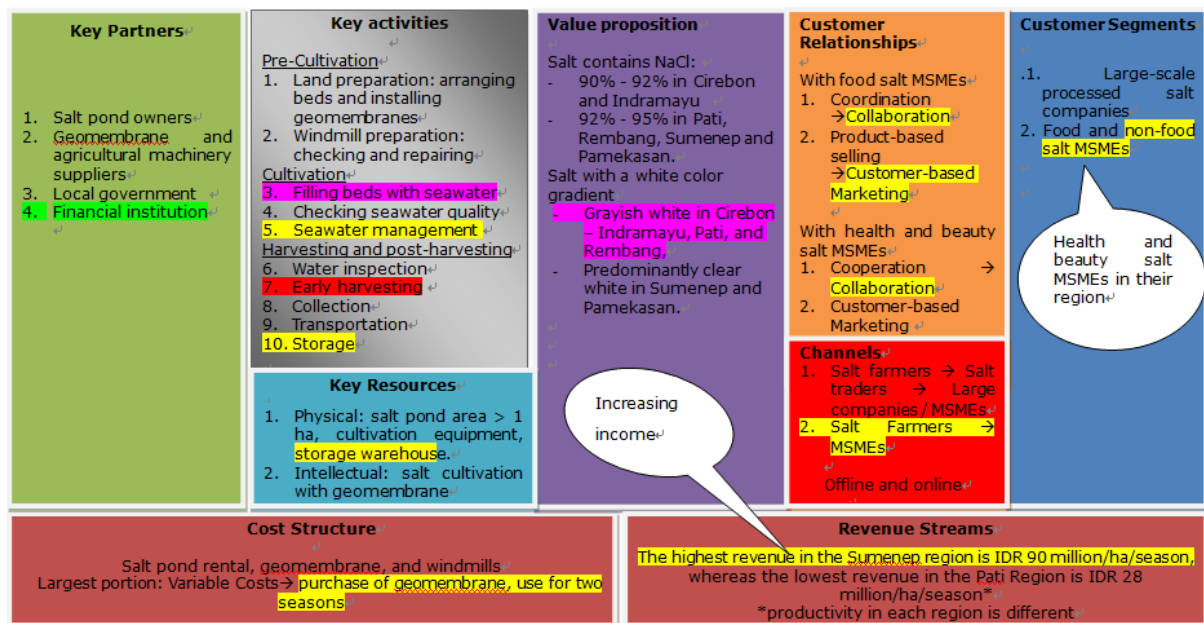


Figure 4. Sustainable business model innovation of sea salt farmers in Indonesia (text highlights: red is eliminated, pink is reduced, yellow is raised, and green is created).

Business model innovation of sea salt farmers

Value proposition – reduce. Sea salt farmers minimize the production of gray sea salt by engaging with local communities to prevent waste disposal at the sea. This collaboration is essential because waste affects the color of seawater, which, in turn, impacts sea salt quality. This issue is particularly relevant for farmers in Java, including those in Indramayu, Cirebon, Pati and Rembang.

Customer segment – create. Sea salt farmers are expanding into the health and beauty consumer markets. Groups of sea salt farmers have the potential to establish health sea salt MSMEs in each sea salt production center located in Pati (Central Java) and Sumenep (Madura, East Java). This initiative aims to enable farmers to benefit from the added value of their products. Pioneer of health sea salt MSMEs in Cirebon are prepared to collaborate in creating non-food MSMEs in other sea salt production centers.

Customer relationship – raise. Farmers are encouraged to enhance their interactions with sea salt processing MSMEs by moving from coordination to collaboration. Castañer & Oliveira (2020) describe collaboration as the voluntary support of partners in reaching their objectives, a concept illustrated by Lakshminarasimha (2017) through the exchange of information and the establishment of shared-performance indicators. Moreover, the business model for sea salt farmers is enhancing from a focus on product sales to a marketing strategy centered on customer relationships, as outlined by Frow & Payne (2009) in their customer relationship categories. This strategy prioritizes meeting the diverse product needs of food and health sea salt MSMEs.

Channel – create. The presence of non-food sea salt MSMEs in sea salt production centers will provide alternative marketing channels from farmers directly to health sea salt MSMEs, thereby enhancing the efficiency of the marketing channel. This arrangement provides an alternative route for marketing, which contributes to a more streamlined supply chain.

Key activities – eliminate, reduce, and raise. Farmers must eliminate the practice of early harvesting, defined as harvesting less than a week in advance, as it adversely affects the quality of sea salt harvested. In addition, it is crucial for farmers to reduce the practice of not continuously refilling seawater to meet demand. Consequently, there is a need for improved seawater management strategies. Moreover, farmers should enhance their storage capacity when prices are low and sell strategically when prices increase.

Key resources – raise. Farmers should consider expanding their warehouses. It is advisable for multiple farmers to join a group to establish communal warehouses to minimize expenses. Ideally, each sea salt farmer should either own or have the option to rent a warehouse, similar to the practices observed among farmers in Sumenep and Pamekasan, who rent ponds that include sea salt storage facilities.

Key partnership – raise. Warehouse expansion can be implemented collectively, necessitating enhanced collaboration among sea salt farmers within a group. This presents a challenge for sea salt farmers compared to food crop farmers, who typically organize into farmer groups. In addition, to prevent premature harvesting and satisfy daily necessities, farmers require financial support from institutions, particularly microfinance entities such as Baitul Mal wat Tamwil Nahdlatul Ulama (BMT-NU), given that coastal communities are predominantly composed of Nahdliyyin (NU members). Moreover, sea salt farmers have the opportunity to forge partnerships with sea salt MSMEs in both the food and health sectors.

Cost structure – reduce. According to the cost structure, sea salt farmers can attain cost efficiency by judiciously employing geomembranes and ensuring proper post-harvest storage. This approach allows farmers to purchase geomembranes every four seasons instead of every two seasons.

Revenue stream – raise. Sea salt farmers in Pati and Cirebon may increase their income by implementing a weekly harvesting schedule. Evidence from Sumenep indicates that this method results in a significant sea salt yield of five tons per hectare per year.

Business model innovation in sea salt processing MSMEs

Value proposition – raise. Sea salt processing MSMEs can offer customized or personalized value propositions. Iyelolu et al. (2024) reported that personalization increased direct revenue by 5-15% and marketing efficiency by 10-30%. Therefore, food sea salt MSMEs can offer packaged sea salt tailored to customer preferences, such as branded packaging for companies such as hotels and restaurants. Health sea salt MSMEs can add oil variants to suit customer preferences and orders or even customize packaging. Sea salt processing MSMEs for health need to obtain halal certification through the BPJPH-MUI (Indonesian Ulema Council) because halal assurance has become a key consumer attribute when purchasing various products, including health-related products.

Customer segment – create. Sea salt processing MSMEs should establish customer communities in their specific regions or markets. The formation of consumer communities is instrumental in attracting and retaining customers. According to Molinillo et al. (2020), such communities enhance customer engagement, which fosters co-creation, increases stickiness, promotes electronic word-of-mouth (eWOM), and boosts repurchase intentions.

Customer relationship – raise. Sea salt processing MSMEs, which have traditionally depended on direct sales, must transition their relationships from mere coordination to genuine collaboration with both upstream and downstream consumers. Sea salt processing MSMEs can use a personalized approach model for end consumers. This model emphasizes catering to customers by offering a diverse range of products tailored to their needs. Personalization involves designing and producing products that align with customer preferences (Chandra et al. 2022). This often necessitates customer

engagement to create shared and personalized experiences, which can be facilitated through customer reviews, purchase data, and social media interactions, among other methods (Lim et al., 2022).

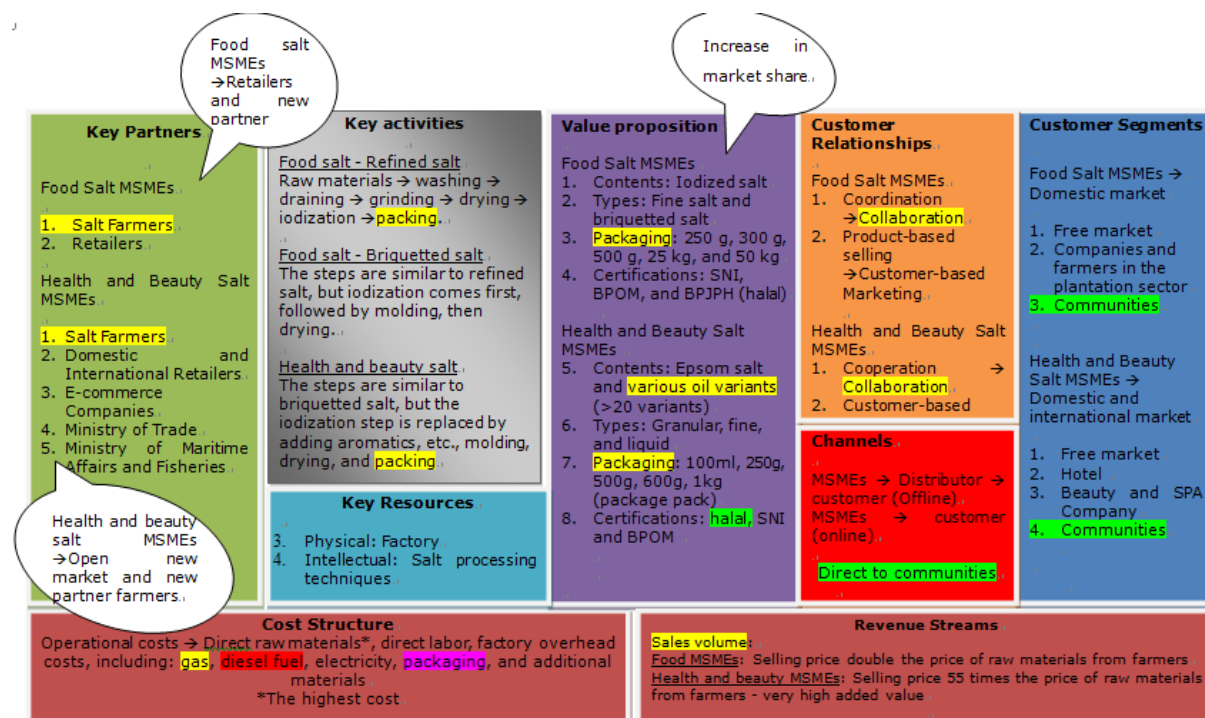


Figure 5. Sustainable business model innovation of sea salt processing MSMEs in Indonesia (text highlights: red is eliminated, pink is reduced, yellow is raised, and green is created).

Channel – create. The establishment of a customer community for sea salt processing MSMEs, is anticipated to enhance direct marketing channels from these MSMEs to consumers. This development is expected to improve the efficiency of marketing channels and the supply chain.

Key activities – raise. MSMEs must prioritize enhancing their packaging processes to align with customer specifications and expectations. In addition, there is a need to increase the adoption of non-plastic packaging materials. The use of packaging materials in sea salt product packaging contributes to environmental degradation.

Key resources – raise. MSMEs should enhance their expertise in sea salt processing, particularly for sea salt with NaCl concentrations exceeding 98%. A viable technique to increase the NaCl content involves washing with a saturated sea salt solution or utilizing hydroextraction (Ali et al., 2024). This process can elevate the NaCl concentration to 99.34% (Sumada et al., 2018). By adopting this method, MSMEs can significantly bolster their competitive market position.

Key partnership – raise. Sea salt processing MSMEs should enhance their collaboration with farmers. These MSMEs can contribute by offering financial support, thereby preventing farmers from prematurely harvesting to meet their daily necessities. Timely harvesting by farmers will ensure the provision of high-quality raw materials for MSMEs.

Cost structure – reduce and raise. Sea salt processing MSMEs currently incorporate diesel fuel into their cost structure, which contributes significantly to CO₂ emissions. Transitioning to gas, a more sustainable alternative, could replace diesel-related expenses with those associated with gas. In addition, adopting environmentally friendly packaging is expected to reduce the costs associated with plastic packaging.

Revenue stream – raise. The innovation of value propositions, building of community, enhancement of relationships, addition of channels, improvement of activities, enhancement of resources, inclusion of additional partners, and management of costs will collectively generate substantial revenue for sea salt processing MSMEs.

Sustainable partnership business model innovation. Sea salt industry involves sea salt farmers as the primary suppliers of raw materials, whereas MSMEs are responsible for processing sea salt for applications in food and health. By integrating their respective sustainable business model innovations, a collaborative and sustainable partnership business model for the sea salt sector was established, as shown in Figure 6.

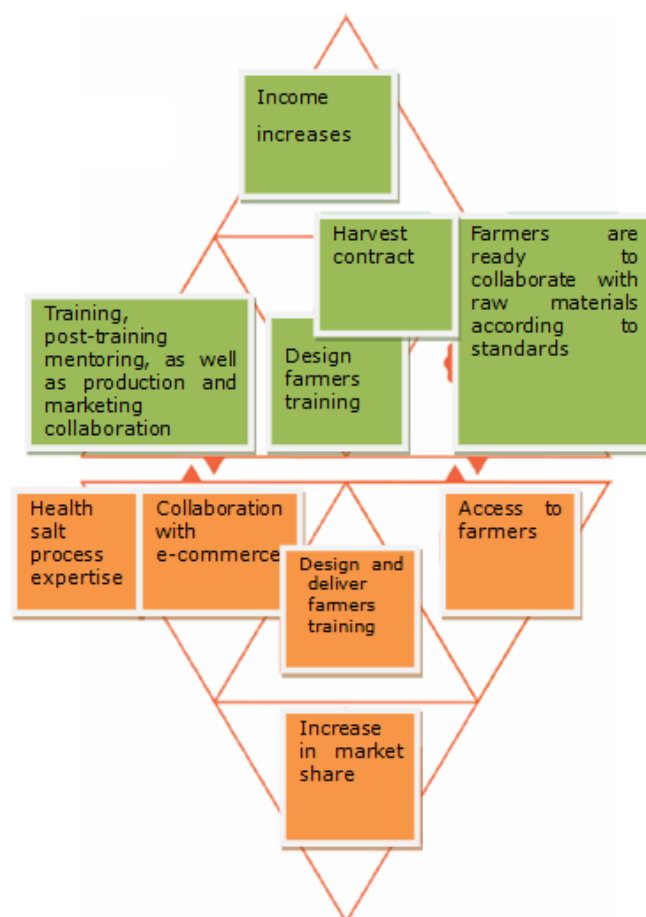


Figure 6. Sustainable partnership business model.

Sea salt farmers

Created value. Sea salt farmers prioritize increasing their income and establishing sea salt processing MSMEs for health in their respective regions. This value creation requires partnerships. Fudemma et al. (2020) highlighted that collaborative efforts initiated by local farmers represent a form of social innovation. These efforts enable farmers to overcome structural obstacles and participate in sustainable rural development. The authors further elaborate that collaboration involves two key components - collective action and partnerships - which are interconnected and bolstered by social capital.

Desired asset. Figure 6 illustrates the necessity for sea salt farmers to receive training, post-training mentoring, and engage in collaborative efforts in production and marketing to enhance their income and establish processed MSME. The training aims to equip farmers with the requisite knowledge and skills for sea salt processing. However, to ensure their success, farmers require ongoing post-training mentoring and must maintain collaborative marketing.

Offered asset. Farmers should engage in collaborative training and mentoring activities to ensure that the preparation of raw materials aligns with the standards of the sea salt processing industry. They also harvest sea salt in a timely manner to preserve its quality.

Transfer activities. Farmers are actively involved in shaping the training and mentoring initiatives they will receive. To ensure the continued success of these educational and collaborative efforts, it is essential to establish mutual agreements formalized through learning, training, and harvest contracts.

Sea salt MSMEs

Created value. Sea salt MSMEs prioritize expanding their market shares. Achieving this expansion necessitates collaboration with both upstream smallholder sea salt farmers and downstream wholesalers. Engaging with farmers ensures the availability of raw materials in terms of quality and quantity, while collaboration with wholesalers fosters consumer loyalty. Such value creation is contingent on effective partnerships.

Desired asset. Figure 6 illustrates that sea salt processing MSMEs require access to farmers to enhance their production capacity, which serves as a basis for market share growth. Efforts to augment sea salt production capacity are frequently impeded by issues related to both quantity and quality, such as the adequate NaCl content and a clear white color.

Offered asset. Sea salt processing MSMEs possess extensive expertise in sea salt processing and substantial experience collaborating with e-commerce managers or owners. Therefore, these MSMEs must engage in collaborative efforts to exchange knowledge regarding sea salt processing and share their experiences in online product marketing.

Transfer activities. Sea salt processing MSMEs and farmers collaboratively design training and mentoring programs in which the farmers will participate. In addition, sea salt processing MSMEs provide training materials, mentoring, and collaboration through various activities and mutual agreements such as learning contracts, training sessions, and harvest results.

Conclusions. A sustainable sea salt business model requires innovation from actors in the Indonesian sea salt industry. For sea salt farmers, business model innovation involves reconfiguring their value propositions to meet sustainability requirements. This value proposition is created through sound seawater management for sea salt cultivation, harvest management, and storage. For sea salt processing MSMEs, business model innovation involves developing value propositions through the use of non-plastic packaging, developing partnerships with sea salt farmers, fostering collaborative relationships, and creating customer communities.

For a sustainable sea salt industry in Indonesia, every actor shares the same goal of increasing revenue, reducing negative environmental impacts, and fostering social responsibility. Therefore, business model innovation for each actor is built within the framework of partnerships business model. To create value, sea salt farmers and sea salt processing MSMEs exchange desired assets, offered assets, and transfer activities. On the one hand, farmers want to improve the quality and capacity of their sea salt production. On the other hand, sea salt processing MSMEs have the competency to improve quality and capacity. The two parties are partnering to provide training and mentoring to these sea salt processing MSMEs, which will be attended by sea salt farmers. This partnership will produce quality sea salt that can be purchased by these sea salt processing MSMEs.

For future studies, we propose to explore the sustainable partnership business model integrating Triple Layer Business Model Canvas (TLBMC). Further studies also can

be conducted from a dynamic systems perspective. These two topics strengthen this study.

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Conflict of Interest. The authors declare that there is no conflict of interest.

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