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Value Chain Analysis of the Marine Ornamental Reef: A Case Study in Banyuwangi, East Java, Indonesia

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Coral is the main component of coral reefs and forms an ecosystem that is home to approximately 93 000 species of marine biota. In their development, corals are traded and become decorations in aquariums because of their beauty. Currently, in Indonesia, the trade in ornamental corals is still on an export scale, including hard coral species, which are strictly monitored because some are included in the Convention on International Trade in Endangered Species of Wild Fauna and Flora Appendix II. This research aimed to analyze the ornamental coral value chain at an ornamental coral company in Banyuwangi related to value-added activities, governance, and profit margins to see economic and environmental sustainability using the Porter value chain. The results showed that the primary activities that still needed to be more optimal were operational activities and outbound logistics, environmental factors (weather conditions), and improper handling causing coral death or damage (wounds). Meanwhile, the secondary activities that could have been more optimal are infrastructure and technology development. The profit margin obtained by the company was 97 523.53 US dollars with a value of 45.16% of revenue, showing that the business is profitable. Therefore, infrastructure improvements and technology development are still needed for optimal results. Further research is recommended to be conducted in relation to business development strategies and improvement of coral quality and packaging processes. Additionally, in order to support better traceability and long-term business sustainability for corals, the dearth of historical data on the ornamental coral trade in Indonesia needs to be tackled.

Keywords: porter value chain, ornamental coral, business, coral transplant, CITES, tropics.

Introduction

Trade with marine species as ornamentals is an important sector of the international pet trade. The vast majority of these species are collected from the wild, and one of the top supplying countries is Indonesia. In 2018, 777 marine vertebrate and invertebrate species were traded, belonging to 174 families, including corals. Akmal et al. (2020) also noted that hitchhiking species, i.e. unintentionally transported invertebrate assemblages, which are easily overlooked by traders and keepers, exist (Patoka et al., 2020).

Coral reef ecosystems play an essential ecological and socio-economic role in fisheries (Teh et al., 2009). Coral reefs are widely highlighted for their biological diversity and high productivity. They comprise less than 1% of the surface of the ocean but provide tremendous benefits (Thur, 2004). Coral reefs are one of the most threatened ecosystems globally. A coral reef ecosystem (CRE) status is an essential indicator in measuring the potential for sustainable management of coral resources in small islands and islets (Yonvitner et al., 2022).

There are two types of corals: hard corals and soft corals. The main components of a coral reef ecosystem are hard corals with a hard structure and containing lime, which is in mutualism with zooxanthellae algae plants which become a place to live, take shelter, and find food by various other types of biota; meanwhile, soft corals are soft body animals of somewhat rubbery texture, strengthened by an internal skeleton of calcium carbonate named spicule, and having stalks attached to a hard substrate, especially dead corals (Manuputty, 1986). From an ecological standpoint, coral reefs are home to approximately 93 000 species of marine life and protect the coast from abrasion. In the meantime, coral reefs can be exploited as a source of additional supplies and medications for human health. Coral reefs can boost the production of fishing resources, which are a source of revenue for the community, particularly coastal areas, from a socio-economic standpoint. As part of marine ecotourism, the attractive and well-maintained coral reef environment now has economic value (CRITC Coremap-LIPI, 2016).

Ornamental coral reef trade, which includes trade in aquariums, jewelry, and antiques, supports a multi-million dollar industry but potentially free trade that could affect ecosystems if not properly regulated (Dee

et al., 2014; Grey et al., 2005; Wabnitz et al., 2003). The trade-in coral reef biodiversity for private and public aquaria has brought benefits: a new and badly needed source of income to coastal communities of the Indo-Pacific, inspiration to people in the developed world to care about remote regions of the developing world (Rhyne et al., 2014).

Ornamental hard coral species is a type of animal that is listed in the list of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (so-called CITES, <https://cites.org>), which is classified in Appendix II, meaning that international trade is permitted with strict rules to prevent over-exploitation so that it has an impact on the traded species' sustainability. The management authority for the use of ornamental coral in Indonesia is currently the Ministry of Environment and Forestry, and the scientific authority is the Indonesian Institute of Sciences (Simanjuntak, 2020). The trade of ornamental hard coral species in Indonesia is rigorously regulated to ensure that it does not violate CITES laws. The type of soft coral, on the other hand, can be freely traded.

Indonesia has 569 species of corals, of which 55 species, or as much as 9.6%, are sold alive. Ornamental corals have beautiful coloration, colonize, and have exotic tentacles with traded sizes of 10–25 cm (AKKII, 2018). In 2016, Indonesia's ornamental coral export value was 10.70 million US dollars of a total world trade of 168.51 million US dollars (Suhana, 2018). The ornamental coral trade was halted in 2018 and then resumed in 2019 due to a policy shift toward coral cultivation (transplantation), which means that taking coral from nature will be prohibited in the future. In general, Indonesia's current state of coral reefs has changed slightly due to relatively stable water conditions that allow corals to grow well. However, increased use of coastal fisheries resources can threaten ecosystems; therefore, raising public awareness about the importance of coral reef ecosystems for biota survival is necessary (Humas LIPI, 2018).

In facing global trade competition, Indonesian fisheries need to increase productivity, apply the marketing concept as a system, and prioritize quality so that fishery commodities can be highly competitive. For this reason, the availability of inputs in the form of technology

(facilities and methods), human resources, and capital, as well as an efficient chain of agribusiness systems from upstream to downstream is required, not forgetting product quality assurance (Wardani et al., 2021).

The value chain is a tool for the sustainable management of fishery (Vieira Crespo et al., 2021). In fisheries, the value chain relies heavily on the utilization of natural and environmental resources. It is used as a managerial tool to reduce processing and distribution costs, improve product quality and productivity, and enable economic agents (chain driving forces) to evaluate the level of the development of value production activities (production, marketing, distribution, and support to the final consumer) (Swara and Intyas, 2021; Vieira Crespo et al., 2021). Natural resources in coastal areas are divided into three types, namely mangrove resources, coral resources, and seagrass resources (Intyas et al., 2020). Sustainable business is also a concern for today's consumers; thus, traceability and zero waste are mandatory if one wants to compete in the global market. Based on the configuration of the value chain intended for fisheries management, this study aims to analyze PT's ornamental coral value chain in Banyuwangi related to value-added activities, governance,

and profit margins to see economic and environmental sustainability.

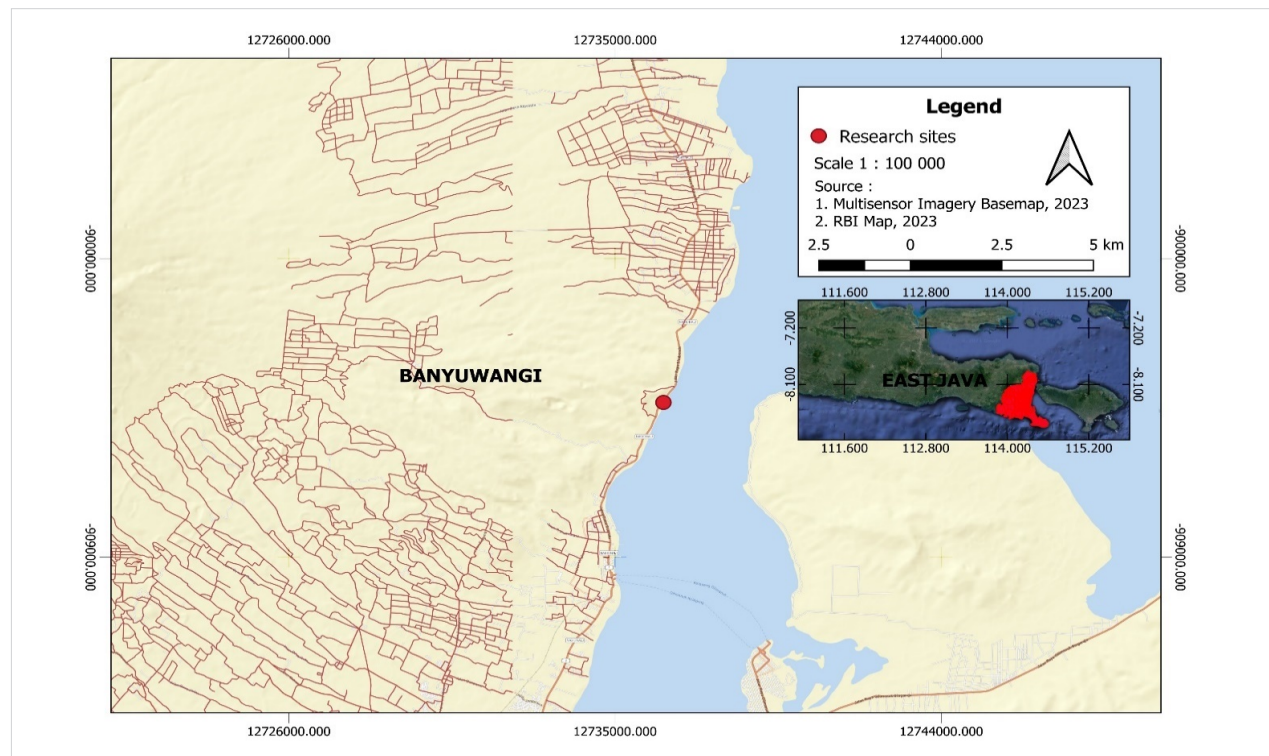
Methods

This research was conducted in the Bali Strait, Ketapang Village, Banyuwangi Regency, Indonesia, where about 14 export-scale ornamental coral companies are spread across the Bali Strait, with a special focus on one company, namely PT. SA. It is the longest-running company in this ornamental coral business. The location of the study area is seen in Fig 1.

The descriptive study method was used to analyze the complex phenomena in ornamental coral companies by analyzing the company's value chain, namely primary and secondary activities so that they can compete in the international market. According to Nazir (2003), descriptive research is a study to find facts with the correct interpretation that accurately describes the properties of several phenomena, groups, or individuals.

The sampling technique used is purposive sampling carried out with specific considerations, and selecting participants for a sample is based on preset criteria

Fig. 1. Research area of PT. SA in the Bali Strait, Ketapang Village, Banyuwangi Regency, Indonesia



(Sugiyono, 2017). The criteria specified in the company PT. SA include respondents who know the important aspects and are directly involved in PT's ornamental coral cultivation business for at least ten years in Banyuwangi. Respondents selected in this study were company directors who worked for the longest and employees who were experts in ornamental coral transplantation for five years, as many as five people, namely supervisors from each division of personnel, production, marketing, administration, finance, and security. The data collection technique included direct interviews with respondents, closed questionnaires for assessing competitive advantage, and documenting activities in the form of both primary and secondary data.

Results and Discussion

Porter's model value chain analysis identifies activities that can create and add value to company management and formulate appropriate management strategies. The value chain within the company's scope to generate competitive advantage emphasizes adding value from the extraction of raw materials to the disposal of products by end consumers through research and development of innovation, manufacturing, marketing, final distribution, and sale of products. Recognizing that profitability is key to corporate strategy, the total value is differentiated into margin activities and value by performing value activities, which are categorized into primary and support activities. The main or primary activities concern the physical creation of a product, namely the sequence of delivery of company materials (internal or inbound logistics), the physical transformation of the final product (production or operations), sales and transfer to consumers (external or outbound logistics), marketing and sales, and the resulting services. Then support or secondary activities provide the necessary support so that the main activities can occur, such as providing purchased inputs, technology development, human resources, resource management, and company infrastructure (Abdelhadi, 2017; Porter, 1985). This competitive advantage analysis is carried out by building a value chain mapping model and then calculating competitive advantage activities, where primary and secondary activities are shown in *Fig. 2*.

Value-adding primary activities

Primary activities at the bottom of the value chain consist of inbound logistics, operation, outbound logistics, marketing and sales and services.

Inbound logistics in ornamental coral cultivation consists of scheduling for planting media, receiving coral brood stock, storage and warehousing of planting media/substrates.

Scheduling the planting medium/substrate for ornamental coral seeds consisting of cement and pumice. Pumice was chosen as a substrate mixture, so the substrate was light. The raw material in the form of cement is purchased twice a month. In one purchase, the company buys five sacks of cement. There are many purchases of indirect cement because the longer the cement is stored, the harder it will be. The tools used for planting media are molds, containers for mixing ingredients, broken toothbrushes, spoons of cement, plywood for the base of the substrate, stone mortar for pounding pumice, and tablespoons. Meanwhile, laying the substrate used string, rubber tires, and plastics. In addition, there is a production table made of iron. Substrate media production activities are carried out daily from 8 AM to 4 PM with an hour break, 12 PM to 1 PM.

Reception of coral brood stock. The raw material from ornamental coral is obtained from harvesting ready-to-cut brood stock. Ornamental coral brooders consist of 27 species originating from transplanted sources. The list of corals can be seen in *Table 1* below.

Having brood stock cannot be arbitrary because an origin from which the coral brooders come must be declared. There are two ways to get this brood stock: buying from another company or asking the government for a wildlife quota that will issue a wildlife quota letter. The wildlife quota letter is submitted to the company supplier with a wildlife quota collection permit. The declared origin of the traded corals is a mandatory condition for exporting them as ornamental.

Storage and warehousing. Storage is still being carried out to keep the planting medium usable at any time. The pumice media is stored in a Styrofoam box, while cement is placed near the room for making transplant media in an open space because it does not require a special storage place. The stock of planting media is quite a lot because it has its own space and cannot expire.

Fig. 2. Structure of the Ornamental Coral Value Chain at PT. SA Banyuwangi

SECONDARY ACTIVITIES				
INFRASTRUCTURE: General management is structured, but the organizational structure is relatively simple; Planning for ornamental coral needs according to market demand and stocking; Law Legality consists of a Business Identification Number, Taxpayer Identification Number (NPWP), foreign distribution permits, certificates of origin for brood stock, and cultivation/transplant permits.				
HUMAN RESOURCES consist of 26 people including one main director, one director, one personnel, ten people in the production team, four people in marketing, six people in administration and warehouse, and three people in security; Recruitment involves families and the surrounding community, especially in production and security. Open recruitment is conducted for hiring office and marketing staff; Compensation for employee salaries according to the Regional Minimum Wage (UMR), annual bonuses, overtime bonuses, and health insurance.				
TECHNOLOGY DEVELOPMENT: Product design: products in the form of live animals require special treatment and care to maintain quality until they reach consumers' hands; Primary research: using technology to maintain water quality, trials for making planting media/substrates, reducing mortality, monitoring corals, and maintaining coral quality; Design review: feasibility study and keeping stock sustainable.				
PROCUREMENTS: Raw materials are obtained by collaborating with suppliers to purchase certified brood stock and materials for planting media; Inventory has 27 species of corals transplanted and harvested according to consumer demand; Assets include machines to keep corals alive to reach consumers in good condition, diving equipment, coral filter treatment equipment, skimmers, chillers, aerator pumps, maintenance tanks, and wave generators.				
REGULATORS: Regulations for the use of ornamental corals are regulated in CITES Appendix II; Quota control for both natural and cultivated corals is regulated by the management authority of the Ministry of Environment and Forestry (KLHK), with the scientific authority being the Indonesian Institute of Sciences (LIPI).				
INBOUND LOGISTICS	OPERATION	OUTBOUND LOGISTICS	MARKETING AND SALES	SERVICES
<ul style="list-style-type: none"> Scheduling for growing media/substrate Reception of brood stock Storage and warehousing of growing media/ substrates 	Coral transplantation process	<ul style="list-style-type: none"> Handling Distribution 	<ul style="list-style-type: none"> Cooperation agreement with stakeholders Have a minimum purchase order 	Guaranteed return of damaged products/ animals
PRIMARY ACTIVITIES				

Profit Margin : Rp. 1,395,366,720
with a value of 45.15% of revenue

Table 1. List of corals of PT SA export in 2022

No	Hard corals species	No	Hard corals species	No	Hard corals species
1	<i>Acropora</i> spp.	10	<i>Dendrophyllia</i> spp.	19	<i>Favites</i> spp.
2	<i>Merulina ampliata</i>	11	<i>Echinopora</i> spp.	20	<i>Galaxea</i> spp.
3	<i>Montipora</i> spp.	12	<i>Euphyllia ancora</i>	21	<i>Goniopora</i> spp.
4	<i>Pocillopora</i> spp.	13	<i>Euphyllia cristata</i>	22	<i>Lobophyllia</i> spp.
5	<i>Porites</i> spp.	14	<i>Euphyllia glabrescens</i>	23	<i>Plerogyra sinuosa</i>
6	<i>Seriatopora</i> spp.	15	<i>Euphyllia paraancora</i>	24	<i>Turbinaria</i> spp.
7	<i>Stylophora</i> spp.	16	<i>Euphyllia paradivisa</i>	25	<i>Acanthastrea</i> spp.
8	<i>Alveopora</i> spp.	17	<i>Euphyllia yaeyamaensis</i>	26	<i>Physogyra lichtensteini</i>
9	<i>Caulastrea</i> spp.	18	<i>Favia</i> spp.	27	<i>Symphyllia</i> spp.

Source: Primary data, 2022

Operation. The primary activity in the operations carried out by PT. SA is a coral transplantation process comprising operational facilities, production processes, and coral treatment. The coral transplantation process starts with the coral planting medium and attaches the coral substrate to be transplanted into the sea.

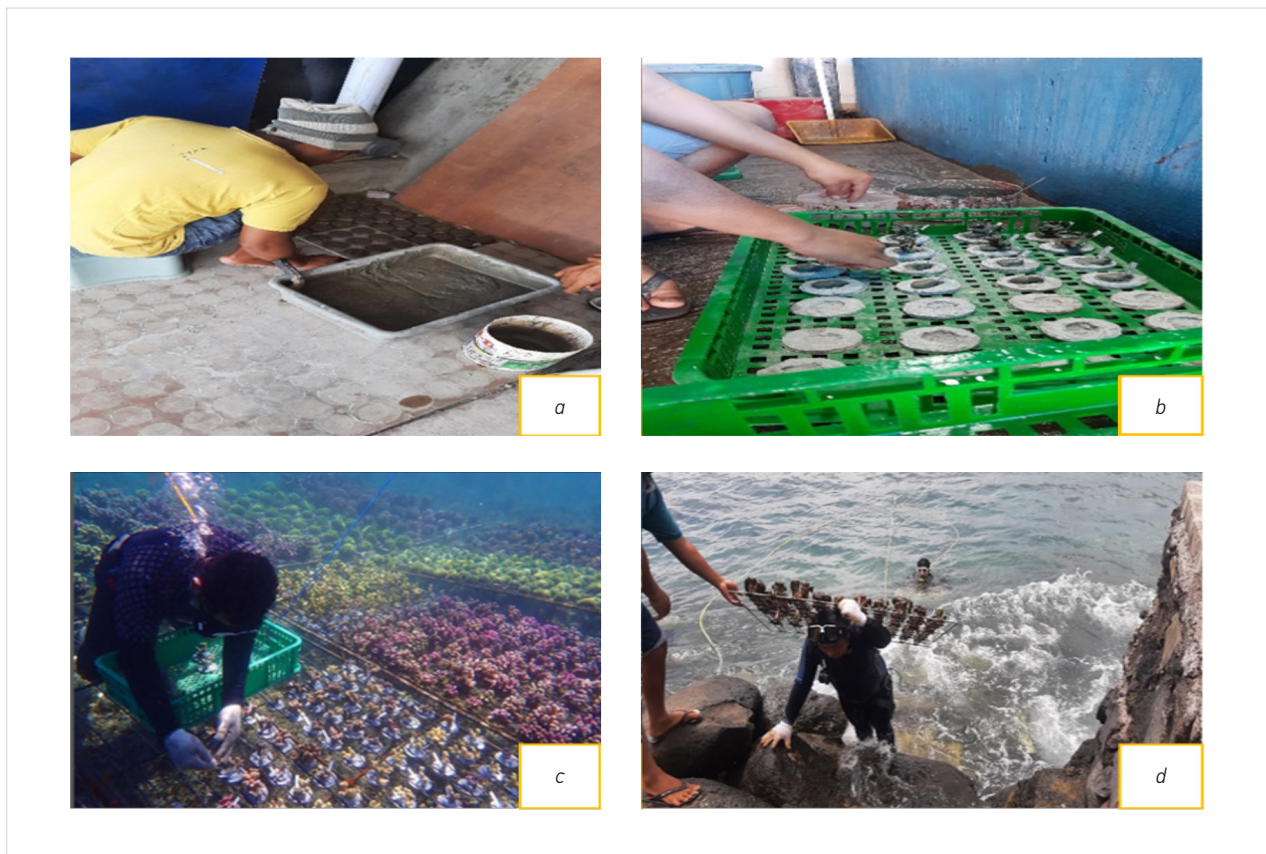
Operational facilities. Complete operational facilities are from diving to coral transplantation and processing of corals before they are sold.

Production process (Fig. 3). To plant corals, first, planting medium or substrate is prepared. The planting medium comes from pumice, which is pounded until smooth and then mixed with cement in a ratio of 3:1. Then, sufficient water, molding the dough into a round shape, is added, and dried in the sun completely. There are two types of substrate models, namely a concave surface and a striped surface to suit the type of coral to be transplanted. Furthermore, diving activities are

carried out in the morning and evening. Every morning the divers clean the transplant table at sea and make cuts on the parental coral, which is due to be cut, using a grinder or coral scissors and putting into the rearing tank. Then, the coral is attached to the substrate using cement glue and given a name tag. After that, it is placed back into the maintenance bath for 24 hours until it hardens. The coral substrate that is ready to be placed in plastic crates to be lowered into the sea is then installed on iron shelves that are already in the sea. Coral harvesting is done when there is an order, usually done at six months to a year.

Coral treatment. The treatment is carried out by cleaning the coral in the sea using a brush, scrap, and toothpick to remove dirt on the coral and substrate. Treatment also includes expelling fish that want to prey on certain species of ornamental corals. Wounded corals are also given treatment in rearing tanks before being put into the sea or sold for 10% mortality.

Fig. 3. Coral transplantation production process consisting of (A) planting medium/substrate, (B) planting coral to substrate/media, (C) planting coral in the sea, and (D) coral harvesting



Outbound logistics at PT. SA consists of product handling and product distribution.

Product handling. Handling is one part of the physical function of marketing. The role of the marketing system is to inhibit the 3D (death/destroyed, decay/damaged, deterioration/decrease) of these commodities (Intyas and Abidin, 2018). Harvesting/collection of coral handling is carried out in the afternoon and put into the receiving tank. After that, the corals are cleaned and transferred to the quarantine tank for 1–2 days to see and maintain the quality of the corals. In the quarantine tank, an ultraviolet lamp kills pathogenic organisms such as bacteria, fungi, or parasites attached to corals. Furthermore, checking the corals with an ultraviolet flashlight and special glasses is done to select good corals according to the order. After sorting the corals, they are transferred to a fiber tub to prepare for packing. The fiber tub also has a chiller and air pump to stabilize water conditions. The process of packing corals uses PE plastic, the water must be clean and sterile, and oxygen is provided so the corals can breathe during the shipping process. Ready-to-be-shipped corals are rubberized on round Styrofoam and then placed upside down in plastic. Then the plastic containing the coral is put into a Styrofoam box, in a cardboard box, and covered with plastic so it would not get wet while transport. Employees must wear boots, waterproof aprons, and modified serving hoods during packing.

Product distribution. The distribution process is vital because PT. SA only sells for exports. With a maximum coral survival period of 70 hours, the distribution process is only for cargo to Bali to be sent by plane abroad directly.

Marketing and sales comprise cooperation agreements with stakeholders and a minimum purchase. Digitalization in agribusiness is a new challenge as well as an opportunity to increase the value chain of agribusiness products (Intyas et al., 2022). Before 2020, PT. SA used a website but it is no longer active and only has an Instagram account because coral sales are still limited by export permits and the form of cooperation determined by the government.

Cooperation agreement with stakeholders. The forms of cooperation agreements with stakeholders are with suppliers and exporters. Suppliers specifically purchase coral brood stock that has obtained permission

from the government. At the same time, the raw materials for planting media are only based on a trust system with traders in Bali, while exporters are in Bali and Surabaya, which also obtain permission from the government. PT. SA also directly gets overseas customers with deliveries made via Bali.

Minimum purchase. PT. SA stipulates a minimum purchase of 100 individuals of ornamental corals with various species of corals agreed upon before delivery. PT. SA will send product photos and diameter of offered and stocked corals to customers to choose before the shipment. Coral prices vary depending on the species, shape, and color. The lower limit for coral prices is set at 5 US dollars. In setting the price, PT. SA has a price range which is not based on species only but varies depending on the shape and difficulty of carrying.

Services. *Damaged product warranty.* The payment system for suppliers and exporters uses a 50% down payment (DP), where the remaining payment is made after the goods arrive because not all corals can survive. Generally, the survival rate is 70–85% due to the shocks that arise during delivery, the stress level, and the handling level when the shipment arrives. The number of dead corals will be the responsibility of suppliers, including PT. SA if sending corals to exporters. PT. SA compensates by sending back dead or damaged corals. The weather factor has become an obstacle to shipping due to cargo and flight schedule delays, so the corals will be put back into the rearing tanks while waiting for the proper transportation schedule. The price of shipping services for exports varies depending on the destination country. The farther the destination country is, the more expensive the shipping fee.

Support activities

The support activities are described at the top of the value chain (*Fig. 2*) and represent the institutional arrangements that provide the necessary support for implementing the primary activities. Institutions and types of support are according to infrastructure, human resources, technology development, procurement, and regulators.

Company infrastructure is a value chain analysis of secondary activities comprising general and financial management. Some of these activities are essential to ornamental coral cultivation business sustainability.

General management and the managerial process have been running well but there still is a simple organizational structure. Planning for the needs of ornamental coral is adjusted to demand (orders) but planning for scheduling planting media and coral raw materials is carried out continuously by maintaining stock. The financial system is directly managed by the main director, who is assisted by one of the employees. In terms of legality, having a complete business permit starts from Business Identification Number, Taxpayer Identification Number (NPWP), domestic and foreign distribution permits for species of coral that are not protected by law and CITES, certificates of origin for brood corals, and letters permitted cultivation/transplantation of coral species.

Human resources. PT. SA has 26 staff including one main director, one director, one personnel, ten people in the production team, four people in marketing, six people in administration and warehouse, and three people in security. PT. SA also has facilities to create a comfortable working environment for staff, including television entertainment facilities, internet, employee mess, a bathroom, a prayer room, a kitchen, and a room for employees when they want to rest.

Employees are still primarily hired from within the company's family and the neighborhood, particularly in the production and security divisions. Meanwhile, the hiring process for office and marketing personnel is open to the public. The company director and the main director will conduct the interviews directly. Accepted employees will get a probationary period of three months to adapt to their environment and duties. Employee training is one of the strategies to form a qualified and highly competent workforce. Older employees and business owners are all in charge of delivering training and giving instructions.

Compensation given to employees is a basic monthly salary based on the Regional Minimum Wage (UMR), annual bonus, and overtime salary if packing is done outside working hours. Overtime money is calculated from the number of boxes produced and then divided equally among employees. In addition, all employees receive health and employment benefits at the Social Security Administration Agency (BPJS).

Technology development consists of product design, primary research, and design review.

Product design refers to a live animal transplanted from 27 species of corals in Indonesia that require

extra handling and care to ensure that the quality is still good when it gets to customers.

Primary research conducted by the company is the use of technology such as filters, chillers, skimmers, and air pumps to maintain water quality so that corals can grow ideally with the use of machines so that the water conditions used for coral life follow their natural habitat condition to prevent death or damage to corals. Coral collection methods require special handling to reduce damage and even death to corals. Innovations and planting media trials continue to be carried out, such as changing the material and shape of the media or substrate to match the coral planted. Coral monitoring continues to be conducted to maintain coral quality, such as injuries to corals that require special handling or provision of food and vitamins needed if the corals are in an unhealthy condition.

The design review was performed in collaboration with universities specializing in coral transplantation research, calculating economic feasibility and stocks for sustainable use of coral.

Procurement consists of purchasing raw materials, planting media supplies, and assets. Procurement of raw materials for planting media in the form of pumice and cement is relatively easy. Meanwhile, procuring ornamental corals as brood stock has two ways. The first way is to permit the government to have brood stock, and then the government looks at the quota that the government owns. The government will issue a taking permit at the proper coral collection location when the quota is still available. The second way is to buy directly from companies with brood stock. Then the certificate of origin of the sires will be taken care of by the company that already has the sires obtained from the government. In these two ways, the company gets a certificate in the form of the origin of the corals.

Supply of planting media and coral. Stock for planting media is continuously produced because the media cannot expire. Meanwhile, transplanted corals are also being produced and treated in the sea, waiting to be harvested (taken) if there is an order. Currently, 27 species of corals have been granted permission by the government to be transplanted.

Assets consist of diving and maintenance equipment. In the diving process for transplant activities, 15 oxygen cylinders, two compressors, five air control units, three wave makers, and five diving vests, gloves, shoes, and goggles were provided. Then for coral treatment, there

were one oxygen cylinder and three freezers to produce ice needed for packing, three rearing tanks equipped with a filter and skimmer, four receiving tanks equipped with filters and skimmers, three coral quarantine tanks equipped with filters, chillers, and skimmers and four fiber tubs equipped with filters and skimmers. The supporting facilities used by the company were four water pumps to fill the tanks. The filter functions are filter sea-water to suit the condition of the coral. The chiller functions are to get the ideal water temperature to maintain the survival of corals, and the skimmer functions are to remove foam and dirt in the tank or aquarium.

Regulators. Corals consists of two basic types, namely hard corals and soft corals. The hard corals are included in the CITES (Convention on International Trade Endangered Species of Wild Fauna and Flora), a global treaty agreement focused on protecting wild plant and animal species. Corals are included in the CITES Appendix II, which means that although international trade in coral species is permitted or legal, the trade must be strictly controlled to prevent the possibility of over-exploitation, which can lead to the extinction of these coral species. The CITES plays a crucial role in ensuring the trade's sustainability, traceability, and legality. Sustainability is proven by sustainable and non-destructive use. Traceability ensures that the species of corals used can be traced to its origin. Legality guarantees that coral management and trade are carried out legally (Kasmi et al., 2017, 2020). There are two institutions of oversight of the ornamental coral trade in Indonesia. The management authority for the use of ornamental coral is the Ministry of Environment and Forestry (KLHK), and the scientific authority is the Indonesian Institute of Sciences (LIPI); (Simanjuntak, 2020).

The natural ornamental coral (hard corals) quota recommended by LIPI and set by the Ministry of Environment and Forestry for 2019 is 565 050 individuals or 0.0001% of the ornamental coral population in Indonesia, while cultured ornamental corals are allowed

on condition that there is traceability (DariLaut.id, 2019).

Profit margin on the company. The last part of the value chain structure is the profit margin which in this study consists of the difference between revenue and estimated costs in a chain segment. Revenue and costs are estimated in *Table 2*.

Table 2. *Estimated costs, revenues, and profits in the value chain in PT. SA for one year*

Average coral price (US\$)	0.95–12.05
Production quantity (coral individuals)	34 326
Fixed costs (US\$)	74 824.82
Variable costs (US\$)	43 624.55
Total cost (US\$)	118 449.37
Revenue (US\$)	215 972.90
Profit (US\$)	97 523.53
Profit/revenue (%)	45.16

Note: IDR value based on average prices in 2021 (IDR. 14 308)

Profit margin is the company's ability to generate profits compared to sales achieved (Mulyadi et al., 2020). The financial aspects of a business are the key to business feasibility studies because, if the financial aspects are weak, the proposed project will be rejected as it will not provide significant economic benefits (Intyas et al., 2019). Based on *Table 1*, the estimated revenue for one year was 215 972.09 US dollars, obtained by multiplying the price by the number of different quantities of coral depending on the style and type of coral. At the same time, the total costs incurred amounted to 118 449.37 US dollars with the highest cost being fixed costs (63.17%) of the total costs. The highest fixed costs were incurred for employee salaries. The profit margin generated by the company is 97 523.53 US dollars with a value of 45.16% of revenue.

Conclusions

The study indicates that the primary activities, including operations and outbound logistics, especially during the distribution of goods and coral care, required extra handling, especially after delivery, result in injury or mortality. Uncertain environmental factors (weather

conditions) limit the production and delivery, while secondary activities are constrained by infrastructure and technological development, which still need to be improved. Considering the profit margin obtained by the company amounting to 97 523.53 US dollars with a

value of 45.16% of revenue shows that this business is economically profitable. Therefore, infrastructure and technological developments are still needed to minimize coral mortality rates and generate maximum benefits. We urge that future studies focus on future sustainable business development strategies to improve their competitive advantage. In addition, the lack of historical data on the ornamental coral trade in Indonesia needs attention to support better traceability and business sustainability of corals.

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