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Technical or Operational Aspects of Vannamei Shrimp Business Plan

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Abstract: In a Vannamei shrimp farming business plan, the operational plan aspect is the main foundation that organizes all business activities in a structured and measurable manner, starting from the establishment stage to projected operational costs. This process begins with site preparation, procurement of production facilities, equipment, and licensing, as a legal and technical foundation for optimal farming (Budi, 2020). Next, operational goals and objectives are set, including production targets, shrimp size, and harvest quality standards, which form the basis for technical and resource arrangements (Asmara et al., 2021). Operational design includes RAS-based intensive culture systems, water quality management, feeding schedules, disease control, as well as the number of workers and utilization of supporting technology (Surianti et al., 2024). The operational delivery phase is carried out according to standard schedules and procedures, with regular monitoring of water quality, shrimp health and growth, and recording of operational data (Prakoso & Riani, 2019). Projected operational costs include all production components, such as fry, feed, labor, electricity, water, and maintenance, with a focus on efficiency to maintain profitability (Saputra et al., 2019). With a systematic operational plan, Vannamei shrimp farming is expected to be efficient, sustainable and profitable.

Keyword: Vannamei Shrimp Farming, Farming Operational Plan, Business Plan.

INTRODUCTION

In the business plan for vannamei shrimp farming, the operational plan aspect serves as an essential foundation that governs the entire business activity process from start to finish, starting from the establishment stage to the calculation of operational costs. A structured and measurable planning is needed to ensure that the production process runs optimally, yields quality harvests, and the business can be sustainable.

This operational plan begins with the establishment phase, where entrepreneurs prepare the pond location, procure production facilities, equipment, and obtain business permits. This serves as the initial foundation to ensure that the cultivation process proceeds according to technical and legal requirements. According to Budi (2020) in the Indonesian Aquaculture

Journal, the readiness of the location and cultivation infrastructure greatly affects the productivity of Pacific shrimp, especially in terms of water quality and biosecurity.

Furthermore, the operational goals and objectives are established, including targets for production quantity, shrimp size, and harvest quality standards. These objectives will serve as a reference in technical planning and resource utilization. In line with the research by Asmara et al. (2021) in the Tropical Fisheries Journal, setting realistic and measurable production targets is key to controlling production costs and mitigating the risk of failure.

The operational design includes technical planning for cultivation, including maintenance systems (extensive, semi-intensive, or intensive), water quality management, feeding schedules, and pest and disease control (Surianti et al., 2024). Additionally, the operational design also encompasses the number of labor, task distribution, and the use of supporting technology. A study by Suryaningrum et al. (2020) in the Journal of Tropical Fisheries Science emphasizes the importance of implementing standardized maintenance systems to ensure the survival of shrimp and maximize harvest yields.

At the operational delivery stage, all cultivation activities are carried out according to schedule and standard procedures, with regular monitoring of water quality, shrimp health, and growth performance. The implementation of monitoring systems and data recording for operations is very important, as explained by Prakoso & Riani (2019) in the Journal of Tropical Aquaculture Science.

Finally, an operational cost projection was prepared, covering all production cost needs such as seeds, feed, labor, electricity, water, and maintenance. This aligns with the findings of Saputra et al. (2019) in the Journal of Marine and Fisheries Social Economics, which state that the efficiency of operational costs is crucial for the profitability of vannamei shrimp farming.

Through a systematic operational plan, it is expected that vannamei shrimp farming can run efficiently, sustainably, and generate optimal profits.

METHOD

The method used in this research is a descriptive method. The types of data collected consist of primary data and secondary data. Primary data collection was conducted through participation, observation, and direct interviews in the field, which includes data regarding maintenance facilities and income results. Meanwhile, secondary data was obtained from documentation, literature, research institutions, fisheries departments, and other parties related to the activities of vannamei shrimp maintenance. This research was carried out in the ponds of Klirong District, Kebumen Regency, Central Java.

RESULTS AND DISCUSSION

Establishment Phase

The stages of establishing a vannamei shrimp farming business represent a series of strategic processes designed to build a solid foundation for the company amid the competition in the vannamei shrimp farming industry. Below is the timetable for establishing the vannamei shrimp farming business:

Table 1. Business Establishment Phase Timeline

Phase	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
1. Planning and Feasibility Study	X	X				
2. Establishment Legal Entity		X	X			
3. Basic Permits			X	X		
4. Specific Cultivation Permits				X	X	

5.	Location and Environtmental Permits	X	X	X	
6.	Bonded Zone and Export Permits			X	X
7.	Operational Preparation			X	X

(Source : Author Team, 2024)

This timetable takes into account the efficiency of the process through an online system, the possibility of managing several permits in parallel, and a focus on proper preparation.

Location Selection

The selection of pond locations for vannamei shrimp farming uses the following analysis:

Location Quotient (LQ) Analysis
Based on data from the Marine and Fisheries Office of Kebumen Regency in 2022:
Xi = 1.250 ton
Xt = 2.850 ton
Yi = 5.600 ton
Yt = 15.800 ton
LQ = (1.250 / 2.850) / (5.600 / 15.800) = 1,23

An LQ value greater than 1 indicates that the vannamei shrimp farming sector in Klirong District has a comparative advantage and is potential for export to other regions. This suggests that the location is suitable for the development of large-scale vannamei shrimp farming.

Klassen Typology Analysis

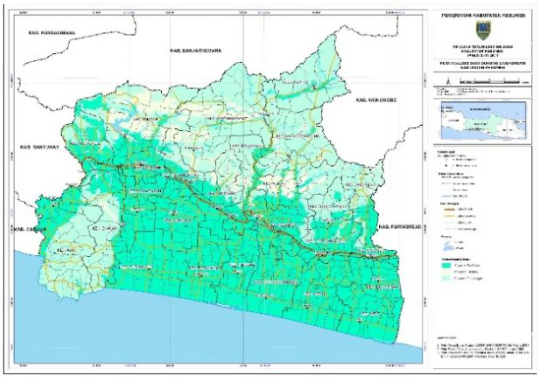
Based on the data, the aquaculture sector in Klirong District has shown a growth rate of 6.8%, which is higher than Kebumen Regency's overall rate of 5.2%. Its contribution to the regional economy also reached 3.5%, surpassing the regency's average of 2.8%. These results place Klirong's aquaculture sector in Quadrant I, or the leading sector category, as it demonstrates both above-average growth and contribution levels. This condition highlights the strong potential and opportunities for further development of vannamei shrimp farming in the area, supported by its strategic location and positive economic indicators.

GIS Spatial Analysis

The analysis results indicate that approximately 70% of the coastal land in Klirong District has an elevation of 1–3 meters above sea level, making it ideal for pond construction. The land is located 50–150 meters from the shoreline, facilitating easy access to seawater, while the gentle slope of 0–2% supports efficient water flow and drainage systems. The alluvial soil, with a clay content of 60–70%, is considered suitable for pond bottoms due to its high water retention capacity. Additionally, three major rivers in the surrounding area can serve as supplementary sources of freshwater. The site also offers good accessibility, supported by an adequate provincial road network. Based on an overlay of all parameters, approximately 100 hectares of land are identified as highly suitable for the development of vannamei shrimp ponds in this region.

A site survey was conducted in Klirong District, Kebumen Regency, taking into account several key criteria for the sustainability of vannamei shrimp farming. The selected location lies within a coastal area with tidal fluctuations of 2–3 meters, situated 50–150 meters from the shoreline, with adequate freshwater sources and a safe distance from pollution sources. In addition, the site was evaluated for land-use compatibility based on the local Spatial Planning

(RT/RW) regulations, as well as through environmental and social impact assessments to ensure feasibility, legal compliance, and support from the surrounding community.



Picture 1. Map of Business Location in Klirong District, Kebumen Regency

The establishment of the vannamei shrimp farming business by PT Anugerah Jaya Abadi began with the reservation and approval of the company name, preparation of the Deed of Establishment, and registration of the legal entity until obtaining the approval decree (SK) from the Ministry of Law and Human Rights (Kemenkumham). The company then proceeded with obtaining basic permits such as the Business Identification Number (NIB), Taxpayer Identification Number (NPWP), and Business License (SIUP) through the Online Single Submission (OSS) system.

For operational activities, PT Anugerah Jaya Abadi is required to obtain an Aquaculture Business License (IUPB), Good Fish Farming Practices (CBIB) certification, as well as location and environmental permits, including the Coastal Water Utilization Approval (PKKPRL), Environmental Impact Assessment (AMDAL), and a seawater extraction permit. If operating within a Bonded Zone, the company must undergo verification by the Directorate General of Customs and Excise.

In the export sector, registration as an exporter is required, along with certifications such as the Hazard Analysis and Critical Control Points (HACCP), Certificate of Origin (SKA), and Health Certificate. Additionally, the company must also manage the Building Approval (PBG), register with the Social Security Administration (BPJS), report employment data, and submit regular Investment Activity Reports (LKPM).

This comprehensive process ensures that the company operates in compliance with regulations, supports sustainability, and is well-positioned to compete and expand within the vannamei shrimp farming industry.

Preparation of Infrastructure and Technology

The next phase is the preparation of infrastructure and technology. Below are the stages of infrastructure and technology preparation for the Vannamei Shrimp Farming business of PT Anugerah Jaya Abadi.

The process begins with planning and design through a feasibility study of the location, followed by the preparation of the Detailed Engineering Design (DED), which takes into account operational efficiency and biosecurity. This is followed by the construction of pond infrastructure, including settling tanks, maintenance ponds, separate water channels, regional wastewater treatment plants (IPAL), and production roads. The implementation of the RAS-Biofloc farming system involves the installation of a water recirculation system, tarpaulin-covered biofloc ponds, aerators, and blowers.

Supporting facilities such as offices, laboratories, feed warehouses, cold storage, harvest halls, and employee accommodations were also constructed. The installation of energy

and utility systems includes the electricity grid, solar panels, and clean water systems. To enhance efficiency, smart farming technologies were implemented, including IoT sensors, automation systems, and an integrated dashboard.

Additionally, a blockchain-based traceability and food safety system, as well as HACCP equipment, were prepared. Processing facilities were established, including the factory, IQF machines, and export-standard packaging areas. Furthermore, supporting equipment and technologies were procured, such as water mills, pumps, laboratory instruments, and CCTV systems. All systems underwent testing during the trial and commissioning phase, including calibration, staff training, and technology refinement before full operational launch.

With strategic investments in infrastructure and technology, PT Anugerah Jaya Abadi positions itself as a leading vannamei shrimp producer, ready to meet the competitive export market demand with premium-quality products and sustainable farming practices.

Operational Goals and Objectives

Here are the following operational goals and objectives of PT Anugerah Jaya Abadi

Tabel 2. Operational Goals and Objectives of PT Anugerah Jaya Abadi

Objectives	Goals
Short-term	
1. Achieving full production capacity of 6,500 tons of vannamei shrimp per year with a minimum survival rate of 85%.	▪ Gradually increasing production capacity from Quarter 1: production of 1,000 tons with a survival rate of 80%, to Quarter 4: total production of 6,500 tons with a survival rate of 85%. ▪ Focus on increasing production in Quarter 4 to meet higher demand during the winter season in the U.S. Projections indicate a demand increase of up to 20%.
2. Implementing the RAS-Biofloc system across 100% of the farming area to increase water use efficiency by up to 90%.	Phased implementation of the RAS-Biofloc system: ▪ 1st Quarter: Implementation on 25% of the farming area. ▪ 2nd Quarter: Expansion to 50% of the farming area. ▪ 3rd Quarter: Achieving 75% implementation. ▪ 4th Quarter: Completion of implementation across 100% of the farming area.
3. Obtaining BAP (Best Aquaculture Practices) and ASC (Aquaculture Stewardship Council) certifications for all production facilities.	BAP and ASC Certification Application: ▪ 1st Quarter: Completing the initial assessment and gap analysis. ▪ 2nd Quarter: Implementing improvements based on the gap analysis results. ▪ 3rd Quarter: Conducting internal audits and final improvements. ▪ 4th Quarter: Undergoing external audits and obtaining certification.
Mid-term	
4. Increasing production capacity to 13,000 tons of vannamei shrimp per year with a minimum survival rate of 90%.	▪ Production Capacity Increase: ▪ 1st Year: Achieving production of 6,500 tons with a survival rate of 87%. ▪ 2nd Year: Increasing production to 10,500 tons with a survival rate of 89%. ▪ 3rd Year: Reaching the target of 13,000 tons with a minimum survival rate of 90%.
5. Implementing the RAS-Biofloc system across 100% of the farming area, increasing water use efficiency by up to 95% compared to conventional methods.	RAS-Biofloc System Implementation: ▪ 1st Year: Implementation on 50% of the farming area, increasing water use efficiency to 80%. ▪ 2nd Year: Expansion to 75% of the farming area, achieving water efficiency of 90%. ▪ 3rd Year: Completion of implementation across 100% of the farming area, reaching the target efficiency of 95%.
6. Obtaining and maintaining international certifications such as BAP (Best Aquaculture Practices), ASC (Aquaculture Stewardship	International Certifications: ▪ 1st Year: Obtaining BAP certification for 50% of production facilities. ▪ 2nd Year: Obtaining ASC certification for 75% of facilities and maintaining BAP.

Objectives	Goals
Council), and Global G.A.P. for all production facilities.	▪ 3rd Year: Achieving Global G.A.P. certification for 100% of facilities while maintaining BAP and ASC.
7. Reducing the Feed Conversion Ratio (FCR) to 1.2:1 through the optimization of feed management based on AI and IoT.	Feed Conversion Ratio (FCR) Optimization: ▪ 1st Year: Achieving an FCR of 1.4:1 through the implementation of an IoT-based feed management system. ▪ 2nd Year: Reducing FCR to 1.3:1 with the integration of AI for shrimp feeding pattern prediction ▪ 3rd Year: Reaching the target FCR of 1.2:1 through full optimization of the AI and IoT systems.
Long-term	
8. Increasing production capacity to 25,000 tons of vannamei shrimp per year with a minimum survival rate of 95%.	Production Capacity Increase: ▪ 1st Year: Achieving production of 6,500 tons with a survival rate of 92%. ▪ 3rd Year: Increasing production to 13,000 tons with a survival rate of 94%. ▪ 5th Year: Reaching the target of 25,000 tons with a minimum survival rate of 95%.
9. Implementing an AI-integrated RAS-Biofloc system across 100% of the farming area, increasing water use efficiency by up to 98% compared to conventional methods.	AI-Integrated RAS-Biofloc System Implementation: ▪ 1st - 2nd Year: Implementation on 50% of the farming area, increasing water use efficiency to 90%. ▪ 3rd - 4th Year: Expansion to 80% of the farming area, achieving water efficiency of 95%. ▪ 5th Year: Completion of implementation across 100% of the farming area, reaching the target efficiency of 98%.
10. Obtaining and maintaining international certifications such as BAP (Best Aquaculture Practices), ASC (Aquaculture Stewardship Council), Global G.A.P., and organic certification for all production facilities.	International Certifications: ▪ 1st - 2nd Year: Obtaining BAP and ASC certification for 60% of production facilities. ▪ 3rd - 4th Year: Obtaining Global G.A.P. certification for 80% of facilities while maintaining BAP and ASC. ▪ 5th Year: Achieving organic certification for 30% of production while maintaining 100% BAP, ASC, and Global G.A.P. certifications.
11. Reducing the Feed Conversion Ratio (FCR) to 1.1:1 through the development of specialized feed based on AI and genomic technology.	Feed Conversion Ratio (FCR) Optimization: ▪ 1st - 2nd Year: Achieving an FCR of 1.3:1 through the implementation of an AI-based feed management system. ▪ 3rd - 4th Year: Reducing FCR to 1.2:1 by integrating genomic technology into feed development. ▪ 5th Year: Achieving the target FCR of 1.1:1 through full optimization of AI and genomic technology systems.
12. Developing an integrated processing facility with a capacity of 100 tons per day, equipped with automation and robotics technology to enhance efficiency and quality consistency.	Integrated Processing Facility Development: ▪ 1st - 2nd Year: Building a facility with a capacity of 50 tons per day, implementing basic automation. ▪ 3rd - 4th Year: Increasing capacity to 75 tons per day, integrating robotics for key tasks. ▪ 5th Year: Achieving the target capacity of 100 tons per day with full automation and robotics.

Through the implementation of the established goals and objectives, PT Anugerah Jaya Abadi positions itself as a pioneer in the vannamei shrimp farming industry, combining technological innovation, sustainable practices, and international quality standards.

Operation Design

PT Anugerah Jaya Abadi has designed a comprehensive and integrated production process to produce premium vannamei shrimp of export quality

Although the business processes are not yet fully matured, the implementation of Value Stream Mapping (VSM) has provided significant benefits across the entire value chain of vannamei shrimp production—from hatchery to shipment to the United States. In the cultivation process, VSM has successfully reduced the cultivation cycle from 120 days to 100 days, increased the survival rate from 75% to 85%, lowered the Feed Conversion Ratio (FCR) from 1.6 to 1.4, and increased productivity per pond from 5 tons to 5.75 tons per cycle.

In the processing side, the batch processing time was reduced from 4 hours to 1.48 hours, while productivity surged from 46.25 tons per hour to 125 tons per hour. Automation also decreased labor requirements by 70%, and although energy consumption increased, it remains more efficient compared to the output generated. Overall, VSM has proven effective in improving time efficiency, productivity, as well as labor and feed cost efficiency, while also enhancing the company's competitiveness in the export market.

Picture 2. Shrimp Peeler Machine

VSM is applied to map and optimize the process of exporting Vanname shrimp to the United States through the Free On Board (FOB) method, starting from storage in cold storage, document preparation, land transport to the port, to shipping. As a result, the lead time was successfully reduced from 39 days to 32.5 days (a 16.7% decrease), mainly through the acceleration of document processes, storage, and transportation. Optimization was achieved through the digitization of documents, integration of IoT and RFID for inventory management, AI for transportation management, and a real-time tracking system.

As a result, inventory accuracy increased to 98%, logistics costs decreased from 12% to 9% (with a potential efficiency of IDR 45 billion per year), and on-time delivery improved to 95%. Additionally, the implementation of blockchain and IoT enhanced transparency, traceability, and decision-making speed, thereby strengthening PT Anugerah Jaya Abadi's competitiveness in the export market.

Product Design

PT Anugerah Jaya Abadi develops premium vanname shrimp products with superior specifications tailored for the export market, particularly the United States.

Table 3. Specifications and Development of Premium Shrimp Products

No	Aspects	Current Specification	Development Plan
1.	Size	30/40 - 16/20 count/kg	Add jumbo sizes (U10, U12) for the premium market
2.	Nutritional	Protein 20-25g/100g	Increase omega-3 content to 0.6g/100g
3.	Safety	BAP 4-star, HACCP	Add organic and non-GMO certifications
4.	Freshness	IQF, -18°C, 18 months	Implement HPP (High Pressure Processing) technology for a shelf life of 24 months
5.	Traceability	Blockchain based	Integrate with IoT for real-time monitoring
6.	Variants	Raw, cooked, breaded	Add ready-to-cook and snack product lines

No	Aspects	Current Specification	Development Plan
7.	Packaging	Vacuum sealed	Implement smart packaging with freshness indicators
8.	By-product	Not optimized	Develop high-value by-product products

(Source : Author Team, 2024)

PT Anugerah Jaya Abadi has developed a product strategy focused on innovation and sustainability. The company offers a range of premium products, including certified organic shrimp for the premium segment, ready-to-cook products with distinctive seasonings such as BBQ shrimp and black pepper shrimp, and healthy shrimp snacks like shrimp shell chips. In terms of packaging, the company has developed eco-friendly packaging with appealing designs, single-serving portions, and clear nutritional information. Additionally, they have integrated smart packaging technology, including freshness indicators, RFID tags for temperature monitoring, and Augmented Reality (AR) features. On the quality front, PT Anugerah Jaya Abadi focuses on enhancing nutritional content through feed formulations rich in omega-3, farming techniques to produce low-cholesterol shrimp, and fortifying with minerals such as selenium and zinc. For preservation, the company adopts High Pressure Processing (HPP) and cryogenic freezing technologies to maintain freshness without the need for preservatives. Furthermore, the company leverages aquaculture waste to create valuable by-products such as chitin, chitosan, animal feed, and organic fertilizers. They also offer custom cutting and sizing services to meet the needs of the HORECA (Hotel/Restaurant/Catering) segment and provide private labeling for retail. These efforts aim to enhance competitiveness, cater to the premium and health-conscious market, and ensure sustainability through the efficient and innovative use of waste.

Table 4. Value-Added Product Development

No	Product Category	Inovation	Advantages	Potential Market
1.	Ready-to-Eat	PND Shrimp, Breaded, Marinated	Convenience, flavor variety	Restaurants, catering, retail
2.	Organic & Sustainable	Organic Shrimp, Antibiotic-Free	Health-conscious, eco-friendly	Premium market, health-conscious consumers
3.	By-Products	Chitin, Animal Feed, Fertilizer	High economic value, zero waste	Pharmaceutical industry, livestock, agriculture
4.	Functional	Omega-3 Shrimp, Low-Calorie Snacks	Specific health benefits	Diet-conscious consumers, elderly, athletes
5.	Customizatio n	Custom Cut, Private Label	Flexibility, exclusive branding	HORECA, premium supermarkets

(Source: Author Team, 2024)

PT Anugerah Jaya Abadi's product development strategy aligns with rapidly growing global market trends, including the projected 5.8% growth in the ready-to-eat seafood market until 2027. This creates significant opportunities for products such as frozen cooked shrimp and marinated ready-to-cook shrimp. The increasing demand for organic and sustainable products, along with the seafood-based nutraceutical market expected to reach $11.9 billion by 2030, drives the company to offer certified organic, antibiotic-free shrimp products. PT Anugerah Jaya Abadi also ensures that its premium shrimp products meet stringent quality standards, including physical, nutritional, and food safety controls, with international certifications such as BAP, ASC, and HACCP. The integration of HACCP with Value Stream Mapping (VSM) to optimize production flow, along with the use of technologies such as IoT and blockchain, supports quality management and supply chain transparency. Furthermore, the company adopts various certifications like USDA Organic, Non-GMO, Friend of the Sea, and Carbon Neutral to enhance sustainability and meet the demands of the premium market.

Table 5. Development of Quality Standards and Certifications

No	Category	Current Standards/Certifications	Planned Development
1.	Product Quality	BAP 4-star, ASC	Organic Certification (USDA/EU)
2.	Food Safety	HACCP, ISO 22000:2018	Blockchain Traceability Certification
3.	Sustainability	Global G.A.P.	Friend of the Sea, Carbon Neutral
4.	Product Differentiation	-	Non-GMO Project Verified

(Source : Author Team, 2024)

Farming Process Design

PT Anugerah Jaya Abadi adopts the RAS-Biofloc aquaculture system as the core technology in the production of premium Vannamei shrimp for the export market to the United States. This system combines the advantages of the Recirculating Aquaculture System (RAS) with biofloc technology to optimize productivity and sustainability.

Picture 3. RAS-Biofloc Pond Design

The RAS-Biofloc system at PT Anugerah Jaya Abadi combines two core technologies: the Recirculating Aquaculture System (RAS) and Biofloc technology. RAS optimizes closed water circulation to reduce water usage by up to 90% and precisely control water quality, while Biofloc technology utilizes microorganisms to convert nitrogen waste into natural feed, enhancing feed efficiency and lowering the Feed Conversion Ratio (FCR). The advantages of this system include resource efficiency, improved feed efficiency, and more efficient land usage. It also increases productivity with faster production cycles and higher shrimp survival rates. Future development focuses on optimizing shrimp genetics, functional feed innovation, automation through IoT, and the use of renewable energy to enhance operational efficiency, as well as diversifying products with added value such as organic and jumbo shrimp.

Table 6. Comparison of Performance: RAS-Biofloc System vs. Conventional System

No	Parameters	Conventional System	RAS-Bioflok System	Improvement
1.	Stocking Density	60-100 individuals/m^3	300-600 individuals/m^3	500%
2.	FCR	1.6	1.2	25%
3.	Survival rate	75%	90%	20%
4.	Water Usage	100%	10%	90%
5.	Production Cycle/Year	2	3	50%
6.	Productivity	10-15 tons/ha/year	75-100 tons/ha/year	600%

(Source : Author Team, 2024)

PT Anugerah Jaya Abadi implements a comprehensive feed and shrimp health management system to ensure optimal productivity and premium product quality. The company utilizes various types of feed, including high-quality imported feed, affordable local

feed, and sustainable alternative feed based on Black Soldier Fly (BSF) larvae. Feeding is carried out using IoT-based automatic feeders, which improve feed efficiency by 15-20% and manage the Feed Conversion Ratio (FCR) with a target range of 1.2-1.3. The company also develops functional feeds fortified with probiotics and natural immunostimulants to enhance shrimp health. The feed formulation is tailored to the shrimp's growth stages, using high-quality ingredients such as premium fishmeal and non-GMO soybeans. Additionally, the company replaces a portion of animal protein with BSF larvae meal and microalgae as alternative protein sources. Feed inventory management is executed using an RFID system for real-time stock tracking, along with temperature and humidity control in the warehouse to maintain feed quality.

Table 7. Comparison of Shrimp Feed Types

No	Types of Shrimp Feed	Protein (%)	FCR	Price (per Kg)	Availability
1.	Import	35 - 40	1,2	18.000 – 22.000	Stable
2.	Local	30 - 35	1,4	15.000 – 18.000	Fluctuating
3.	BSF	40 - 45	1,3	9.000 – 15.000	Limited

(Source : Author Team, 2024)

Seeds management at PT Anugerah Jaya Abadi includes local seeds, imported SPF (Specific Pathogen-Free) seeds, and in-house seeds development. Local seeds is more affordable and adaptable, but its genetic quality and disease risks can vary. SPF seeds offers superior genetic quality and better disease resistance, although it comes at a higher cost and poses a risk of new pathogens. In-house seeds development allows for complete control over quality but requires significant investment and a long development time. The company addresses these challenges through stringent selection, collaboration with reputable suppliers, and investments in modern hatchery facilities as well as breeding programs.

Table 8. Comparison of Seeds Types

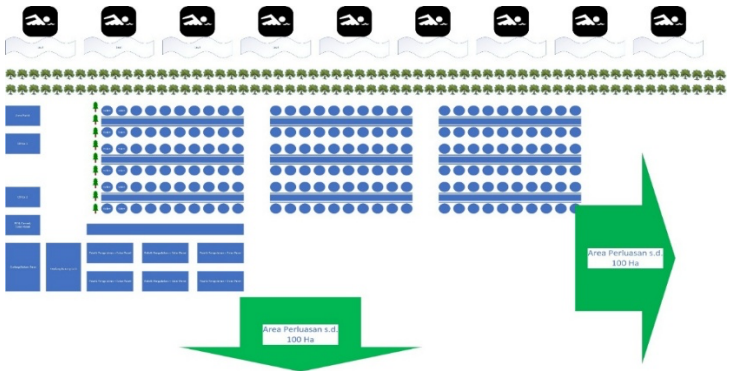
No	Aspects	Local Seeds	Imported Seeds (SPF)	In-house Seeds
1.	Price (Rp/each)	30-40	60-80	50-70
2.	Genetic Quality	Varies	High & identical	Customizable
3.	Disease Resistance	Moderate	High	Can Be Improved
4.	Local Adaptation	High	Requires Adaptation	Customized
5.	Availability	Easy	Limited	Controlled
6.	Biosecurity Risk	Moderate	Low-Moderate	Low
7.	FCR	1,4 - 1,6	1,2 - 1,4	1,3 - 1,5
8.	Survival Rate	70-80%	85-90%	80-85%

(Source : Author Team, 2024)

Health management for shrimp at PT Anugerah Jaya Abadi involves routine monitoring, strict biosecurity measures, and detailed sanitation procedures. Monitoring includes weekly sampling, microscopic examination, and daily water quality analysis. Diseases such as WSSV, EMS, and IHHNV are screened using PCR every two weeks. The closed RAS system, water filtration with UV sterilizers, and ozonization, along with stringent sanitation protocols, are implemented to maintain shrimp cleanliness and health. Functional feed containing immunostimulants and probiotics is used to support shrimp health, in addition to a vaccination program. AI technology and digital access control systems help detect and manage diseases. Shrimp stress is minimized through feed supplementation and natural immunostimulants. Major diseases like WSSV, EMS, and HPM are addressed with biosecurity, probiotics, vaccination, and enhanced water quality. Disease management protocols involve rapid responses by expert pathology teams and the use of formalin and DNA vaccination.

Process Design for Processing

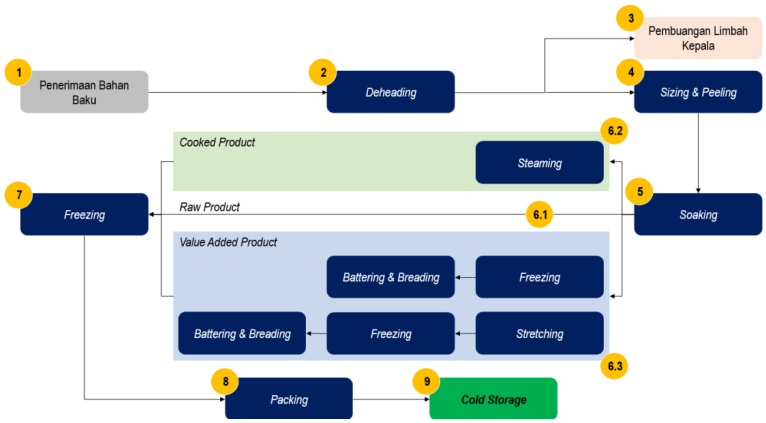
The schematic or layout of the Vaname Shrimp Farming at PT Anugerah Jaya Abadi is provided below:



Picture 4. Layout of the Vaname Shrimp Farming at PT Anugerah Jaya Abadi

The company owns a land area of 100 hectares, which is divided into facilities for cultivation, processing, and support. The cultivation area includes production ponds divided into three stages, with a total of 440 ponds in the first year, 870 ponds in the third year, and 1,750 ponds in the fifth year. The processing facility includes raw material reception, sorting, processing lines, packaging, and cold storage with a capacity of 500 tons. The support facilities include offices, an IoT and AI control room, waste processing, and solar panel systems. The modular land design supports gradual expansion. The business process includes the reception of seeds from the hatchery, health monitoring, AI-based automatic feeding, and the use of probiotics and biofloc. Harvesting takes place after 80 days and is immediately processed using a refrigerated conveyor system."

The shrimp product processing begins with sorting and grading using a computer vision system to ensure more than 99% accuracy in separation based on size and quality. The shrimp are then washed with ozonated water and go through a multi-stage washing system for optimal cleanliness. Freezing is done using an IQF system with liquid nitrogen at -40°C in less than 10 minutes to preserve texture. After that, the shrimp are coated with a thin layer of ice using an automatic glazing system, followed by vacuum packaging and QR code labeling for traceability. Storage is done in cold storage at temperatures between -18°C and -20°C with real-time temperature monitoring using IoT sensors. For export, quality is checked through statistical sampling, and products are packaged in IoT-enabled reefer containers with temperature control. Delivery is made using refrigerated reefer trucks with real-time temperature and location monitoring via GPS and IoT sensors, along with blockchain for data integrity throughout the supply chain.



Picture 5. Shrimp Processing Production Flow

Process Technologies

PT Anugerah Jaya Abadi implements advanced technology to enhance the efficiency and quality of premium Vanname shrimp production. The cultivation system uses RAS (Recirculating Aquaculture System) and biofloc, along with real-time IoT monitoring for water quality and automatic control of aeration and feeding. AI technology optimizes feeding, and shrimp health management is carried out with strict biosecurity measures and pathogen detection. The processing facility is equipped with IQF (Individual Quick Freezing) technology, automatic glazing, and sorting with computer vision. The company also manages energy through solar panels and biogas, while product traceability is ensured using blockchain. With a focus on genetic development and CRISPR technology, the company aims to increase production capacity to 7,500 tons per year and achieve international certifications such as BAP and ASC for the premium export market.

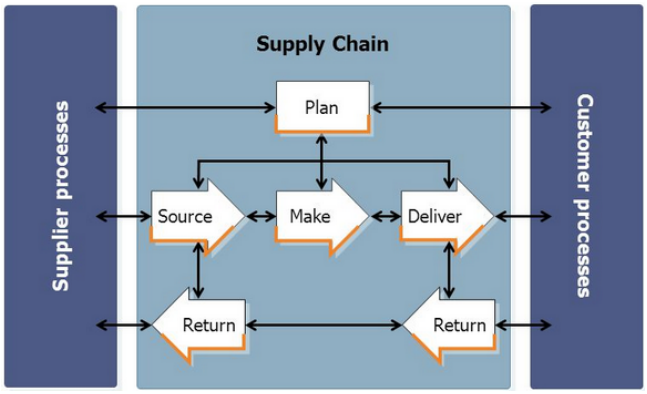
Environmental Management and Sustainability

PT Anugerah Jaya Abadi adopts sustainability in shrimp farming through the use of RAS (Recirculating Aquaculture System), which reduces water usage by 90-95%, utilizes solar panels for 30% of electricity needs, and biogas for energy. Sustainability is reflected in mangrove conservation, AI-based feeding, sustainable raw materials, and the implementation of a circular economy with waste conversion. The company also holds international certifications and develops organic shrimp products with eco-friendly packaging. The focus on mangrove restoration and local community empowerment is part of a broader sustainability effort.

Supply Chain

Supply Chain Management

PT Anugerah Jaya Abadi adopts an integrated Supply Chain Management approach by utilizing the SCOR framework and sustainable performance measurement. The goal is to create a resilient, responsive, and sustainable supply chain to support long-term growth and strengthen its competitive position in the global market as a leading producer of premium Vanname shrimp.



Picture 6. Framework SCOR of PT Anugerah Jaya Abadi

By implementing Value Stream Mapping (VSM), PT Anugerah Jaya Abadi can optimize the production and export processes of shrimp, which in turn helps the company obtain and maintain the Green Ticket. The Bonded Zone status allows the company to achieve efficiency in importing raw materials and production equipment, defer payment of import duties and taxes, as well as streamline customs procedures that support smooth exports.

Inventory Planning and Control

PT Anugerah Jaya Abadi implements an integrated inventory planning and control system to support efficient and sustainable premium Vanname shrimp farming. This system includes cloud-based Warehouse Management System (WMS) and RFID integrated with ERP, as well as AI-driven production planning through Advanced Planning and Scheduling (APS) and machine learning algorithms. Buffer stock is managed dynamically using probabilistic models and ABC-XYZ analysis, while quality control applies the FEFO system, IoT, and blockchain to ensure product safety and traceability. Additionally, cost optimization is achieved through Economic Order Quantity (EOQ), vendor-managed inventory (VMI), and dynamic pricing. To minimize risk, the company utilizes Monte Carlo simulations, hedging strategies, and inventory insurance. The entire system is supported by real-time dashboards, automated reporting, and Business Intelligence analytics for fast and accurate decision-making

Quality Management

The following are several aspects of Quality Management implemented by the company:

Table 9. Quality Objectives

Aspects	Quality Objectives	Target	Methodes of Measurement	Frequency
Product Quality	Compliance rate with shrimp size standards	>98%	Visual inspection and sample measurement	Daily
	Product freshness level (TVB-N)	<30 mg N/100g	Laboratory analysis	Weekly
	Free from antibiotic residues	100%	Laboratory testing	Per Batch
Production Efficiency	Feed Conversion Ratio (FCR)	<1.2:1	Feed vs. biomass calculation	Monthly
	Survival Rate	>85%	Population count calculation	Per Cycle
	Productivity (tons/ha/year)	>50	Harvest yield calculation	Yearly
Food Safety	HACCP compliance rate	100%	Internal Audit	Monthly
	Food safety incidents	0	Incident report	Monthly

Aspects	Quality Objectives	Target	Methodes of Measurement	Frequency
Sustainability	Water use efficiency	>90%	Input-output water measurement	Monthly
	Carbon emission reduction	5% YoY	Carbon footprint calculation	Yearly
Customer Satisfaction	Net Promoter Score	>8/10	Customer Survey	Quarterly
	Product return rate	<0.5%	Return report	Monthly
Inovasi	Number of new products launched	2 per year	Product development report	Yearly
	Improved process efficiency	5% YoY	Process analysis	Yearly
Certifications	Maintain ASC and BAP certification	100%	External audit results	Yearly
Employee Training	Training hours per employee	>40 hours/year	Training records	Quarterly

(Sumber: Tim Penulis, 2024)

Operational Cost Projection

The Operational Cost Projection of PT Anugerah Jaya Abadi is prepared by considering various factors that influence operational costs in the Vanname shrimp farming industry. This projection covers a five-year period, with cost breakdowns reflecting the operational complexity of the company. Below are the cost assumptions and the company's operational cost projection:

1. Feed Cost: 30% of total operational cost, with an expected increase of 50% per year as production increases, supported by feed efficiency through automated technology and improved feed formulations.
2. Seeds Cost: 6% of total operational cost, with an expected increase of 50% per year, using high-quality SPF seeds to improve survival rate.
3. Electricity & Energy Cost: 8% in the first year, decreasing to 7% in the fifth year, with an expected increase of 40% per year, supported by energy efficiency through solar panels and energy-saving technologies.
4. Labor Cost: 10% in the first year, decreasing to 7% in the fifth year, with an expected increase of 30% per year, facilitated by automation and employee training.
5. Maintenance Cost: 4% of total operational cost, with an expected increase of 30% per year for routine and preventive maintenance.
6. Processing Cost: 12% of total operational cost, with an expected increase of 50% per year as production volume grows, supported by investments in processing technology.
7. Packaging Cost: 6% of total operational cost, with an expected increase of 50% per year, focusing on eco-friendly packaging and smart packaging technology.
8. Transportation Cost: 4% of total operational cost, with an expected increase of 50% per year, optimized through logistics and long-term contracts.
9. Administrative Cost: 2% of total operational cost, with an expected increase of 30% per year, supported by administrative efficiency.
10. Marketing Cost: 4% of total operational cost, with an expected increase of 50% per year, focusing on market development and branding.
11. Insurance Cost: 2% of total operational cost, with an expected increase of 30% per year as asset and production values rise.
12. Certification & Licensing Cost: 1% of total operational cost, with an expected increase of 30% per year, driven by a commitment to quality and sustainability standards.

13. R&D Cost: 2% of total operational cost, with an expected increase of 50% per year, focusing on product innovation.
14. Miscellaneous Costs: 4% of total operational cost, with an expected increase of 30% per year, covering unforeseen expenses and operational flexibility.

CONCLUSION

PT Anugerah Jaya Abadi was established with a modern, high-tech concept, adopting the Recirculating Aquaculture System (RAS), biofloc, and a modular cluster-based concept to ensure efficiency, sustainability, and flexibility for gradual expansion in line with short-, medium-, and long-term targets. The company aims to become a leading producer of premium Vannamei shrimp for export markets, particularly the United States, with a production target of 7,500 tons per year. Operational goals include achieving water efficiency of up to 95%, producing internationally certified products, and implementing environmental sustainability principles and community empowerment. The operations are fully integrated from upstream to downstream, covering hatchery, aquaculture, processing, and export distribution. The system is based on IoT, AI, and the use of renewable energy and zero discharge in pond areas, ensuring efficiency, strict quality control, and environmental sustainability. The main products include premium Vannamei shrimp in whole, peeled, butterfly cut, and organic forms. These are packaged in eco-friendly, smart packaging with QR codes for traceability, supported by ASC, Global G.A.P., HACCP, and USDA Organic certifications. The farming utilizes the RAS-biofloc system, with real-time IoT monitoring for water quality and AI-based automatic feeding. Strict biosecurity protocols are applied with high-quality SPF seeds, PCR screening, and in-water vaccination to ensure shrimp health and survival rates. Processing prioritizes efficiency and quality, using computer vision for sorting, ozone water for washing, IQF nitrogen liquid freezing systems, automatic glazing, and vacuum packaging. All processes are monitored with HACCP systems and IoT sensors. Distribution is carried out using IoT-enabled reefer containers, with real-time temperature and location monitoring, and blockchain technology to maintain supply chain data integrity. Transportation is conducted through refrigerated reefer trucks under long-term contracts until the export port. The largest cost components are feed (30%), followed by processing (12%), labor (10%), electricity & energy (8%), and others. Operational cost projections show an annual increase of 30-50% in line with production growth, with energy efficiency, automation, and the use of technology expected to reduce cost proportion relative to production volume.

REFERENCE

Budi, W. (2020). Pengaruh Kualitas Lingkungan Tambak Terhadap Produktivitas Udang Vaname (Litopenaeus vannamei). Jurnal Akuakultur Indonesia, 19(2), 101-110.

Asmara, R., Yuliana, N., & Santosa, D. A. (2021). Analisis Target Produksi dan Efisiensi Biaya Budidaya Udang Vaname. Jurnal Perikanan Tropis, 8(1), 45-53.

Suryaningrum, D., Wibowo, D., & Raharjo, D. (2020). Penerapan Sistem Pemeliharaan Udang Vaname Berbasis Bioflok. Jurnal Ilmu Perikanan Tropis, 5(2), 67-74.

Prakoso, A., & Riani, E. (2019). Monitoring Kualitas Air dan Pertumbuhan Udang Vaname di Tambak Tradisional. Jurnal Sains Akuakultur Tropis, 3(1), 24-32.

Saputra, R., Hasanah, U., & Firmansyah, D. (2019). Analisis Biaya dan Keuntungan Budidaya Udang Vaname. Jurnal Sosial Ekonomi Kelautan dan Perikanan, 14(1), 13-22.

Mazidatul QonitaS., PurwonoJ., & FeryantoF. (2024). Strategi Pengembangan Usaha Budidaya Udang Vannamei Dalam Meningkatkan Pendapatan Petambak di Kecamatan Klirong Kabupaten Kebumen. Jurnal Agribisnis Indonesia (Journal of Indonesian Agribusiness), 12(1), 163-174. https://doi.org/10.29244/jai.2024.12.1.163-174.