

Value Co-Creation in Inland Fish-Farming: A Service-Dominant Logic Approach for Sustainable Practices in Indonesia

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Abstract - *Indonesia's agriculture and aquaculture sectors are vital for the nation's economy and food security, yet both face substantial challenges. Inland fish-farming, a key employer and contributor to domestic food production, struggles with low technology adoption, insufficient infrastructure, volatile commodity prices, and limited access to fair markets for farmers. Addressing these issues are crucial for improving inland fish-farmer welfare and ensuring the sustainability. Current supply chain in local level still facing major problems to fulfil the current food manufacturing standard in term of quantity and quality. Also, there is limitations in connecting upstream to downstream and lack of education and feedback from customers. Empirical findings reveal two critical insights: first, adopting clear payment schemes and responsive ordering processes significantly enhances supply chain coordination in inland fish-farming. Second, robust inventory and grading systems address quality and stock management issues, ensuring consistent market standards. This research underscores the importance of stakeholder collaboration and strategic planning in addressing food security issues. It offers practical recommendations to tackle challenges in inland-fisheries, one of critical sectors for Indonesia's food security and local economic sustainability.*

Keywords – *Service-Dominant Logic, Value Co-creation, Inland Fish-Farming, Local Economy Development, Sustainability*

I. INTRODUCTION

Inland fish-farming in Indonesia is one of backbone of the national and local economy, providing employment and contributing significantly to domestic food production. However, the sector faces serious

challenges, including low adoption of modern technology, lack of infrastructure, and volatile commodity price fluctuations. Lack of access for farmers to fair markets is also a serious problem that needs to be addressed to improve farmer welfare and the sustainability of the inland fish-farming sector as a whole [1].

Other obstacles are related to socio-economic and cultural factors, namely that most areas that have the potential to be developed as inland fish-farming areas still have limited facilities and infrastructure or are even undeveloped. Road networks, electricity, and communication are usually not yet available or lacking. Coupled with the difficulty of market access and uncertainty of product prices, these things become disincentives for investors to enter most fields and locations of inland fish-farming [2].

The imbalance between food demand and supply is also a persistent problem in Indonesia. Promising inland fish-farming activities must have a competitive advantage [3]. Competitive advantage is obtained from managing the chain of activities from post-harvest fish production (catching and cultivation) until the product is in the hands of consumers, both in terms of value and cost. The supply chain essentially flows products involving three or more entities (organizations or individuals) that are directly involved in the upstream and downstream flow of products, services, finances and/or information from a source to consumers. To achieve competitive advantage in the fisheries industry, fisheries businesses must be able to produce products that meet consumer desires in terms of quality, quantity, price, time and the right place [4].

Related to post-harvest infrastructure, the Indonesian fisheries sector often faces difficulties in the distribution and marketing of production. Lack of adequate storage facilities and inefficient distribution systems cause many post-harvest losses. This also

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results in unstable prices for consumers and uncertain incomes for farmers and fishermen [5].

To overcome these challenges, comprehensive steps are needed from the government, non-governmental organizations, and the private sector. In local level, we should improve the supply chain system that support efficiency in information flow and distribution channel. Investment in modern agricultural technology, infrastructure development, and strict supervision of sustainable fisheries practices will be key to achieving the sustainability of the Indonesian agricultural and fisheries sector. Collaboration among relevant stakeholders is important to promote a better value for all and improve resource integration. Therefore, this research aims to rethinking inland fisheries sector to promote a better supply chain system using service-dominant logic.

II. LITERATURE REVIEW

Service-Dominant Logic (SDL) emphasizes the importance of collaboration, shared value creation, and a paradigm shift from physical products toward service experiences [6].

Previous research [7-8] shows that SDL has driven business transformation, especially in the digital context. Companies, both large and small, are increasingly recognizing the importance of collaborating with customers to create shared value. This is reflected in business practices such as coopetition and customer-centric marketing approaches.

The application of SDL has also penetrated into various sectors, including the supply chain. Empirical studies [9-10] show that by adopting an SDL perspective, companies can improve operational efficiency and responsiveness to changes in customer demand. The use of quantitative techniques such as genetic algorithms and simulation-optimization models has enabled companies to optimize resource allocation and improve supply chain performance [11-12].

While SDL offers great potential, its implementation is also faced with a number of challenges. One of the main challenges is the complexity of measuring service performance and evaluating the impact of investments in SDL. In addition, the balance between quantitative and qualitative approaches in SDL research is also a concern. Qualitative aspects such as customer emotions and perceptions are often difficult to measure objectively, but it is still important to understand the full customer experience.

III. METHODOLOGY

This study used focus group discussions involving inland fish-farming practitioners engaged in catfish farming. Using purposive sampling technique, the selected participants are:

Table I Selected Participants for Focus Group Discussion

Name	Position	Experience
Participant A	Province Coordinator	7 years
Participant B	Head of Yayasan	7 years
Participant C	Field Coordinator	4 years
Participant D	Processing & Packaging	6 years
Participant E	Processing & Packaging	6 years
Participant F	Marketing	6 years
Participant G	Sales	4 years

The seven participants were invited to identify issues in the catfish supply chain, from seeding to post-harvest sales. This Islamic boarding school purchases catfish from other Islamic boarding schools, which then process them into ready-to-eat fish products.

The analysis results will then be transcribed and analyzed using thematic analysis, identifying frequently occurring key keywords. The coding results will then be grouped into specific categories or themes, which will identify problems and propose solutions relevant to the inland fish-farming supply chain. To ensure the developed solution is long-term and serves as a value co-creation platform, the proposed solution will then be framed through a Service-Dominant Logic lens.

IV. FINDINGS AND DISCUSSION

The Indonesian government has taken several steps to improve inland fish-farming, a sector vital to the national economy. Currently, the government is focusing on developing infrastructure and providing technical assistance to fish farmers, including providing quality seeds, training in modern farming techniques, and subsidies for fish feed. The goal is to increase productivity and quality of the farmed products so that they can compete in domestic and international markets.

However, the main challenge in inland fish-farming in Indonesia is the inefficient supply chain between fish farmers and large-scale buying companies. Many fish farmers have difficulty selling their harvests due to limited access to wider markets and lack of information on market demand. To address this problem, the government has introduced a supply chain digitalization program that allows farmers to connect directly with buyers through online platforms.

One of the flagship programs is the implementation of an e-commerce platform specifically for the fisheries sector, which was developed with the aim of

shortening the supply chain and increasing price transparency. Through this platform, farmers can sell their harvests directly to large companies without going through intermediaries, which often results in unfair selling prices for farmers. In addition, the platform also provides real-time data on market prices and demand, so that farmers can better plan their production.

The government is also working with various technology and logistics companies to improve the efficiency of inland fish farming distribution. With this collaboration, it is hoped that the delivery of fish from farmers to buying companies will be faster and more affordable. In addition, the government provides incentives for companies that invest in cold storage infrastructure and refrigerated transportation, which are important for maintaining fish quality during the shipping process.

Overall, the government's efforts to improve the fish farming supply chain in Indonesia have shown positive results. Through various programs and initiatives, it is hoped that the fisheries sector can grow more rapidly and provide greater economic benefits for fish farmers. By continuing to improve efficiency and transparency in the buying and selling process, the government hopes to create a more sustainable and profitable ecosystem for all parties involved in this industry.

The Indonesian government has launched several well-known programs to address challenges in the fish farming supply chain. Here are some of them:

- *Sistem Ketertelusuran dan Logistik Ikan Nasional* (STELINA) is an innovation from the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia to support transparency and efficiency in the supply chain of marine and fishery products. This application is designed to meet the standards of interoperable seafood traceability systems that are increasingly important in global trade. STELINA enables tracking of marine and fishery products from upstream to downstream. With this technology, data related to the origin, capture and cultivation process, processing, distribution, to marketing of marine and fishery products can be digitally documented and easily accessed.
- The Government's Seed and Feed Assistance Program through the Ministry of Marine Affairs and Fisheries (KKP) provides assistance in the form of quality fish seeds and subsidized feed to farmers. This program aims to increase productivity and the quality of inland fish-farming results, so that farmers can produce fish that are more competitive in the market.
- Fisheries People's Business Credit (KUR) Fisheries KUR is a low-interest financing program aimed at fish farmers. Through this program, farmers can access capital to purchase equipment, seeds, and

feed, as well as to develop their inland fish-farming infrastructure. This program also includes financial management training for farmers.

- Fish Cultivation Training and Extension The government routinely holds training and extension programs for fish farmers on good inland fish-farming techniques (Good Aquaculture Practices/GAP), environmental management, and the use of the latest technology in inland fish-farming. The aim is to improve the skills of farmers and reduce the environmental impact of inland fish-farming activities.
- Partnerships with Technology Companies The government is working with technology companies to develop mobile applications and e-commerce platforms specifically for the fisheries sector. These applications allow farmers to sell fish directly to consumers or large companies, monitor water quality, and get technical advice in real time. An example of this platform is Aruna, which has successfully connected thousands of farmers with domestic and international markets. These programs are designed to improve efficiency, transparency, and market access for fish farmers in Indonesia, so they can get fairer prices and improve their welfare.

A. Issue Exploration

We conducted a focus group discussion with five participants representing AI Umanaa's business development departments in the fish farming sector, frozen food processing, and marketing. We also invited an integrated food coordinator in Sukabumi to gain a comprehensive view of the inland fish farming supply chain in Sukabumi. According to the interviews and focus group discussions, there are several issues to address, including:

Optimizing Payment Schemes

Efficient payment schemes are essential for fostering trust and ensuring financial fluidity within the inland fish-farming supply chain. The proposed system, which sets a maximum payment timeline of H+7 for suppliers and H+1 for farmers, provides a structured approach to addressing payment delays. By adhering to this timeline, stakeholders can strengthen relationships, build trust, and encourage a more collaborative environment. This structure also supports the financial stability of farmers and suppliers, enabling them to focus on their operational efficiency.

Implementing Responsive Ordering Systems

A responsive ordering system, initiated only after farmers signal readiness, can play a pivotal role in optimizing time and resources. This approach aligns production schedules with actual market

demand, reducing waste and preventing unnecessary delays. By ensuring orders are processed in real-time, farmers can better plan their harvesting cycles and allocate resources more effectively, creating a more adaptive and responsive supply chain.

Ensuring Order Information Reliability

Unclear or ambiguous order information poses significant risks, including uncertainty and potential cancellations. A transparent system that provides real-time updates on order status and details is crucial for mitigating these issues. Reliable order communication not only boosts confidence among farmers but also ensures that all stakeholders are aligned, reducing the likelihood of operational disruptions.

Addressing Inventory Management Challenges

Farmers often face difficulties managing their catfish stock, particularly when it comes to efficiently depleting pond inventory. These challenges highlight the need for strategic harvest planning and robust inventory management systems. By addressing these constraints, farmers can maintain consistent supply levels, avoid overstocking or shortages, and meet market demands more effectively.

Streamlining Grading and Quality Control

Quality consistency remains a significant concern in inland fish-farming, particularly in catfish grading. Developing an efficient grading system ensures that only fish meeting quality standards enter the market, thereby maintaining consumer trust and satisfaction. Moreover, mechanisms to manage overstock or shortages, such as flexible redistribution systems, can help balance supply-demand dynamics and minimize waste.

Enforcing Product Conformity through Penalties

To uphold quality standards, a penalty system for non-conforming products can be implemented. This system would discourage errors in size and quality while promoting accountability among farmers and suppliers. Such measures are instrumental in ensuring that the supply chain consistently delivers high-quality products that meet market expectations.

Strengthening Collaboration with Clear MoUs

A detailed and well-structured Memorandum of Understanding (MoU) between farmers and stakeholders, such as AI Umanaa, can serve as a cornerstone for effective collaboration. By clearly defining roles, responsibilities, and expectations, the MoU provides a transparent framework that

minimizes conflicts and promotes mutual understanding.

Establishing Standardized Size Verification Processes

Standardized indicators for verifying the size of catfish are critical for maintaining consistency and fairness in product assessment. Clear, measurable benchmarks not only improve transparency but also enhance the reliability of transactions, ensuring that all parties have a common understanding of quality standards.

Enhancing Communication through Digital Tools

Robust communication tools, including chat platforms and notification systems, are vital for improving coordination and responsiveness within the supply chain. These digital facilities enable real-time interactions, allowing stakeholders to address issues promptly and make informed decisions more efficiently.

Advancing Digital Payment Systems

Transitioning to digital payment platforms can significantly enhance the transparency and speed of financial transactions. By streamlining the payment process, these systems reduce administrative burdens and foster a more efficient financial management framework, benefiting all participants in the supply chain.

Introducing a Subscription-Based Model

The development of a subscription system offers a structured approach to planning and supply management. This model provides both producers and buyers with greater predictability and stability, enabling better resource allocation and reducing uncertainties in the supply chain.

Empowering Farmers through Education

Education plays a crucial role in improving farming practices and fish quality. Training programs focused on catfish care and treatment can equip farmers with the knowledge and skills needed to meet market standards. These initiatives not only enhance productivity but also promote sustainable inland fish-farming practices.

Focusing on Production Parameters and Processes

A deep understanding of production parameters and processes is essential for ensuring that catfish meet quality expectations. By adhering to these standards, farmers can optimize their operations, reduce variability, and consistently deliver products that align with market needs.

This comprehensive analysis underscores the importance of integrating these strategies into

inland fish-farming supply chains. Together, they create a framework for efficiency, sustainability, and quality, ensuring the long-term viability of the industry.

B. Rethinking Value Co-Creation Using Service Dominant Logic

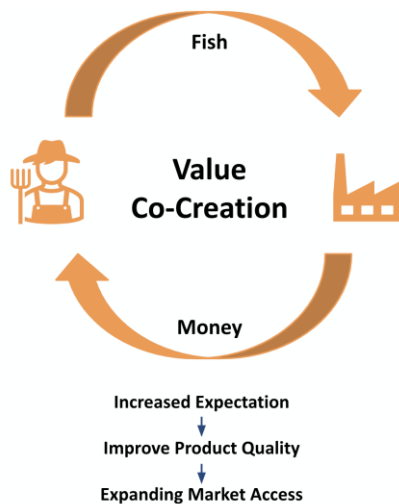


Figure 1 Value co-creation through interaction between fish farmers and food manufacturer.

In Fig.1, we can see how the interaction between the two parties, namely fish farmers and food manufacturers, creates added value through value co-creation. The value exchange that occurs is that fish farmers will sell fish to food manufacturers, while food manufacturers will exchange it for a certain amount of money in return. Fish and money as a means of exchange represent value when viewed from the lens of service dominant logic. Both parties provide value that benefits the counterpart.

If we only stop at this understanding, then the value exchange system between the two parties will not develop. However, if we use the concept of service dominant logic, value exchange will change into value co-creation. The initial step in this stage is to conduct co-experiencing, by bringing both parties and finding out each other's expectations so that the counterpart understands what standards they should fulfill from their counterpart.

The second step is co-definition, which means determining the objectives of the value co-creation process. Both parties will set up the goal according to their respective abilities so that both parties can determine how far the expectations they can give to the counterpart. Although it cannot be fulfilled immediately, this does not matter because each party will grow and develop in a clearer direction following the expectations from their counterpart. Here, they

start to build trust by securing commitment as partners.

Next is co-elevation, where each party tries to meet the expectations of the counterpart by continuing to learn and improve their respective business systems. Of course, this requires investment and innovation so that their business processes are better than before.

The last step is co-development, where both parties will try to meet higher expectations than before. The interaction that occurred in the previous stage enables them to deliver a better value standard. For fish farmers, they can deliver fishes as food manufacturer requests in terms of quantity and quality. For food manufacturers, they can provide higher prices and offer better payment schemes.

This process is carried out with a cyclic process with the concept of continuous improvement. In the next cycle through an evaluation from the beginning, namely co-experience, where both parties will evaluate the value co-creation process and provide suggestions to each other so that the next interaction is better.

In this case, it can be seen how communication, openness, and trust are the initial capital in value co-creation development. Followed by strive for excellence, the value co-creation process can have a positive impact on their collaboration. The expected value co-creation as the big goal is expanding market access, where the better the quality of the fish provided, the better the quality of frozen food produced by the food manufacturer. If the quality of frozen food is good, it is expected that sales will also increase and expand market access. This makes the demand for fish from fish farmers also increase to meet the increasing market needs.

C. Proposed Solutions

Supply chain integration (SCI) development is a process of unifying all supply chain related activities to improve operational efficiency and customer satisfaction. Here are some results of problem analysis to answer customer needs.

Establishing a Clear Memorandum of Understanding (MoU)

A well-defined and comprehensive Memorandum of Understanding (MoU) serves as a foundational framework for collaboration between AI Umanaa and catfish farmers. This agreement, established during the registration process, ensures mutual understanding of roles, responsibilities, and expectations, fostering a transparent and cooperative relationship. A strong MoU reduces potential conflicts and provides a structured basis for long-term partnerships.

Optimizing Production Parameters and Processes

To meet market quality standards, it is critical to

define clear production parameters and processes for catfish farming. Through effective grading and quality management systems, farmers can ensure the fish meet required standards before entering the market. The implementation of measurable grading indicators and size verification processes further enhances consistency and reliability, safeguarding product quality throughout the supply chain.

Enhancing Inventory Management and Addressing Farmer Constraints

Effective inventory management is essential for addressing the challenges farmers face during harvesting. Key practices include regular stock monitoring, meticulous harvest planning, feed management, and stringent control over water quality and fish health. These measures ensure balanced inventory levels and timely responses to market demands. Additionally, managing stock surpluses or shortages requires a mechanism that allows efficient and equitable resolution, benefiting both farmers and stakeholders like AI Umanaa.

Implementing Responsive Ordering and Quality Control

A responsive ordering system aligned with farmers' readiness to supply can optimize time and reduce supply delays. This approach helps farmers synchronize their production with actual demand, minimizing waste and inefficiencies. Simultaneously, providing AI Umanaa with transparent and detailed order information mitigates uncertainties, reducing the risk of order cancellations. Efficient quality control systems, including robust grading mechanisms and measurable size indicators, ensure consistent product quality. Moreover, a penalty system for non-conformity in size or quality enforces adherence to standards, enhancing overall supply chain reliability.

Reforming Payment Schemes and Financial Systems

To streamline financial transactions and foster trust, a payment scheme with a maximum time limit of H+7 for suppliers and H+1 for farmers is recommended. This approach ensures a smooth flow of funds, enhancing trust among all stakeholders. Transitioning to digital payment systems further increases transparency and efficiency while accelerating the payment process. Additionally, developing a subscription-based model provides producers and buyers with greater certainty, enabling effective planning and consistent supply throughout the chain.

Strengthening Communication with Chat and Notification Facilities

Robust communication channels are vital for maintaining coordination and responsiveness across the supply chain. The introduction of chat and notification facilities enhances real-time interactions, enabling stakeholders to address issues promptly and ensuring seamless communication throughout the process.

Educating Farmers for Enhanced Productivity

Educational features tailored to the needs of catfish farmers play a crucial role in improving production quality and fish health. By providing information on optimal treatment and farming practices, these resources empower farmers to adopt more sustainable and efficient methods, ensuring their products consistently meet market standards.

These strategies collectively aim to create a more integrated, efficient, and resilient inland fish-farming supply chain. By addressing critical operational, financial, and educational aspects, stakeholders can ensure sustainable growth and improved outcomes for all parties involved.

The proposed co-creation platform can be seen in Figure 2.



Figure 2 Proposed application design as value co-creation digital platform.

V. CONCLUSION

Indonesia's agriculture and aquaculture sectors are vital for the nation's economy and food security, yet both face substantial challenges. Agriculture, a key employer and contributor to domestic food production, struggles with low technology adoption, insufficient infrastructure, volatile commodity prices, and limited access to fair markets for farmers. Addressing these issues is crucial for improving farmer

welfare and ensuring the sustainability of the sector.

Inland fish-farming holds significant potential as a source of protein and income for coastal communities but is hindered by overfishing, habitat degradation, climate change, and unsustainable practices. In marine and coastal aquaculture, challenges include environmental damage, inadequate management, limited infrastructure, and socio-economic barriers, such as poor market access and uncertain product prices, which deter investment. Similarly, inland fisheries face technological limitations, with farmers unable to adopt innovations that enhance cultivation efficiency.

Another pressing issue is the imbalance between food demand and supply. Competitive advantage in fisheries depends on managing the entire supply chain, from post-harvest production to delivery to consumers, ensuring quality, affordability, and timely availability. However, Indonesia's fisheries sector is plagued by inadequate storage facilities, inefficient distribution systems, and significant post-harvest losses. These issues result in unstable prices and unreliable incomes for farmers and fishermen.

To address these challenges, enhancing infrastructure, fostering technological innovation, and streamlining the supply chain are essential. These measures will not only boost the efficiency and competitiveness of agriculture and aquaculture but also contribute to greater food security and economic stability.

The proposed sustainable supply-chain framework consists of sustainable development dimensions, list program & policies, list several significant events, and food security dimensions. The proposed framework leads to sectoral issues: price stability, stock & distribution, human development, regulation, capital and information flow, food sovereignty, distribution and price stability, and nutrition & health status. The main goal of this proposed framework is to promote a healthy population, sustainable condition, and socio-economic welfare.

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