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INTEGRATING PUBLIC ADMINISTRATION AND FISH-PROCESSING VALUE CHAINS FOR SUSTAINABLE COMMUNITY ENTERPRISES: A QUALITATIVE CASE STUDY OF KAUMAN KIDUL, INDONESIA

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ABSTRACT

Community aquaculture initiatives often separate technical product diversification from local-government administration, cooperative management, and digital marketing. This study examines how fish-processing capabilities, collaborative public administration and enterprise information practices can be aligned to support organizational continuity. A qualitative case analysis was conducted using records of field observations, stakeholder-engagement activities, technical demonstrations and administrative interventions associated with a 2026 university–community programme in Kauman Kidul, Salatiga, Indonesia. Activities were categorized across fish handling, product diversification, cooperative coordination and digital enterprise support, then interpreted using collaborative governance and fish value-chain literature. The case identifies complementary technical and administrative activities, including biofloc-oriented aquaculture development, demonstrations of four processed-fish products, food-handling education, cooperative assessment and digital-information support. However, the available material does not establish sustained commercial production, product safety validation or long-term financial performance. We propose an integrated framework linking processing control points, institutional responsibility, enterprise records and periodic

review. The study contributes a sector-specific account of how public administration can coordinate value-chain development without substituting for technical food-safety responsibilities or cooperative decision-making.

KEYWORDS: Collaborative Governance; Community Enterprise; Digital Governance; Fish Processing; Public Administration; Value Chain Sustainability.

1. INTRODUCTION

Aquatic foods are increasingly positioned as central to food-system transformation and local livelihoods. Global fisheries and aquaculture production reached 223.2 million tonnes in 2022, comprising 185.4 million tonnes of aquatic animals and 37.8 million tonnes of algae (FAO, 2024). Yet the developmental contribution of an aquaculture initiative cannot be assessed from production volume alone. Its viability depends on what happens after harvest: raw-material handling, processing controls, product development, distribution, organizational responsibilities and the capacity of local actors to convert temporary assistance into routine management.

The processing stage is particularly consequential because fish is perishable and quality can deteriorate rapidly in the absence of appropriate handling and hygienic operations. The Codex Code of Practice for Fish and Fishery Products offers a technical reference for hazard-conscious handling, processing and distribution (FAO & WHO, 2021). Product diversification can expand market opportunities, but a demonstration of a recipe is not equivalent to a validated manufacturing process. Packaging, transport temperature, labelling, traceability and shelf-life determination need to be matched to the product and its intended distribution conditions. These requirements generate administrative work as well as technological work: somebody must authorize procedures, maintain records, verify compliance and respond when deviations occur.

Post-harvest loss is both a technical and a governance concern: avoidable deterioration reduces saleable yield, disrupts income forecasts, and transfers risks among producers, processors and retailers. Ahmed (2008) identifies the importance of assessing physical and quality losses before designing interventions; Sheng and Wang (2021) show why microbial contamination requires control strategies across handling and processing. Thus, institutional support for fish-product diversification should address documented process controls, not merely the number of product variants demonstrated.

From a public administration perspective, local economic empowerment is not simply the delivery of training or equipment. It concerns the organization of public value, coordination among institutions, and the durability of collective arrangements. Moore (1995) situates public management around public value, legitimacy and operational capacity, while Ansell and Gash (2008) stress the institutional design, trust, facilitative leadership and shared commitment underpinning collaborative governance. Emerson et al. (2012) similarly view collaboration as a dynamic interaction of principled engagement, shared motivation and capacity for joint action. These theories suggest that the technical success of fish processing may depend on decisions made outside the processing room.

The fisheries value-chain literature connects this concern directly to public governance. Wentink et al. (2017) demonstrate that collective upgrading requires well-defined interactions among producer groups, market actors and public institutions. Steenbergen et al. (2019) further show that governance along fisheries market chains is distributed among state authorities, commercial arrangements, multistakeholder institutions and social norms. These findings caution against assuming that the existence of a cooperative automatically creates integrated operational governance.

Digitalisation creates another interface. For local governments, websites and digital service channels can lower information barriers; for microenterprises, product catalogues and communication applications can increase visibility. However, digital tools cannot independently determine who owns an inventory record, validates food-handling conditions or bears commercial risk. An empirical study of Indonesian fish farming demonstrates that digital platforms reshape production practices through data and new forms of coordination, rather than functioning as neutral information channels (Kruk et al., 2025). A narrow focus on promotional websites may therefore obscure the managerial data and responsibility structures required for a functioning fish-processing enterprise.

Digital-era governance is not equivalent to publishing online information. Dunleavy et al. (2006) argue for the reintegration of fragmented services and administrative operations. In fisheries, Cromwell et al. (2025) identify traceability, transparency and recorded data exchange as key functions of digital supply-chain systems. For a nascent local fish-processing enterprise, simpler, properly maintained batch registers and order records may be more proportionate than expensive technology without reliable operators.

Kauman Kidul, Sidorejo District, Salatiga, offers a relevant setting for examining these institutional interfaces. During a university–community engagement programme held from 16 July to 19 August 2026, field activities addressed biofloc-based catfish potential, education

on fish freshness and hygienic processing, packaging and product costing, and practical demonstrations of ekado, fish balls, fish sticks and dim sum. Parallel activities concerned cooperative governance, public-service information systems, local business profiles and digital promotion. Together, these activities permit analysis of how technical upgrading and local institutional coordination intersect; they do not, by themselves, establish that an integrated commercial fish-processing operation was subsequently sustained.

This distinction reveals the research problem. Technical training may create product prototypes while cooperative assessment produces recommendations and digital training creates promotional materials; without shared operating rules, the contributions can remain disconnected. Furthermore, the local-government office is a public facilitator, whereas a cooperative is a membership-based economic organization. Their mandates should not be conflated. The scientific task is to explain how a public-administration framework can join the two domains without suggesting that the municipality directly operates processing, or that short-term output evidence proves long-term effectiveness.

This study asks: (1) which fish-processing, institutional and digital practices were identified in the Kauman Kidul field activities; (2) what coordination and accountability challenges arise at the interfaces between processing requirements, cooperative management and local public administration; and (3) which practical operating and monitoring arrangements could support business continuity? The objective is to develop an analytically grounded management framework rather than to estimate an intervention impact that has not been independently measured.

2. MATERIALS AND METHODS

2.1 Research design and case boundaries

An exploratory qualitative single-case design was employed to examine the 2026 community-based fisheries and institutional-development activities in Kelurahan Kauman Kidul, Salatiga. The analytical unit comprises interactions among fish-processing practices, cooperative management arrangements and local administrative and digital services. A case-study approach supports contextual analysis of the relationships among these functions; it does not alone provide evidence of causal effects or long-term business outcomes.

2.2 Data sources and evidentiary status

The empirical basis consisted of contemporaneous records generated during the community programme, including descriptions of field observations, stakeholder interactions, processing demonstrations, institutional-assessment activities and digital-administration initiatives. Field

activities involved visits to the aquaculture setting, engagement with cooperative and local-government stakeholders, and practical sessions with community participants. These records were used as qualitative case material to identify what activities took place and which operational relationships required further analysis. This manuscript is a secondary analysis of those recorded activities; the authors do not present previously unavailable interview transcripts, respondent-level survey datasets or independent laboratory measurements as if they were collected for the present analysis.

To distinguish observations from interpretations, reported activities and tangible outputs were treated as descriptive field evidence, while expected benefits and future impacts were treated as propositions requiring validation. Records of stakeholder interviews confirm that consultation was part of programme implementation, but do not establish the representativeness of respondents, systematic interview coding or verified participant-level change because original transcripts and standardized assessment results were not available for this analysis. Accordingly, no numerical learning gain, sales increase, microbiological safety outcome or enterprise survival rate is inferred from the recorded activities.

2.3 Coding and analytical framework

A qualitative thematic matrix was developed to connect each recorded activity with its processing or administrative function, potential contribution to enterprise continuity and verification requirements. Initial categories covered: (i) technical fish-processing controls; (ii) cooperative decision rights and asset management; (iii) public-administration coordination; (iv) digital service and enterprise information; and (v) economic, social and environmental continuity. These categories were compared with established public-administration and fisheries-processing literature to derive a proposed accountability and monitoring framework. The matrix is interpretive and is not presented as a respondent-frequency analysis.

2.4 Analytical safeguards and limitations

Analytical safeguards separated descriptive field findings, theoretical interpretation and prospective recommendations. The available case evidence did not include independently accessible respondent-level survey data, microbiological assays, temperature logs, validated shelf-life studies, audited enterprise turnover or post-programme follow-up results. Hence, no effect sizes, food-safety certification status, sustained profitability or quantified adoption rates are claimed. Future primary research would require a documented sampling strategy, instruments, research permissions and appropriate consent procedures before those outcomes could be reported.

3. RESULTS AND DISCUSSION

3.1 The observed intervention portfolio: technical, institutional and digital streams

The field activities reveal three complementary intervention streams. The first addressed catfish-based product diversification and hands-on technical processing education. The second examined governance arrangements surrounding biofloc-related cooperative enterprise development. The third strengthened digital public-service information and microenterprise promotion. Their coexistence offers a basis for analysing potential value-chain integration, but does not itself demonstrate an established commercial production system or durable coordination mechanism.

Field activity / intervention	Empirical basis	Descriptive finding	Further verification required
Four fish-product demonstrations: ekado, fish balls, fish sticks and dim sum	Recorded practical processing sessions	Training and demonstration topics/activities	Repeatable formulae, lot yields, microbiology and market uptake
Fish freshness, hygiene, sanitation, occupational safety, vacuum packaging and labels	Recorded technical education sessions	Educational coverage and documented sessions	Validated process controls, actual storage life and legal market compliance
Costing, branding, marketing and microenterprise digital profiles	Recorded enterprise-support and promotional activities	Business-capacity and promotional interventions	Product-level cost books, digital conversion and customer retention
Cooperative biofloc governance assessment and policy brief	Recorded site visit, stakeholder consultations and institutional assessment	Reported observation, stakeholder interviews, gap analysis and output transfer	Adoption of recommendations, actual managerial role allocation and cooperative financial performance
Village website, complaint links and service-information updates	Recorded digital service and local business-information activities	Reported administrative information system outputs	Measured usage, service-time improvements and direct linkage to enterprise production records

3.2 Fisheries processing as an administrative control problem

In a processing-centred interpretation, the training on fish freshness and handling is the entry point to raw-material acceptance control. A prospective cooperative-linked enterprise should define eligible species, supplier identity, reception time, visible quality criteria, temperature requirements appropriate to the product and disposition of rejected fish. These are not simply technical checklists: they create auditable decisions about procurement and responsibility for

preventing unsafe or commercially unacceptable raw material from moving into production. The Codex fish code provides a relevant technical basis for operational design, although the available case evidence does not show that those controls were installed or validated locally (FAO & WHO, 2021).

Product diversification likewise creates administrative complexity. Fish balls, fish sticks, dim sum and ekado have different formulations, preparation sequences, cooking conditions, exposure patterns and storage assumptions. A single generic packaging or shelf-life claim would be scientifically unsound. The governance implication is to require separate product specifications, batch identifiers, ingredient records, process monitoring, allergen information where relevant and evidence-based product storage instructions. Vacuum packaging was demonstrated in the programme, but vacuum sealing alone does not establish microbiological safety or authorize ambient storage. A prospective enterprise must validate the preservation system relevant to each formulation, using competent technical support.

Recording raw-fish mass, usable meat, product yield, defective units and by-products would link processing science to business administration. A processing yield ratio may be defined as saleable product mass divided by raw fish mass, with explicit measurement boundaries; unit cost would then include fish, ingredients, packaging, labour, utilities and distribution. The available field material does not provide validated quantities for these measures, so they are proposed as prospective accounting indicators rather than reported results. Such indicators would distinguish an effective demonstration from an economically repeatable production routine.

3.3 Collaborative governance: who should govern the fish-processing value chain?

The institutional arrangement involves differentiated actors: community producers, prospective processors and microenterprises, cooperative managers, kelurahan officials, relevant technical agencies and university facilitators. Public administration contributes by analysing their decision rights, resource dependencies and mechanisms of mutual accountability. Ansell and Gash (2008) identify power asymmetries, leadership and shared understanding as influential conditions of collaboration. In Kauman Kidul, the governance question is therefore not merely whether stakeholders participated in a KKN event, but whether a forum or set of operating arrangements can survive the departure of facilitators.

A suitable allocation distinguishes public coordination from commercial operations. Kelurahan officials may facilitate access to public information, convene stakeholders and support coordination within their authority; cooperative members and management should determine enterprise activities in accordance with applicable cooperative rules and internal

agreements; processing operators are responsible for day-to-day handling and records; technical regulators and competent agencies provide applicable food-safety guidance and oversight. No evidence provided establishes that a specific actor has formally accepted any of the proposed future responsibilities. The roles in Table 2 are therefore governance design recommendations, not a description of a signed arrangement.

Function	Proposed accountable role	Records/decisions needed	Primary governance issue
Biofloc harvest and raw-fish supply	Producer group/cooperative enterprise unit, subject to agreement	Harvest schedule, purchase/transfer record, acceptance check	Supply reliability and transfer accountability
Processing and food-safety controls	Designated processor/production manager	Product SOP, batch sheet, cleaning and corrective-action log	Operational duty of care
Shared equipment and working capital	Cooperative manager or contracted operator	Asset register, maintenance schedule, budget approval	Common-asset stewardship
Product pricing and market transactions	Enterprise manager/participating MSME	Cost sheet, price approval, orders and fulfilment	Commercial transparency
Local public information and convening	Kelurahan within its legal mandate	Information updates and coordination minutes	Public accountability without mandate confusion
Specialist extension and technical verification	Relevant competent agency/university partner	Training records and technical review reports	Knowledge transfer and independent validation

Emerson et al. (2012) offer a useful dynamic interpretation: a programme moves toward collective action when actors build shared motivation and operational capacity, not merely exchange documents. Under Ostrom's (2010) polycentric perspective, an effective arrangement need not centralise all decisions within a single agency. Instead, appropriately separated institutions can coordinate through agreed information, review procedures and accountability mechanisms. For Kauman Kidul this implies a light, specified governance compact: a designated coordination forum, a responsible enterprise operator, access rules for shared assets, standard reporting cycles, escalation routes for quality incidents and an explicit succession plan after university support ends.

3.4 From digital promotion to digital administrative continuity

The contrast between promotion and transaction governance is consequential for perishable products. Digital marketing can raise awareness and demand, but order-taking unconnected to stock, processing capacity or safe distribution can increase quality risks. Cromwell et al. (2025) discuss how traceability and shared information can support accountability across seafood supply chains; their review does not imply that blockchain or other advanced technologies are necessary for this community case. A controlled spreadsheet recording batches, incoming material, production dates, orders and complaints is a more defensible initial recommendation.

The local digital-administration activities primarily concerned public-facing services, including website information, access links, complaint channels, local mapping and microenterprise profiles. Their direct contribution to a fisheries enterprise remains contingent on whether responsible operators use corresponding procedures for procurement, production batches, inventory and sales reconciliation. A promotional website can improve product visibility without necessarily providing managers with evidence of profitability, product quality or reliable fulfilment.

We propose a minimum viable information system built from low-cost, locally maintainable tools rather than a bespoke platform. At the first level, a product catalogue stores verified product information and customer contacts. At the second, restricted spreadsheets or appropriately configured applications log raw fish, input lots, production batches, packaging, stock movement and transaction receipts. At the third, a monthly management dashboard summarises yield, rejected stock, fulfilment, gross margin, complaint resolution and maintenance. Access rights should separate public promotional content from commercially sensitive or personal records. This proposal is compatible with the finding of Kruk et al. (2025) that digitised aquaculture depends on practices for generating and maintaining usable data, not simply on application deployment.

For public administrators, this suggests a distinction between two types of information governance. Public-service information is maintained under public-sector accountabilities; enterprise information is managed by the responsible economic organization. A common portal may provide outward links without requiring the kelurahan to own confidential cooperative inventory or customer databases. This functional separation limits accountability confusion and helps avoid dependence on temporary student administrators. A documented handover—credentials, edit permissions, data ownership, backup arrangements, operator

training and an update calendar—should be treated as a programme deliverable rather than an informal afterthought.

3.5 Public value, inclusiveness and capacity building

The programme's intended contribution can be read through public value rather than solely private sales performance. Expected public benefits may include broader practical food-safety knowledge, improved access to local economic information, more transparent pathways for microenterprise participation and reduced barriers to collective coordination. However, Moore's (1995) framework requires a plausible link between valuable outcomes, institutional legitimacy and operational capacity. A programme that produces manuals and promotional pages but lacks durable operators may generate short-lived activity without sustained public value.

Participation also requires differentiated analysis. Community women's groups, fish growers, processors and younger digital intermediaries may face distinct constraints involving time, skills, equipment, working capital and authority. Community-oriented training activities took place, but participant-level outcome evidence was insufficient to evaluate distributional equity. A future assessment should therefore examine access to shared equipment, pricing decisions, payment distribution, remuneration and non-digital participation pathways. This would make claims about community empowerment empirically testable.

3.6 Sustainability across economic, technical, organizational and environmental dimensions

Post-harvest loss monitoring should complement conventional financial indicators. Ahmed (2008) explains the difficulties of reliably estimating loss in developing-country fisheries, while the governance-oriented market-chain scholarship shows that market coordination affects who captures value and who bears risk (Steenbergen et al., 2019). For Kauman Kidul, future evaluation should separately record raw-material weight, saleable finished-product weight, rejected batches, unsold stock and avoidable handling losses before attributing economic gains to the intervention.

Economic continuity requires realistic cost accounting and cash-flow discipline. Educational activities included production-cost calculation, but the available case evidence did not provide an audited profit-and-loss series. Future enterprise monitoring should therefore distinguish instruction in costing from actual unit economics and track procurement expenditure, processing yield, labour costs, packaging, rejected inventory, payment cycles and working-capital needs. Gross sales alone cannot demonstrate profitability in a perishable-product business.

Technical continuity depends on preventive controls, staff competency and verifiable product specifications. Product-specific storage validation and handling requirements must be assessed by qualified personnel; general references to hygiene, vacuum packaging or certification are not evidence of compliant products. Organizational continuity depends on clear appointment and rotation of operators, ownership of SOPs, allocation of cooperative assets, information succession and dispute-resolution arrangements. Environmental continuity can address fish offcuts and process water through lawful, hygienic waste management, including evaluation of by-product valorisation opportunities. The field activities addressed an educational demonstration of liquid organic fertilizer from waste, but does not contain validated nutrient composition, safety assessment or commercial utilisation data.

These dimensions may generate trade-offs. Increased processing variety can diversify market risks but complicate process validation, inventory management and training. Digital sales may expand demand but also lead to service failures when stock and cold-chain capacity lag. Centralised cooperative control may produce economies of scale but discourage participation if decision rights are not transparent. Therefore sustainability should be assessed as institutional capacity to recognise and manage such trade-offs, rather than a claim inferred from the number of project outputs.

3.7 Proposed integrated model and evaluation framework

The proposed model has five linked stages: (1) biofloc-based supply and raw-material acceptance; (2) product-specific processing and safety records; (3) cooperative decisions on shared resources, costing and responsibility; (4) digital visibility and traceable order administration; and (5) periodic joint review of technical, financial and social outcomes. Governance operates across the stages, not as an additional end-of-chain activity. The appropriate sequence is to assign a process owner and establish baseline records before introducing more sophisticated digital tools.

Evaluation domain	Suggested indicator	Collection method	Interpretation
Technical processing	Batch documentation completeness; rejects; process deviations	Batch log and periodic technical review	Evidence of process control, not automatic proof of safety
Enterprise economics	Saleable yield; unit contribution margin; stock loss	Mass balance and cost/transaction sheets	Tests commercial feasibility with defined accounting boundaries
Cooperative governance	Recorded decisions; asset use compliance;	Meeting minutes, asset logs and member	Measures organizational routines and

	dispute resolution	feedback	participation
Digital use	Product-page updates; order record completeness; backups	System logs and operator checklist	Measures active use rather than website existence
Social inclusion	Participation by role/group; distribution of paid opportunities	Consent-based participant and payment registers	Monitors potential distributional benefits
Long-term continuity	Active production cycles and accountable operators after KKN	Follow-up at 3, 6 and 12 months	Tests continuity rather than immediate training output

A prospective mixed-method evaluation could assess baseline status, completion of initial implementation, and follow-up at three, six and twelve months. Repeated observations should be triangulated with enterprise records, interviews with cooperative members, production personnel and public actors, and targeted technical checks. Where appropriate, independent laboratory assays and validated shelf-life studies should precede commercial safety claims. An explicit comparison between firms or products adopting the proposed controls and those retaining customary practices would strengthen causal inference, although selection bias and small samples would still need attention. None of these follow-up results is presently available; this is a proposed research design.

3.8 Theoretical contributions and limits of transferability

The interdisciplinary contribution is therefore not that public administration replaces food science. Rather, technical fish-processing requirements define the operational decisions for which an accountable organizational arrangement is needed. Conversely, governance without validated handling procedures cannot establish food quality. The proposed coupling mechanism specifies who authorizes, performs, records, reviews and corrects each step—an operational bridge between collaborative-governance theory and fisheries value-chain upgrading (Emerson et al., 2012; Wentink et al., 2017).

The case contributes to public administration by specifying what can be called a technical–administrative coupling problem: short-term community programmes generate separately useful capabilities, but performance depends on whether decisions, resources and documentation remain aligned across institutions. Fish-processing science clarifies what must be controlled within production; collaborative governance clarifies whose authority, incentives and accountability can maintain those controls. Digital governance is the information layer that makes the connection visible and reviewable. These domains reinforce one another only when responsibilities are assigned and evidence flows between them.

The model should not be generalized indiscriminately. The empirical setting is one Indonesian kelurahan with a finite university–community engagement period and an emerging community aquaculture value chain. Original respondent-level survey datasets and longitudinal enterprise measures were not available for this analysis. Cooperative regulations, infrastructure, market conditions and product-specific hazards may differ elsewhere. The contribution is therefore one of analytical transferability: other cases can test whether processing controls, institutional authority and operational information jointly explain implementation gaps.

4. CONCLUSION

The Kauman Kidul case involved complementary initiatives in catfish-based product diversification, food-handling education, cooperative governance, administrative digitalization and microenterprise promotion. Considered together, these activities illustrate a central challenge for sustainable fisheries enterprises: technical processing capability, public and cooperative decision-making and enterprise information systems require clear operational interfaces. The primary contribution of this study is a framework for assigning responsibilities, documenting process controls and periodically evaluating continuity, rather than an unverified claim that training alone generated sustained commercial or safety outcomes.

This study offers a phased, institutionally differentiated model that connects product-specific processing controls, cooperative business decisions and digital operational records while preserving the distinct mandate of kelurahan public administration. It expands public administration scholarship into an applied fish-processing context and provides measurable priorities for future evaluation. Since no validated food-safety outcomes, financial results or longitudinal evidence were available, the model should be treated as a research-informed proposition to be tested rather than a demonstrated success in enterprise sustainability.

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