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Cooperative-Facilitated Training and Perceived Production Gains among Smallholder Fish Farmers in Kubwa, Abuja, Nigeria

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Abstract

This study examined cooperative-facilitated training and perceived productivity gains among smallholder fish farmers in Kubwa, Bwari Area Council, Federal Capital Territory, Nigeria. Specifically, it explored reported training opportunities, perceived outcomes relating to technical skills, income, market information and collaboration, self-reported production changes, and barriers to training participation and implementation. A descriptive, cross-sectional questionnaire survey involving 100 purposively selected cooperative-affiliated fish farmers provided the basis for the analysis. The study used source-reported frequencies, percentages, and descriptive summaries from the project tables and accompanying results presentation. Findings indicated that respondents generally perceived training as beneficial: 77.2% agreed and 13.9% strongly agreed that training improved their fish-farming skills, while 59.4% agreed and 34.7% strongly agreed that it positively affected their income. Similarly, 71.3% agreed and 22.8% strongly agreed that training provided useful market information, while 59.4% agreed and 38.6% strongly agreed that it improved collaboration with other farmers. Respondents also reported increased confidence in handling farming challenges. Regarding production, the reported responses indicated perceived increases across different production-change categories, with 46.5% reporting a 25–50% increase and 39.6% reporting a 51–75% increase. However, inadequate training sessions, limited information about training opportunities, financial constraints, and perceived issues with training quality were identified as barriers. The findings suggest that cooperative training is valued by participating farmers, but its practical contribution depends on regular delivery, accessible communication, and farmers' capacity to apply the knowledge gained. Because respondent-level data were unavailable, some reported figures require reconciliation, and no independent production records or comparison group were provided, the findings cannot establish a causal effect of training on productivity or profitability. The study recommends predictable training schedules, practical demonstrations, post-training support, and improved monitoring of farm-level outcomes.

Keywords: *aquaculture; cooperative societies; fish farmers; perceived productivity gains; smallholder aquaculture; training; Kubwa, Nigeria.*

1. Introduction

Fish production depends on husbandry decisions made repeatedly throughout a production cycle: stocking rates, feed quality and quantity, water exchange, disease recognition, harvest timing, and sales. Errors in these decisions can raise costs or reduce survival even where a farmer has access to ponds, fingerlings, and feed. Training offers one route to better decisions, but knowledge gained during a workshop is not equivalent to a documented change in practice or output (Ajala et al..2017). That distinction is central to this study of fish farmers affiliated with cooperatives in Kubwa.

Cooperatives can coordinate specialist visits and demonstrations, circulate advice among members, and organize group responses to shared problems. Their ability to do so depends on governance, member participation, the relevance of trainers, and the resources members have to act on recommendations. A lesson on feed conversion, for example, has limited practical value where farmers cannot monitor feed inputs or purchase appropriate feed. Equally, members who receive training but little follow-up may not know how to adapt a recommendation to their ponds. The cooperative is therefore examined here as a potential channel for learning and coordination, not treated as an intervention whose effectiveness has already been established.

Kubwa, within the Bwari Area Council of Nigeria's Federal Capital Territory, provides a local setting in which to examine these issues. The underlying student project focused on fish farmers affiliated with cooperatives and considered their socioeconomic characteristics, the kinds of training available, and respondents' assessments of training-related outcomes. The accompanying results presentation reports favorable perceptions of training for skills, income, market information, collaboration, confidence, and production. It also identifies barriers associated with the availability and delivery of training.

The available materials consist of project summaries and tables rather than respondent-level records. Some percentages do not correspond cleanly to the stated sample of 100; an item reporting 79.2% male respondents, for example, cannot be converted to a whole-number count out of 100 without additional information. These discrepancies may reflect a different item denominator, missing responses or transcription errors, but the documents do not establish which explanation is correct. Results are therefore labelled as source-reported throughout. The article cannot estimate a training effect, compare members with non-members or calculate changes in physical productivity.

The analysis asks three linked questions: what training opportunities cooperative-affiliated farmers in Kubwa reported; what skills, commercial benefits and production changes they attributed to training; and what delivery or resource barriers might prevent knowledge from becoming established farm practice. It contributes a local account of perceived benefits while specifying what would need to be measured before stronger claims about productivity or profitability are warranted.

2. Conceptual and Theoretical Framing

2.1 Empirical literature on aquaculture training, information, efficiency, and constraints

Training, information access and production performance are separate empirical questions. In Lagos State, Awolumate and Omosola (2017) considered extension support for fish farmers, while Awolumate (2018a) examined the accessibility of information and communication technologies used in fish farming. These studies are relevant to the delivery of advice, not evidence that Kubwa cooperatives improved output. They frame a practical question for this study: do members receive information in a form and at a time that enables them to use it?

Awolumate's (2018b) work on aquaculture information sources in Akwa Ibom State and Awolumate and Inyang's (2019a) study of threats to fish-farming information-use efficiency further direct attention to the reliability, accessibility, and practical usability of information. For the present study, these works provide a relevant basis for examining how cooperative training is announced, delivered, and translated into farm-level practice. They do not, by themselves, demonstrate that cooperative training raises production; rather, they show why the information environment should be considered alongside training participation.

Economic performance studies by Awolumate and Inyang (2019b, 2019c) examined technical efficiency in aquaculture resource use and correlates of business decisions and profitability among selected fish farms. Their focus is relevant because knowledge and training are only part of the production system: profitability and efficiency also depend on resource allocation, farm management, and operating conditions. These studies support a broader performance framework, but the Kubwa source materials do not include comparable farm-level cost, revenue, yield, or efficiency data. Accordingly, the current article cannot claim that perceived training benefits are equivalent to verified efficiency or profitability gains.

Research on constraints across the aquaculture value chain adds an important counterweight to positive accounts of training. Awolumate and Inyang (2020a) examined constraints to value-addition investment in commercial aquaculture in Osun State, identifying issues including access to credit, processing facilities, operating costs, and power supply. Their related work on business operational profiles and managerial performance (Awolumate & Inyang, 2020b) broadens the emphasis from technical knowledge to business operations. Awolumate and Iniobong's study of risk factors associated with value addition (listed in the institutional profile as 2022, while a repository record dates it to 2021) also highlights capacity-building gaps alongside operating costs, institutional support, and water-quality concerns. Together, these studies caution that training alone may not overcome structural barriers to implementation.

Livelihood and fisheries studies provide additional context. Awolumate and Williams (2021) examined household vulnerability and livelihood diversification among fisherfolk in coastal Niger Delta communities. Awolumate (2022a) assessed constraints to artisanal fisheries productivity in Mbo Local Government Area, while Awolumate and colleagues (2022) studied profitability and challenges among smoked- and dried-fish marketers in Lagos State. Although these studies concern different populations and parts of the fish value chain, they reinforce the need to situate training and perceived production outcomes within wider livelihood, market, resource, and institutional conditions. They should be used as contextual evidence, not as direct tests of cooperative training among Kubwa fish farmers.

Mundi et al. (2024) discuss digital channels and communication constraints among fish farmers in Kogi State. Awolumate and Ashiedu (2026) report an analysis of cooperative-based institutional support and aquaculture performance in Lagos State. The latter directly concerns cooperative arrangements but covers a different population and research design; it cannot confirm the self-reported Kubwa production changes. Read together, these studies justify examining communication, institutional access and production outcomes as related but non-identical dimensions.

The literature therefore suggests three propositions relevant to interpreting the Kubwa results. First, extension and communication channels can support farmers' access to aquaculture knowledge, but access may be constrained by literacy, delivery reliability, and communication infrastructure (Awolumate, 2018a; Awolumate & Inyang, 2019a; Mundi et al., 2024). Second, perceived gains in skills or production should be interpreted alongside management, resource-use efficiency, finance, market access, and operating constraints (Awolumate & Inyang, 2019b, 2019c, 2020a, 2020b; Awolumate & Iniobong, 2022). Third, cooperative and extension support is a plausible mechanism for learning and coordination, but stronger data are needed to establish whether it produces measurable, sustained gains (Awolumate & Omosola, 2017; Awolumate & Ashiedu, 2026). This article contributes a cautious descriptive account of members' reported experiences in Kubwa rather than a causal evaluation.

2.2 Independent empirical and institutional literature

Evidence from outside Nigeria permits a more demanding test of the training argument. Ragasa et al. (2022) evaluated aquaculture training in Ghana using a cluster-randomized design and reported improvements in selected management practices and farm outcomes. The strength of that design lies in its comparison between treatment and control groups. The Kubwa study, by contrast, surveys cooperative-affiliated farmers at one point in time and asks them to assess effects retrospectively. The Ghana results show that improvement is possible under particular conditions; they do not establish that comparable effects occurred in Kubwa.

Mensah et al. (2022) examined ICT-based aquaculture extension in Ghana and found positive associations between advice access, management practices and performance, particularly where digital advice complemented extension-agent contact. This supports a practical distinction between sending information and supporting implementation. For cooperative societies, announcements, demonstrations and later consultations may serve different functions; their respective contribution cannot be measured from the Kubwa summary tables.

Nigerian adoption studies also show that access to information does not guarantee widespread implementation. Aphunu and Agwu (2014) reported low adoption of improved aquaculture management practices among cluster fish farmers in Delta State and identified fellow farmers as an important information source. Olaoye et al. (2016) examined the dynamics of improved aquaculture technology adoption in Lagos State. Olaoye et al. (2014; published online/indexed later) assessed the use of improved aquaculture management practices in Lagos, while Ipadeola, Ewebiyi, and Amoo (2018 issue; page record posted in 2023) examined adoption among fish farmers in Ogun State and recommended extension training and cooperative mobilisation. Taken together, these studies support a focus on knowledge transfer and farmer networks, but also show that adoption varies by practice and context.

Studies of barriers to technology adoption qualify any simple claim that training alone increases production. Nwachukwu and Onuegbu (2007) found low adoption of aquaculture technology in Imo State and reported that limited funds for pond maintenance, feed, and other inputs constrained implementation. Solomon and Inyang (2007) documented production, marketing, and technology-related constraints among fish farmers in the Niger Delta. Ogunremi and Olatunji (2019 issue; published online 2020) identified the cost of improved technologies, inadequate capital, unreliable power supply, and limited credit access as barriers in Rivers State. Fregene and Ojo (2012 issue; published online 2023) found that credit access was associated with technology adoption and reported the role of cooperative loans among fish farmers in Oyo State. These findings support the present manuscript's emphasis on finance and implementation conditions as complements to training.

Extension service quality and digital access have also been examined in Nigeria. Olaoye, Ezeani, and Onifade (2014

issue; published online 2021) reported an association between extension services and profitability among fish farmers in Ogun State. Oyetoro, Akinatro, and Akinboye (2023) documented the use of cyber-extension technologies among fish farmers in Osun State and identified technical know-how as an issue relevant to effective use. These studies support the importance of accessible, well-supported information services, but the different locations and designs mean they should be treated as comparative context rather than direct evidence about cooperative members in Kubwa.

At the sector level, the Food and Agriculture Organization's State of World Fisheries and Aquaculture 2024 frames capacity building, scientific research, technology dissemination, and sustainable practices as components of aquatic-food-system transformation. FAO's 2024 training guide for developing and implementing a National Plan of Action for Small-Scale Fisheries likewise emphasises participation and capacity development in small-scale fisheries governance. Although these are institutional sources rather than evaluations of cooperative fish-farmer training, they support the policy relevance of accessible learning systems and participatory institutions. Finally, Olagunju et al. (2025, in press) analyse scale efficiency, profitability, and production challenges in Nigeria's catfish aquaculture sector, highlighting the relevance of production costs and operational scale when interpreting business-performance claims.

Overall, the independent literature points to a balanced conclusion: technical training can improve adoption and performance when it is well designed and accompanied by extension, but finance, input costs, infrastructure, and farmers' ability to apply recommendations condition the result. The Kubwa study is consistent with this literature in reporting perceived learning and production gains alongside delivery barriers. It differs from the stronger impact-evaluation studies because it lacks a comparison group, verified production records, and respondent-level data for reanalysis. Its contribution is therefore descriptive and locally grounded, not a causal estimate.

2.3 Cooperative societies as learning and coordination institutions

In fisheries cooperatives, collective organisation can reduce the fixed cost of bringing a trainer to several farms, coordinate demonstration sites and create a setting in which members compare advice with everyday constraints. Yet cooperative membership is not itself a measure of the amount or quality of training received. The relevant unit of analysis is the member's actual exposure: who attended, how often, which topics were covered, whether demonstrations were conducted and whether the practice was subsequently used.

Cooperative leadership also affects who benefits. Notice given only at meetings may miss members who cannot attend regularly; fees and travel costs may disadvantage smaller producers. Training schedules that ignore feeding and harvesting routines can reduce participation. These are plausible mechanisms, not observed exclusion effects in the Kubwa data. They indicate why membership lists, training registers and attendance records would materially improve future evaluations.

2.4 Diffusion of Innovations theory

The source project adopts Diffusion of Innovations theory, associated with Rogers (2003), as its theoretical framework. The theory explains how knowledge about an innovation is communicated through channels over time within a social system. For this study, cooperative meetings and training sessions can be understood as communication channels through which fish farmers encounter new practices. Interactions among members may help farmers interpret recommendations, assess their relevance, and decide whether to try them.

The framework provides a plausible lens for interpreting reports of improved skills, confidence, collaboration, and application of techniques. It does not, however, prove that training produced these outcomes. Demonstrating adoption or productivity effects would require stronger evidence on exposure to training, timing, implementation, and measured outcomes, ideally with respondent-level data and an appropriate comparison or longitudinal design. In this article, the theory is used interpretively rather than as a hypothesis-testing model.

2.5 Analytical expectations

The article treats training as a potential enabling input and separates four related dimensions: (a) delivery and access, including frequency and communication; (b) perceived learning outcomes, including skills and confidence; (c) reported application and livelihood outcomes, including income and market information; and (d) perceived production change. Barriers are considered alongside favourable perceptions because positive evaluations can coexist with weaknesses in delivery. This structure avoids treating all self-reported outcomes as interchangeable evidence of productivity.

3. Materials and Methods

3.1 Study area and target population

The setting was Kubwa in Bwari Area Council, Federal Capital Territory, Nigeria. The source project identifies the population as fish farmers registered with fish-farming cooperatives and refers to a six-month study period. It does not supply a register of cooperatives, numbers of eligible members by cooperative or the precise interview dates.

These details must be confirmed from the original research records.

3.2 Study design and sampling

The source describes a descriptive, cross-sectional questionnaire survey of 100 purposively selected cooperative-affiliated fish farmers. The reported sample was influenced by cost and proximity. As a result, selection probabilities are unknown, and the findings cannot be treated as representative of all cooperative members in Kubwa or fish farmers across Abuja. No non-member comparison group was available.

3.3 Instruments and measures

The questionnaire included items on sex, age, educational attainment, marital status, years of fish-farming experience, duration of cooperative membership, and reasons for joining. Additional items covered training availability and frequency, perceived quality, consideration of members' educational backgrounds, training providers, training topics, perceived changes in skills and income, access to market information, collaboration, confidence, application of techniques, barriers to participation, and self-reported changes in production. Most attitudinal items used four response categories. The production-change item asked respondents to select a band: less than 25%, 25–50%, 51–75%, or more than 75%.

3.4 Data analysis and reporting approach

The manuscript draws on the source project's tabulated frequencies, percentages and Likert-item summaries. No raw records, questionnaire codebook, item denominators or reproducible model estimates were supplied for this editorial revision. We therefore retained identifiable reported values without recalculating or treating them as independently verified. Percentages, means and standard deviations must be checked against the original questionnaires and dataset; where an item has missing responses, its valid denominator must be stated. No regression, significance test or causal comparison is reported in this article.

4. Results

The findings in this section are drawn from the source project and its accompanying results presentation. Since the respondent-level dataset was unavailable and some table entries are internally inconsistent, the values should be regarded as provisional reported results rather than independently verified estimates.

4.1 Socioeconomic characteristics of respondents

The source describes respondents as predominantly male (79.2%) and mainly aged 36–45 years (47.5%). It reports secondary schooling for 59.4% and marriage for 67.3%. Farming experience and cooperative membership duration also varied. These are source-reported descriptive shares. Because some percentages have fractional components inconsistent with a complete sample of exactly 100 respondents, the underlying item counts and valid sample sizes must be verified before these values are presented as final estimates.

The source also reports that 67.3% of respondents were married, 29.7% single, and 3.0% widowed. For fish-farming experience, 42.6% reportedly had 1–5 years of experience, 26.7% less than one year, 19.8% 6–10 years, and 10.9% more than ten years. Cooperative membership duration was reported as 30.7% for 1–3 years, 26.7% for more than six years, 24.8% for 4–6 years, and 17.8% for less than one year. These distributions suggest a sample composed largely of working-age adults with varied experience and a substantial share reporting secondary education. However, because several figures do not reconcile cleanly with a sample of 100, they should not be interpreted as exact population proportions.

4.2 Reasons for joining cooperatives

Access to training was the most commonly reported reason for joining a cooperative (43.6%), followed by financial support (31.7%). The recorded proportion selecting networking differs between source summaries (15.8% and 16.8%). Until that item is reconciled, its ranking and share should not be used for substantive interpretation. The available evidence nevertheless indicates that respondents associated cooperative membership with both learning opportunities and access to resources.

4.3 Training availability, frequency, and content

The project reports that 43.6% of respondents said their cooperative often organised training sessions, while 8.9% said sessions were always organised; 41.6% selected rarely and 5.0% never. The reported training-frequency item lists monthly, quarterly, annually, and rarely as response options. The source table indicates that quarterly training was the most common response (52.5%), followed by rarely (26.7%), monthly (15.8%), and annually (4.0%). These responses point to variation in training regularity and suggest that access may not be consistent for all members.

Training topics identified in the project include modern fish-farming methods, feed formulation and nutrition, business and financial management, record keeping, fish breeding and hatchery management, pond construction and management, water-quality management and disease control, value addition, marketing skills, and integrated aquaculture techniques. The project's discussion suggests that technical production topics were more prominent than some integrated and value-addition topics. Because complete, reliable frequencies for every training topic are

not consistently available in the supplied results, this article does not rank all topics quantitatively.

The source table reports training quality as excellent for 30.7%, good for 41.6%, fair for 22.8%, and poor for 4.0%. This suggests that most respondents rated training positively, while a minority identified room for improvement. These values also require reconciliation with the stated sample size and original table.

4.4 Perceived learning, livelihood, and networking outcomes

The accompanying results presentation reports favourable perceptions across several training-related outcomes. Table 1 summarises selected figures exactly as reported in the narrative results. They should be treated as provisional because the respondent-level data are unavailable and some percentages do not reconcile with the stated sample size.

Reported item	Agree	Strongly agree	Reported mean (SD)
Training improved fish-farming skills	77.2%	13.9%	3.06 (0.468)
Training positively affected fish-farming income	59.4%	34.7%	3.30 (0.560)
Training provided useful market-access information	71.3%	22.8%	3.18 (0.500)
Training improved collaboration with other farmers	59.4%	38.6%	3.36 (0.523)
Training increased confidence in handling farming challenges	62.4%	32.7%	3.27 (0.548)
Respondent applied techniques learned in training	49.5%	31.7%	3.11 (0.727)

The reported pattern suggests that respondents generally perceived training as useful for skills, income-related confidence, market information, collaboration, and confidence in managing challenges. Collaboration received a reported mean of 3.36 (SD = 0.523), while the reported income item had a mean of 3.30 (SD = 0.560). These are descriptive self-reports; they do not establish that training alone increased income or that all respondents experienced the same benefit.

4.5 Perceived production change

The production-change item records perceived increases of less than 25%, 25–50%, 51–75%, and more than 75%, with reported shares of 1.0%, 46.5%, 39.6%, and 11.9%, respectively. These shares sum to 99.0%, and the respondent-level denominator is unspecified. More importantly, the question measures perceived percentage change rather than actual harvest quantity per pond, cycle, or unit of feed. Even if the reported categories are confirmed, they cannot establish technical productivity, nor can they isolate the effect of training from input use, farm scale, disease, or market conditions.

4.6 Reported barriers to training

The source identifies inadequate training sessions, limited information about them, financial constraints, and perceived issues with training quality as potential barriers. Reported means were 2.39 for inadequate sessions, 2.08 for limited information, 2.25 for financial constraints, and 2.16 for poor training quality; a further item labeled “others” had a mean of 2.20.

5. Discussion

5.1 Cooperatives as channels for practical knowledge

The finding that members valued training is plausible in an activity where feeding, water quality, and disease management require continual judgment. A cooperative can provide members with a common setting to hear advice and compare experiences, as envisaged by Diffusion of Innovations theory (Rogers, 2003). But the source does not record the sequence of specific training exposure, adoption of a named practice and measured harvest response. Cooperative learning is therefore a reasonable interpretation of reported skill gains, not a demonstrated causal pathway.

The high reported agreement on collaboration is also noteworthy. Cooperative arrangements can create repeated contact among farmers and opportunities to exchange practical experiences. Such interaction may help members compare approaches to feeding, disease prevention, pond management, or marketing. This potential should not be confused with proof that a formal peer-learning mechanism was implemented effectively: the source materials do not measure the frequency, content, or quality of peer-to-peer exchanges in sufficient detail.

5.2 Perceived income and production gains: useful signals, not causal estimates

Respondents’ favorable assessments of income and production should be read as judgments about the usefulness of training. Farm profits depend on feed and fingerling prices, survival, stocking density, market prices, costs of power and water, and the timing of sales. These variables are not controlled in the available summaries. The Ghana training trial (Ragasa et al., 2022) demonstrates that training outcomes can be evaluated with a comparison design; the present survey cannot deliver an equivalent estimate. It is more accurate to say that farmers associated training with better performance than that training increased productivity or profitability.

The categorical production measure has further limitations. It asks respondents to select a perceived percentage-change band but does not report baseline production volumes, the reference period in a way that can be independently verified, or supporting farm records. Respondents may interpret the question differently, and recall or attribution bias may affect their answers. Accordingly, the most defensible conclusion is that respondents reported perceived increases; the evidence does not quantify a verified training effect on yield or profitability.

5.3 Training frequency, communication, and implementation constraints

Reports of irregular sessions and inadequate notices point to operational weaknesses a cooperative can address directly. Annual training calendars, advance messages through multiple channels, and a named contact for technical questions are inexpensive organizational measures. Training topics should follow problems faced at production stages: pond preparation and stocking before a cycle, feeding and water quality during grow-out, and cost records and marketing before harvest. These are proposed practices; the source did not evaluate their effectiveness.

Financial constraints and training quality also matter. A training event may generate awareness without enabling adoption if farmers cannot afford the inputs or equipment needed to apply recommendations. Practical demonstrations, farm visits, follow-up mentoring, and low-cost action plans may bridge this gap more effectively than one-off lectures. Training quality should be assessed through clear indicators—such as relevance, practical content, trainer competence, clarity, opportunities for practice, and post-training support—rather than a single general rating.

5.4 Inclusion and responsiveness to farmers' circumstances

The reported respondent profile is predominantly male, but the available data do not establish whether women have equal access to training, leadership roles, or production resources. Cooperatives should monitor participation and outcomes by sex, age, educational background, farm scale, and years of experience. Such monitoring can help identify whether the timing, language, teaching methods, or training costs exclude particular members. Training tailored to participants' existing knowledge and literacy levels may also support practical comprehension and use.

5.5 Implications for theory and future research

Diffusion of Innovations helps explain why cooperative communication and peer discussion might encourage trials of new methods. The Kubwa evidence, however, does not measure the full sequence from awareness through implementation to confirmation. Future work should specify training attendance, the practice introduced, the date it was adopted, and changes in survival, harvest weight, feed conversion, operating costs, and net returns. Linking these records across cycles would enable assessment of what farmers actually changed, for whom, and under what financial constraints.

6. Practical and Policy Implications

i. Develop a predictable training calendar. Cooperatives should consult members and publish session dates in advance, with reminders via channels members commonly use.
ii. Prioritize practical, farm-level instruction. Demonstrations and guided practice should complement classroom-style sessions, especially for water-quality management, feeding, disease recognition, pond preparation, and record keeping.
iii. Provide post-training support. Follow-up visits, peer learning groups, and opportunities to discuss implementation problems can help convert information into practice.
iv. Strengthen partnerships. Cooperative leaders can work with public extension services, aquaculture research institutions, universities, and reputable private specialists to broaden technical coverage and improve trainer quality.
v. Address the application gap. Training should be linked to realistic input and equipment options, including affordable water-testing tools, record templates, and locally feasible production recommendations.
vi. Monitor inclusion and relevance. Attendance and feedback should be documented by sex, age, educational background, and farm characteristics, and training content should be adapted to members' needs.

7. Limitations

This analysis is restricted to purposively recruited cooperative-affiliated farmers in Kubwa. It lacks a non-member or untrained comparison group, baseline farm records, independent harvest measures, and verified expenditure data. The study is suitable as a transparent descriptive report only after the disputed numerical entries are reconciled.

8. Conclusion

Members of fish-farming cooperatives in Kubwa generally described training as useful for technical knowledge, confidence, access to information, and collaboration. They also reported perceived gains in income and production and identified barriers relating to scheduling, notice, affordability, and delivery. These accounts point to

practical opportunities for cooperatives to improve the organization and follow-up of training. They do not show that training caused higher output. A credible assessment of productivity would require training attendance records, practice adoption measures, and farm-level production and financial data collected over comparable cycles. The manuscript's defensible contribution is to describe members' assessments while making those evidentiary requirements explicit.

Declarations

Ethics approval and consent to participate: The ethical approval and participant consent were verbally sought and obtained from the respondents, who are all adult proprietors of their firms.

Consent for publication: Not applicable; no identifying participant information is presented.

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