

Qualitative Study on The Role of Aquaculture Extension Services to Increase Productivity and Innovation of Catfish Farmers in Salatiga City, Central Java

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Abstract

Anangnosi Kusmuntono, Tita Elfitasari* and Dicky Harwanto. 2022. Qualitative Study on The Role of Aquaculture Extension Services to Increase Productivity and Innovation of Catfish Farmers in Salatiga City, Central Java. Aquaculture extension services have a direct contact with fish farmers, therefore, have an important role to improve economy in the fish farming sector. The increasing number of catfish farmer in Salatiga City, makes the task of aquaculture extension services more difficult to assist fostered catfish farmer. The purpose of this study was to analyze the role of aquaculture extension services in supporting catfish farmers to increasing production and innovation. The method used in this research was qualitative approach through conducting interviews with aquaculture extension services as respondents and catfish farmer as informants. Observations was carried out in the field and data obtained were analyzed using triangulation method to validate data. The results obtained in this study are the role of aquaculture extension services to increased production by conducting regular visits and consulting related to aquaculture management problems experienced by farmers. The role of aquaculture extension service to spur innovation by facilitating training and mentoring to apply fisheries technology, facilitating farmers to get certified sangkuriang broodstock so they can increase seed production, facilitating farmers to get pellet machines and feed formulations training so they can produce independent feed, giving advice for farmers to selling their harvests and assisting fish processing groups to keep them running well. Based on these results, aquaculture extension services has several priorities, there are aquaculture management, technology application, market expansion and diversification of fishery products, while the application of Good Aquaculture Practices, independent seed production and independent feed production has not become a priority.

Keywords: Catfish, Counseling, Extension Service, Farmer, Mentoring

Introduction

Extension services have direct contact with the farmers. The main target of extension activities is the fishermen, fish farmers, processors of fishery products, and other communities who are engaged in fisheries (Ministry of State Apparatus Utilization, 2008). Extension activities do not stop only in

disseminating information and providing explanations, but counseling is also a process that is carried out continuously and takes a long time to bring about behavioral changes (Safrida *et al.*, 2015). Characteristics of farmers in general that they really need the role of extension services to be able to develop their aquaculture business to be better (Mardikanto, 2009).

There needs to be intensive and continuous extension activities to be able to change the attitude of farmers (Mustaqim and Nuraini, 2019).

According to Central Bureau of Statistics Salatiga (2019), the number of catfish farmers in Salatiga City is 799 farmers, while the number of aquaculture extension services in Salatiga is only nine people. This means that one extension service must accompany about 88 farmers. Fikri *et al.*(2017) stated that problems on extension services are time constraints and small number of extension services compared to very large number of farmers. Moreover from Nurdin and Effendi (2020), aquaculture extension services have to accompany a lot of farmers so that not all of them can feel the benefits of the extension workers. This is a difficult task for extension services to be able to assist every catfish farmer. Haryadi *et al.* (2014) also stated that the majority of farmers consider a good extension services is the one who has the ability to understanding in the field well and can solve aquaculture problems based on experience that has been done.

Based on Suprihartini and Kurniawan (2018), the importance role of extension workers is very large in bringing changes in the pattern of producing fish products and increasing the number of fish sales. Pro-active relationships between extension services and catfish farmers must be established so that the objectives of extension activities can be achieved. According to Lita and Zaidy (2016), competence of extension services is the main factor that affect how their performance to be

able to work with farmers. Farmers nowadays are more flexible in accessing information to develop businesses and find solutions for their problems, but the role of extension services is still needed, especially not all farmers can find the right information as a solution for their problems. Nurmalia *et al.* (2013) also stated that the existence of extension services is still very expected by farmer and they must ready to respond for farmers problems and try to develop farmers business, so that the existence of extension services has meaning for the farmers.

Materials and Methods

This research is descriptive qualitative research that includes the determination of respondents, data collection techniques, data analysis techniques, and data validity techniques (Nilamsari, 2014). The data collected in this study are the results from observations, interviews, and image documentation and then to be processed into the form of words or verbatim (Gill *et al*, 2008). The main focus in qualitative research is at the interview stage where the largest source of information is obtained from in-depth interviews with the respondents (Bachri, 2010). The selection of respondents in this study used a purposive method by determining respondents who had the appropriate criteria and were needed for this research. According to Sugiyono (2008), purposive is a method of determining respondents based on predetermined criteria. Furthermore, Silvana and Darmawan (2018) mentioned that selection of respondents by purposive method means that respondents are people who can provide as

much information as possible relating to research problems and objectives.

Respondents in this study were four aquaculture extension services as a subject respondents representing four sub-districts in Salatiga City and six catfish farmers built by aquaculture extension services as informants who had at least three years of farming experience, have attended training and they can explain how the role of their extension services. The research was carried out in March until August 2021 in Salatiga City, Central Java. The demographics of the respondents and informants are shown in the table below.

Table 1. The Demographics of the Respondents.

Name	Education	Job	Working Area	Work Experience
Sudarsono, S.P.	Bachelor	Aquaculture Extension Services Coordinator	Argomulyo and Tingkir Sub Districts	25-30 years
RR. Wahyu Sri Rahayu, S.Pi.	Bachelor	Aquaculture Extension Services	Sidorejo and Sidomukti Sub Districts	10-15 years
Yeniarsih Dwi Astuti, S.Pi.	Bachelor	Aquaculture Extension Services	Argomulyo and Tingkir Sub Districts	10-15 years
Asmi Hanik Khumairoh, S.Pi.	Bachelor	Aquaculture Extension Services	Sidorejo and Tingkir Sub Districts	10-15 years

Table 2. The Demographics of the Informants.

Name	Education	Job	Working Area	Work Experience
Nur Achmad	Senior High School	Catfish Seeders	Tingkir Sub Districts	5-10 years
Nanang Haryono	Senior High School	Catfish Farmers	Argomulyo Sub Districts	1-5 years
Amin Fauzi	Senior High School	Catfish Seeders	Tingkir Sub Districts	5-10 years
Udi Subagio	Senior High School	Catfish Seeders	Sidomukti Sub Districts	10-15 years
Tri Joewanto	Senior High School	Catfish Farmers	Sidorejo Sub Districts	15-20 years
Nuh Efendi	Senior High School	Catfish Farmers	Sidorejo Sub Districts	5-10 years

According to Campbell *et al.* (2020), the selection of respondents with a relatively small number can be done to increase understanding related to problems so the information provided can be in-depth and effective. Further more, Miles and Huberman (1994) stated that the data obtained from the interview was considered sufficient if the information obtained was saturated and there was no new information provided by respondents.

The interviews with respondents and informants were carried out directly and recorded by a smartphone camera. The data collected in qualitative research is in the form of transcripts of interviews (verbatim) and observations are in the form of pictures,

documents, and social media activities of extension services. Based on Hadi (2016), the important thing about the qualitative research process is the validity and reliability of the data. The triangulation method was used to analyze and strengthen the data, so the data source can be validated. Triangulation data is carried out by analyzing data obtained from interviews with respondents and compared with the results of interviews with informants, field observations, and existing theory (Moleong, 2014).

Results

Extension Service Competence and Method of Counseling

The aquaculture extension services in Salatiga have a fishery education background from various universities and have the competence in conducting counseling of aquaculture and fishery processing. They also took a competency test of aquaculture and fishery processing. The counseling method was done by discussions, socialization, training, materials presentation, and consultations directly or through social media, especially in this pandemic situation. The Covid-19 pandemic has limited social activities so that consultations are carried out through WhatsApp social media.

The Role of Aquaculture Extension Services to Increasing Productivity of Catfish Farmers

Good Aquaculture Practices in Salatiga is still difficult to implement because many farmers are still using alternative feeds that are not suitable to Good Aquaculture Practices procedures, but extension services have done

their role to introduce Good Aquaculture Practices by providing socialization and training for fostered farmers. The extension services suggested that the use of alternative feed should be processed first before being given to the fish. For the management of catfish culture, the extension services provide counseling and assistance related to catfish culture management and provide several suggestions for management to be better and help provide solutions related to problems experienced by the catfish farmers. Disease management is one of the most frequently asked by farmers.

The Role of Aquaculture Extension Services to Spur Innovation of Catfish Farmers

The aquaculture extension services have provided counseling related to fisheries technology for fostered catfish farmers and the delivery of material and application of the technology must pay attention to the needs and conditions of farmers. For fish seed production, the aquaculture extension services focus on the catfish seeders, so they assist by helping them to get certified Sangkuriang catfish broodstock to increase hatchery production. For fish feed production in Salatiga was still constrained by raw materials that are difficult to obtain and it suggested using alternative feeds instead of pellet feed. The results of independent pellet feed production were not as good as factory pellet feed, and it can be only consumed by the big catfish. The farmers prefer to use alternative feed for the big fish because they are cheaper and easier to give to the fish. For market expansion and product, diversification indicates that extension services have conducted

counseling, assistance, and training related to market expansion and product diversification for farmers and fishery processing groups. The extension services helped provide information regarding catfish sellers as well as selling the harvest in retail and online due to the higher selling price.

Discussion

Kumaran *et al.* (2012) stated that knowledge of extension services must be improved considering their important role. They have to require sufficient knowledge and experience in their fields to be able to influence changes in behavior, attitudes, and habits of catfish farmers (Amanah, 2008). The application and selection of counseling methods are also related to competencies (Haryadi *et al.* 2014). Aquaculture extension services in Salatiga conduct counseling by regular visits, discussions, socialization, materials presentation, consultations directly or through social media, especially in this pandemic situation. According to Putri *et al.* (2019), the counseling method is carried out in various creative ways according to the conditions of the counseling target. Based on Wang *et al.* (2020), consultation is one of the most important roles carried out by extension services. All informants stated that the extension services performance was very good and cared about farmers' problems. The Covid-19 pandemic has disrupted the counseling method because of social activities restrictions.

The farmers expects that counseling activities can return to normal because when the consultation was carried out through social media, they felt that it was less effective. The counseling method is shown in the image below.



Figure.a). Discussing with Farmers by Respondent, b). Regular Visit to Farmers by Respondent, c). Material Brochure for Farmers and d). Consultation via Whatsapp Group

Based on Lee *et al.* (2019), Good Aquaculture Practices has an important role in increasing productivity. The application of Good Aquaculture Practices has not become a priority to be applied in Salatiga because many farmers use the alternative feeds and they are unable to meet the feed standards in Indonesian National Standard. The farmers prefer to use alternative feeds because they are cheaper and easier to

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give for the big fish, but the negative impact will increasingly pollute the environment. Coal *et al.* (2019) mentioned that good aquaculture practices are aimed at implementing sustainable aquaculture in environmental and production management. Aquaculture extension services focus on the aquaculture management to be better so the production can increase. According to Tucker and Hargreaves (2009), good aquaculture management is carried out to increase production quantity. Based on Cuchurousset *et al.* (2017), several problems have occurred due to poor management. Moreover, Muhammad and Andriyanto (2013) stated that extension services need to help farmers to implement good aquaculture management. Disease management is one of the most frequently asked by farmers. More explanation from Yuhanna and Yulistiana (2017), the obstacle often experienced by farmers is the low survival rate of fish due to disease. Informants stated that extension services are ready to help provide solutions related to disease management by giving free medicine and they also serve consultations through social media such as Whatsapp. Training on aquaculture management has been conduct several times and shown by image below.



(a)

(b)

Figure a). Fish Health Management Training and b). Catfish Culture Training.

Technology utilization, market expansion and diversification become the priority for extension services to be able to implement for farmers. According to Bostock (2010), a lot of production increases occur by applying new technology that can increase production to be more effective. Moreover Bush *et al.* (2021) stated that aquaculture innovation was developed to be a solution to the negative impact of aquaculture. The delivery of lessons and application of fishery technology must pay attention to the needs and readiness of the farmers. Some farmers have attended training on fishery technology, but not all of them apply it because the technology is not easy to implement and requires regular assistance from extension services, so they should accompany farmers to be able to apply the technology. According to Ovharhe (2016), training on fishery technology is important considering that the adoption of this technology is not easy for farmers without the help of competent experts. Aquaculture extension services also helped farmers to expand their market network by facilitating farmers to catfish collectors. Based on Swaputra *et al.* (2014), selling catfish is still very dependent on the collectors where the price is not high as the price from market. So, the extension services give advise for farmers to sell their harvest products via online through several social media platform, but also the farmers already have their selling targets. According to Bjørndal *et al.* (2016), the tendency of people to

consume fish products affects the development of the fish processing industry. So, the extension services have been provide some training related to market expansion and diversification. Furthermore, Searles *et al.* (2018) stated that fish processing is one way to increase the value of fish products. Extension services continue to assist fish processing groups so that they can continue to run well. Based on FAO (2017), the online market is currently very open for anyone who wants to do marketing. Widhiastika *et al.* (2021) stated that selling products through online is one of the best solutions due to pandemic because of changing marketing patterns and consumer needs, so the fishery products could be sold optimally. The training of market expansion, diversification and fisheries processing group is shown by image below.



Figure a). Fish Processing Groups with Extension Services, b). Fish Diversification Training and c). Market Expansion Training.

Fish seed production and fish feed production become the non priority for extension services. Training on catfish hatchery

had been held, but not all farmers tried to breed catfish independently because they had focused on enlargement catfish for several years. So, the extension services did not targeting the enlargement farmers to be able to produce catfish seed and they focus on catfish seeders to get assistance of certified Sangkuriang catfish broodstock as a stimulant. According to Dewi and Tahapari (2017), increasing catfish seed production can be achieved by using superior broodstock resulting. Furthermore, Shafrudin *et al.* (2019) stated that Sangkuriang catfish has several advantages, being able to live in a fairly high stocking density, being resistant to disease, and growing faster. For fish feed production in Salatiga is still difficult to do because raw materials are difficult to obtain and it suggested using alternative feeds because it's cheaper and easier to give for the fish, especially for big fish. According to Fauzi and Sari (2018), one of the obstacles in making feed is a source of protein with the fish meal as raw material whose availability often fluctuates. Furthermore, Adéyèmi *et al.* (2020), mentioned that farmers prefer to choose to use artificial feeds or cheap alternative feeds to reduce production costs. Meanwhile, training on feed production and formulation has been held and pellet machine has been given to farmers, but only a few farmers are still running in feed production. The feed produced by the machine can only be consumed by the big fish and the quality is not good as the factory-made pellet. According to

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Pamungkas *et al.* (2018), fish feed production is formulated appropriately according to the needs of the fish. Moreover, Okolie *et al.* (2019), stated that the manufacture of feed is very dependent on the design and type of machine used.



Figure a). Simple Pellet Machine, b). Result of Pellet Machine and c). Sangkuriang Catfish Broodstock Assistance to Farmers.

Based on these results, the aquaculture extension services has done their job to guiding farmers to increase productivity by conducting regular visits and consulting related to aquaculture management problems experienced by farmers and spur innovation by facilitating training and mentoring to apply fisheries technology, facilitating farmers to get certified sangkuriang broodstock so they can increase seed production, facilitating farmers to get pellet machines and feed formulations training so they can produce independent feed, giving advice for farmers to selling their harvests and assisting fish processing groups to keep them running well, but they have several priorities, there are aquaculture management, technology

application, market expansion and diversification of fishery products, while the application of Good Aquaculture Practices, independent seed production and independent feed production has not become a priority to be applied for farmers.

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Table 1. Interview Results of Competence and Method of Counseling

Subject	Extension Service Competence	Method of Counseling
Respondent 1	One non-permanent extension service comes from Fisheries Business Capital Management Institutions who is tasked with assisting farmers in terms of funding.	The counseling methods carried out were discussions, lectures, radio broadcasts, field trips, and direct practice. During the Covid-19 pandemic, counseling and consultations were carried out online via Whatsapp groups.
Respondent 2	The aquaculture extension services have taken a competency test in the field of aquaculture and fisheries processing.	The counseling method was regular meetings and visits to farmers. During the Covid-19 pandemic, regular visits are limited.
Respondent 3	The aquaculture extension services are from university graduates and they have conducted competency tests in the fields of aquaculture and fishery processing.	The counseling method is carried out through giving booklets, posters, group meetings, and consultations. The Covid-19 pandemic has limited the counseling so that communication through social media is maximized.
Respondent 4	The aquaculture extension services is a university graduate and have taken a competency test. The extension services must continue to learn and follow the development of the science of fisheries.	Respondents conducted counseling with regular visits to aquaculture groups as well as outside the group. The Covid-19 pandemic has limited the intensity of group gatherings.
Informant 1	The extension services were good in assisting and helping to solve problems. The informants hope that the extension services will always accompany the farmers.	The informant stated that he had received training on ornamental fish, aquascape, and making fish pellets. Informants hope that the training will be more varied so that farmers can choose according to their needs.
Informant 2	The extension services were good at counseling and helping to solve problems. Informants hope for extension services to be faster in responding to their problems.	The informant stated that he had received material explanation related to making alternative feed from maggot, fish pellets and being taught in medication and probiotics.
Informant 3	The extension services were good but hoped to improve the response to be more responsive in helping farmers.	Informants hope that training is held not only in theory but also in practice. The instructor gave direct explanations when there were regular group meetings.
Informant 4	Informants expect extension services to be able to work optimally as before the Covid-19 pandemic. The pandemic caused the intensity of meetings to be less and mentoring activities to be less effective.	The extension worker provided material during routine meetings related to good aquaculture practices, water preparation, disease prevention, and others. Informants hope that there will always be technology training so farmers can get maximum results.
Informant 5	The informant stated that the aquaculture extension services were good at assisting farmers.	The informant stated that he had received training and explanation regarding the percentage of feed, disease control, and the use of probiotics. Informants hoped that the extension workers would often visit the farmers.

Informant 6	According to the informant, the performance of the aquaculture extension services has been good. The informants hope that the extension services will often provide suggestions so that they can develop.	Informants stated that they had received material explanations regarding enlargement and hatchery. Informants hope to be given information about the training that will be held.
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Table 2. Interview Results on The Role of Aquaculture Extension Service in Increasing Production

Subject	Good Aquaculture Practices	Aquaculture Management
Respondent 1	Respondents suggested farmers who use alternative feeds be processed first and were advised to continue using pellets. Good aquaculture practices training and certification have been conducted in Salatiga.	Respondents helped problems faced by farmers related to fish disease and feed. They suggested that the use of alternative feeds should not be excessive and in the treatment of fish diseases, it is recommended to use natural ingredients.
Respondent 2	Respondents conducted good aquaculture practices socialization to farmers but it is still difficult to apply for farmers because of the alternative feeds they used. The feed has a low price so that it increases profits.	Respondents taught farmers to keep records in each cycle of aquaculture and advised on water management to prevent the disease from occurring. Respondents are ready to help farmers by directly coming to the location for a consultation.
Respondent 3	Good aquaculture practices are still difficult to implement in Salatiga because of farmers that need alternative feeds for their high feed requirements.	Respondents advised farmers to learn to understand fish by making notes on the behavior and treatment given to fish. Respondent ready to assist related fish diseases.
Respondent 4	The implementation of good aquaculture practices is constrained by the use of alternative feeds. Alternative feeds are widely used by farmers because they are cheap and easy to obtain.	Respondents provide assistance and consultation related to problems experienced by farmers and gave several suggestions related to feed management such as the percentage and amount of feed given and disease management by observing the behavior of the fish.
Informant 1	There was no explanation from the informant regarding the indicator.	The informants stated that by applying the advice on culture management, fish production can increase.
Informant 2	There was no explanation from the informant regarding the indicator.	Informants received assistance related to fish diseases and received free medicine. By implementing the advice on disease and water management, the survival rate of fish increased by about 70%.
Informant 3	There was no explanation from the informant regarding the indicator.	The informant stated that by implementing the advice on water and disease management, the hatchery production yield could increase to 100 thousand spawns per brood.
Informant 4	The informant stated that the extension worker had already provided socialization about CBIB during routine group meetings.	The informant stated that applying the advice on the use of certified broodstock, feed and disease management, could increase the yield of seed production to 90 thousand seeds per 1 brood.
Informant 5	There was no explanation from the informant regarding the indicator.	The informant stated that applying the advice on feed and disease management could

		increase the yield of catfish harvest from the usual 1 ton per pond to 1 ton 2.5 quintals per pond due to the better survival rate.
Informant 6	There was no explanation from the informant regarding the indicator.	The informant stated that there was no significant increase in production if the fund owned was limited, so there was a need for guidance from extension services regarding fund assistance.

Table 3. Interview Results on The Role of Aquaculture Extension Services to Spur Innovation

Subject	Technology Utilization	Fish Seed Production	Fish Feed Production	Diversification and Market Expansion
Respondent 1	During the Covid-19 pandemic, the price of ornamental fish increased so that farmers were directed to try ornamental fish.	Respondents encourage and recommend farmer groups to have a hatchery unit that can meet the needs of their group.	Fish feed production is still constrained by raw materials that are difficult to obtain. It suggested using alternative feeds. There had been assistance for farmers such as pellet machines.	Respondents helped expand the market by giving some information about catfish collectors. There were already several fish processing groups running in Salatiga.
Respondent 2	Respondents socialize the technology recommended by the KKP to farmers. The delivery of lessons adapts to the needs and conditions of farmers.	Extension services assist in the form of certified broodstock to breeders, conduct regular training and counseling to farmers during routine meetings.	There were already groups that tried to produce fish feed but were constrained by raw materials.	Respondents helped find catfish collectors and advised farmers to retail because of the higher selling price. They assist fishery processing groups and provide suggestions for online selling to consumers.
Respondent 3	Respondents socialize the technology recommended by the KKP and assist farmers to apply the technology. The delivery lesson and application must adapt to the conditions of farmers and understand what technology can be applied.	Respondents provide mentoring, training, and assistance in the form of certified broodstock to seeders. In selecting a good broodstock, they must know the origin of the catfish broodstock so the assistance of certified broodstock can help increase seed production.	Respondents assist groups that produce feed and assist in finding suitable feed formulations for fish. The fish feed production is not as good as factory production, but at least it can meet the needs of the group.	Respondents suggested cultivators sell through social media in retail because of the higher selling price. Fishery processing requires extra energy, but it can increase the selling value of the product.
Respondent 4	Respondents provide counseling and assistance in applying technology. The technology adapts to	Respondents stated that there had been training on catfish hatchery. Respondents conducted socialization with	Respondents helped farmers get assistance with pellet machines and provided assistance who were still in the	Respondents facilitate farmer groups to cooperate with catfish collectors so that the harvested products from

	the conditions of the cultivators.	seeders about hatchery technology such as stimulating hormones and intensive hatchery.	production of fish feed. The results of feed production were not as good as factory feed because the tools used were still simple.	the group can be sold smoothly. Respondents also suggested to start selling online and try fishery processing.
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Continuation Table 3. Interview Results on The Role of Aquaculture Extension Services to Spur Innovation

Informant 1	The informant stated that he had attended training on ornamental fish farming and aquascape. Informants hope that there would be more fishery technology training.	The informant stated that he had received assistance from the Sangkuriang type broodstock from the fisheries service.	The informant stated that he had received training in making feed and feed formulation but it had not been done because of the difficulty of raw materials.	There is no explanation from the informant regarding the indicator
Informant 2	The extension services provided socialization about probiotics and taught them to use them thoroughly. By applying probiotics, water quality can be maintained well and reduce fish mortality.	The informant stated that he had received assistance in the form of a tarpaulin pond, catfish seeds, and Sangkuriang mother.	The informant stated that he had attended training on the manufacture of fish feed.	The extension services advised to try processing catfish and then selling it online.
Informant 3	The technology applied such as aerators, paragnet for attaching fish eggs was done by self-taught, but the extension services gave suggestions regarding the use of probiotics to improve water quality.	The informant stated that he had received the material for broodstock maintenance and basic hatchery.	There was no explanation from the informant.	The extension services had helped promote catfish seeds through social media.
Informant 4	Informants received counseling about the water circulation system from tilapia to catfish ponds and stated that the results obtained were better. Informants hope for extension services to provide training with new and practical technology.	Informants received assistance in the form of certified Sangkuriang brooders and more and better seeds produced.	The extension services provided information regarding alternative feeds in the form of Azolla and according to the informants, the feed was good for seeds.	The extension services had helped related to the market but it was not optimal. They hope that extension services can help with seed sales by finding consumers and setting a standard price for the seeds.
Informant 5	The extension services advised on the use of probiotics and the results obtained were better.	The informant stated that hatchery and enlargement training had been held.	There was no explanation from the informant.	There was no explanation from the informant.
Informant 6	The informant stated that he had been taught about the manufacture of probiotics to maintain water quality.	The informant stated that he had received training in seedling but had not practiced it further.	There was no explanation from the informant.	The extension service had provided information on catfish collectors.