

INDEPENDENT PELLET FEED PRODUCTION SKILLS IN IMPROVING THE INCOME OF FRESHWATER FISH FARMERS IN KLABAT VILLAGE, DIMEMBE DISTRICT, NORTH MINAHASA REGENCY**Moze M. Wullur¹⁾, Marien Pinontoan²⁾, Norry Wullur³⁾**mozeswullur@unima.ac.id¹⁾, marienpinontoan@unima.ac.id²⁾, wullurnorry@yahoo.com³⁾

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Abstract

Livelihood education for the community is considered strategic in facing the demands of increasingly competitive changes in society's civilization, including the ability of farmers in the business of making freshwater fish feed in the form of pellets independently. This study aims to analyze and describe the motivation, process and results of independent learning of farmers in producing freshwater fish feed pellets at the research location. This study uses a naturalistic qualitative approach with observation techniques, in-depth interviews and documentation of informants 4 farmers, 2 fisheries extension officers, 4 collectors/retailers of freshwater fish production, village heads and 1 community leader which was carried out for 4 months, the results obtained; 1. The motivation for independent learning of farmers in learning to make freshwater fish feed pellets includes; a. curiosity to learn how to make carp, tilapia and mujair feed pellets, b. accelerating the fish growth process, c. increasing fish harvest production and d. increasing farmer business income. 2. The independent learning process for making freshwater fish feed pellets includes; learning through YouTube videos, b. Observing the pellet making process at the Freshwater Fish Cultivation Center in Tatelu Village, Dimembe District, North Minahasa Regency, c. Seeing friends making freshwater fish feed pellets, d. Reading books on freshwater fish feed pellet making techniques and e. Group learning. 3. The results of independent learning to make freshwater fish feed pellets are; a. the acquisition of knowledge, experience and insight as well as farmer skills to make freshwater fish feed pellets independently in togetherness. b. The existence of farmers who are ready to be a source of learning for other farmers, c. There is an acceleration of maintenance time and increased harvest production of carp and tilapia cultivation from the aspect of fish weight and farmer income as informants. d. An independent freshwater fish feed pellet production farmer group has been formed at the research location. It is recommended for farmers to continue to develop towards independent production marketing in the form of farmer groups. For the relevant government to support the production of freshwater fish feed pellets. 3. The university, especially UNIMA, should continue to provide assistance in the form of fostered villages through fostered groups of freshwater fish farming farmers at the research location.

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Fish feed, pellets, farmers, fish farming

INTRODUCTION

Livelihood education for the community is seen as strategic in facing the demands of increasingly competitive changes in society's civilization. It is said so because the educational practices carried out in elementary and secondary school educational institutions prioritize laying the foundation of children's knowledge and insight into the formation and development of academic abilities and entrepreneurial insight for students in vocational schools facing the world of work and industry. The number of graduates in all types and levels of education is perceived by most of the community as ending up as State Civil Apparatus (ASN) which with the limited ASN quota causes an increase in the number of national unemployment rates. This condition has resulted in concerns about the problem of low competitiveness of national education because the curriculum design is likened to being in the position of a car hitch, and not in the position of the front bumper of the car, so that the curriculum is ready to be changed by change and the curriculum is not in a position to plan change. Therefore, the curriculum is expected to continue to be revitalized periodically according to the development of increasingly

accelerated changes. It is said so because "The curriculum is one of the tools to achieve educational goals, as well as a guideline in implementing the teaching process at all types and levels of education. The curriculum is based on and reflects the philosophy as a nation's outlook on life, where and how the nation's life will be in the future." Pinontoan, M., 2023; 1. This problem has no other choice to find a solution to prepare educational programs to face the globalization of education and the industrial revolution 4.0 within the framework of presenting a new paradigm modern education through the Livelihood Education (PMP) program in all types and levels of education (Wullur, 2021:3). This program is in line with the view that:

"... facing education in the industrial world 4.0, among others: (1). Preparing a quality golden generation of Indonesia, so that they become competent human resources, able to think innovatively, and optimally master the field of science and apply it in the world of work; 2). Improving the quality of life of the Indonesian people; (3). Contributing to; and (4). Being able to answer the challenges of globalization and revolution (. Imon Arifin, (2019:87). This livelihood education concept can be implemented starting from the elementary education level with an early love saving movement approach, education that introduces the potential of the business world from an early age with the aim of creating knowledge and insight into love for entrepreneurial behavior, which in turn in the future according to the field of science being studied will later be oriented towards innovative productive thinking and actions towards business independence and will not be dependent on one field of work as a State Civil Apparatus (ASN).

This study focuses on the problem of Livelihood Education for Making Fish Feed by Freshwater Fish Farmers in Klabat Village, Dimembe District, North Minahasa Regency, the problem of motivation, process, and independent learning outcomes for making fish feed pellets by freshwater fish farmers in Klabat Village, Dimembe District, North Minahasa Regency. This study aims to analyze and describe the motivation, process, and independent learning outcomes for making fish feed pellets.

Fish feed pellets by farmers as a reference for developing freshwater fish farming at the research location.

LITERATURE REVIEW

Development as a process is a series of community activities that will never end, where community activities continue to move forward on their own strength, a 'self-sustaining process' for all aspects of life towards...

social change. According to Macionis, in Piotr Sztompka in Wullur Mozes 2021:5, social change is "Changes in behavioral patterns, social relationships, institutions and social structures at a certain time". This condition indicates that society has the potential for resources that are ready to be optimized by themselves, fellow citizens and the government towards improving the quality of life. Efforts to improve the dignity and quality of life of the community are based on the internalized awareness of the community to find their identity independently in togetherness in order to seek and find sources and media for learning life skills education through livelihood education.

In the context of out-of-school education, efforts to find and discover learning sources and media independently by the community as learners of out-of-school education are included in the area of adult education studies. This view is clarified by Pinontoan, 2020, who states that adult education is all educational activities carried out by adults in everyday life. only use some of their time and energy to get additional intellectual.' For the smoothness and success of independent learning activities for farmers, there must be a main prerequisite, namely the readiness to learn independently. The readiness to learn independently includes; 1. The ability to identify learning needs, 2. The ability to set learning goals, 3. The ability to determine the learning activity plan, 4. Determining learning sources and media, 5. Determining full study

time, 6. Reflecting on the learning materials obtained, 7. Determination to solve problems faced creatively, 8. Conducting self-assessment and being willing to cooperate with others. This view is supported by Syamsu Mappa. 1999; 29, that; "Students seek information through reading materials in the library, study notes, observe the results of experiments in the laboratory, conduct observations ..." indicates the readiness to learn by adults.

The concept and implementation of independent learning activities for adults in out-of-school education by Stephen Brookfield, 1983 is called; "Independence Learning", namely independent learning. The advantage of independent learning is that adult learners are dominated by internal motivation as learners to utilize learning sources and media in the learning interaction process. It is said so because learning for adults has its own uniqueness. The uniqueness is meant that adults in carrying out learning activities

have a number of experiences, abilities and motivations. That is why Rogers, 1983 put forward this learning method with the term 'Student centered or learning centered', namely learning activities that are centered on the learner. This is based on the understanding that learning for adults is closely related to work to meet their life needs, so that this independent learning is carried out in their work "learning by doing", namely

learning while working. Related to the concept of independent learning for adults, Stephn Brookfield 1983; x, put forward the concept of independent learning analysis for adults, namely; 1. Independent learning and correspondence study, 2. Independence in learning; 3. Self-teaching; 4. Self-directed teaching; 5. Autonomous learning; 6. Idependence learning as the aim of education; and 7. Voluntary learning".

Based on the analysis, independent learning for adults can take place by self-study and learning through correspondence, namely with a package or module system. The existence of independence or freedom for adults in the learning process, adults teach themselves through good experiences that are successful, both successful and failures that have been experienced. nIn carrying out learning activities, adults have the ability to direct themselves, and are more autonomous in making learning decisions, and adults have their own will to determine the learning goals to be achieved, and there is a willingness for them to carry out learning activities.

For rural farming communities, the concept of learning livelihood education is often encountered in carrying out daily work tasks. Thus, they can easily carry out learning activities related to the desired learning needs, by carrying out learning interaction activities with learning sources and media that are affordable. This is strongly supported by the ability of adults to plan in out-of-school educational activities. This planning refers to the concept of Shrode and Voice in M. Wullur, 2010; 26 which states that; "The planning process is the vehicle for transforming perceptions about environmental conditions into meaningful and manageable operating plans" which means, the planning process as a tool for transforming perceptions about environmental conditions into meaningful plans that can be implemented regularly. Independent learning planning for farmers among rural communities has been ongoing and is a basic potential for the government and community leaders to mobilize

Village community development activities, using a system analysis approach that must be understood and carried out by adults in carrying out independent learning activities. The system analysis has components as Turang's view in M. Wullur, 2011; 16 which include; "1. Input components, 2. Process components, and 3. Output components, and 4. Impact components". For farmers as learners in carrying out independent learning activities, it is considered necessary and very important to analyze the components in a single system unit before and during carrying out independent learning activities to manage the production of fish feed pellets in freshwater fish farming. Klabat Village, Dimembe District, North Minahasa Regency is one of the villages that is a center for developing freshwater fish farming businesses in North Sulawesi Province. The community's interest in pursuing this business is due to internal motivation and external motivation. Internal motivation includes initial knowledge

about managing carp farming by farmers, continuing development of tilapia, Nile tilapia and snakehead fish farming, the existence of future thinking insights, and cultural value orientations about managing freshwater fish farming. While external motivation includes geographical conditions, the availability of learning resources and learning media that allow farmers to interact with learning independently. Other supporting factors for farmers to carry out freshwater fish farming include; a. The fertility of natural resource potential due to the balance of the rainy season and the dry season alternately, b/ The change of dry season and rainy season regularly every year, c. The land is categorized as fertile which is indicated by the growth of various types of plants, d. The distance of the freshwater fish farming location to the marketing center of Manado city is around 14 km. In addition to geographical factors, the marketing factor of freshwater fish production also supports farmers to improve and develop their businesses because the consumption of freshwater fish meat, both carp, tilapia and Nile tilapia has also become a typical menu of the North Sulawesi region as a daily menu for party menus, mourning menus, and menus for domestic and foreign tourists.

In order to develop freshwater fish farming businesses, the government has placed Field Agricultural Extension Officers or PPL, and has upgraded the status of the Fish Seed Center or BBI in Dimembe District to the North Sulawesi Province Freshwater Fish Cultivation Center with various pilot project programs or Demplots, has encouraged communities that are not covered by extension services by officers.

PPL to pursue freshwater fish farming. Farmers are willing and able to make efforts to find and find sources and learning media for freshwater fish farming by means of independent learning. Thus, this study examines the form of independent learning model for farmers in producing freshwater fish feed pellets in increasing freshwater fish farming efforts based on the learning readiness factors of farmers who do not receive direct counseling by Field Extension Officers programmed by the Fisheries Office of North Sulawesi Province. This is very important and strategic because the urgent problem felt by farmers is the high cost of fish feed obtained instantly in the form of ready-made pellets in stores. This problem makes the production costs of carp, tilapia and Nile tilapia farming high. With the development of existing technology, a number of farmers are trying to learn independently about making or managing pellet production as freshwater fish feed independently to reduce fish feed costs. Theoretically, this fish feed in the form of pellets has the main raw materials available in the freshwater fish farming area and is easy to obtain.

Composition of Pellet Raw Materials

The composition of raw materials for freshwater fish feed pellets varies, depending on the needs of farmers. Therefore, the selection of raw materials is the first step in making fish feed pellets. In addition to choosing the materials used as raw materials, the nutritional content of each raw material must also be known. The composition of fish feed pellets includes;

1. Rice bran;
2. Corn bran;
3. Soybean bran;
4. Fish meal;
5. Coconut cake;
6. Fish/Livestock Vitamins;
7. Tapioca flour/Kanci;
8. EM4 Fisheries, for fermentation, Wullur.M. 2021

To assemble a freshwater fish feed pellet menu, it is necessary to determine a good nutritional composition design for fish feed, including:

1. Protein;
2. Carbohydrates;

3. Fat;
4. Minerals;
5. Vitamins. Vivi Lestari Bastiar, 2022

The composition of the comparison of the nutritional content of pellets as a food menu for freshwater fish bargaining is explained as follows;

1. Protein, fish need feed with a protein content of 20-60 percent. Protein functions to build muscles, cells and body tissues especially for fish seeds. Protein is the key needed for growth and health in all types of fish.
2. Carbohydrates, carbohydrates in fish are needed around 20-30 percent consisting of crude fiber and extract materials without Nitrogen or BTN. Carbohydrates are needed for growth and energy.
3. Fat, The fat content of feed needed by fish is around 4-18 percent. The fat needed by fish must come from animal fat or vegetable fat. Fat functions to maintain fish stamina. However, the fat in fish should not be too high. Excess fat in fish can cause liver damage, disease and premature death.
4. Minerals, the mineral requirement for fish is 2-5 percent. Minerals in fish are needed to maintain healthy bones, teeth, physical and skin. The main minerals needed are calcium and phosphorus.
5. Vitamins, Vitamins cannot be produced by the fish's body. Therefore, it must be assisted by feed. Fish need vitamins as much as 2-5 percent, where the need for vitamins in fish is influenced by age, size, growth rate, milk and composition of fish feed. Nutritional Content of Animal Raw Materials for Freshwater Fish Feed Pellets

Table 1
Nutritional Content of Animal Raw Materials Fish meal

1	Protein	22.6555 percent
2	Fat	15.385 percent
3	Ash	26.65 percent
4	Fiber	1.80 percent
5	Water	10.72 percent

Table 2
Nutritional Content of Animal Raw Materials Blood Flour

1	Protein	71.455 percent
2	Fat	0.425 percent
3	Carbohydrates	13.125 percent
4	Ash	5.45 percent
5	Water	7.95 percent

Table 3
Vegetable Ingredients for Making Freshwater Fish Feed Pellets
Vivi Lestari Bastiar, 2022

No.	Material Vegetable	Protein	Fat	Carbohydrates	Ash	Fiber	Water
1.	Rice Bran	8.2 percent	12.15 Percent	28.62 Percent	10.5 percent	24.46 percent	10.15 Percent
2.	Flour	8.9 percent	1.3 Percent	77.7 Percent	0.06 percent	-	13.25 Percent
3.	Soybean Flour	44 percent	14.3 Percent	29.5 Percent	5.45 percent	2.8 percent	8.4 percent

No.	Material Vegetable	Protein	Fat	Carbohydrates	Ash	Fiber	Water
4.	Tofu Dregs Flour	23.55 percent	5.54 Percent	26.92 Percent	17.03 percent	15.53 Percent Rough	10.43 percent
5.	Coconut Meal	17.09 percent	9.44 Percent	27.77 Percent	5.92 percent	-	3.35 percent
6.	Turi Leaf Flour	27.54 percent	4.73 Percent	21.30 Percent	20.45 percent	14.01 Percent Rough	11.97 percent
7.	Lamtoro Leaf Flour	36.82 percent	5.4 percent	6.08 Percent	1.31 percent	18.4 Percent Rough	18.8 percent
8.	Cassava Leaf Flour	34.21 percent	4.6 Percent	14.69 Percent	-	-	0.12 Percent

Freshwater Fish Feed Pellet Management Process

In the process of managing freshwater fish feed pellets, the materials used are divided into 2 parts according to protein content, namely supplement materials and basal materials. Supplement materials are materials that have a protein content of more than 20 percent. While basal materials are materials that have a protein content of less than 20 percent. The composition of the materials used for freshwater fish feed pellets has requirements such as high nutrition, easy to process, cheap/affordable prices, easy to obtain and do not contain toxins. Given the price of pellets that continues to soar, the raw materials are attempted to be obtained around the freshwater fish farming location.

1. Composition of Freshwater Fish Feed Pellets

Making freshwater fish feed pellets in a mixture of raw materials of 5.5 kg, 55 kg, 110 kg and 220 kg with a protein content of 30 percent as stated in the table as follows ;

Table 4

Composition of Raw Materials for Freshwater Fish Feed Pellets with a protein content of 30 percent

No.	Raw material	5.5 kg	55 kg	110	220 kg
1.	Fish meal	1.5 kg	15 kg	30 kg	60 kg
2.	Soybean flour	1.5 kg	15 kg	30 kg	60 kg
3.	Cornstarch	8 grams	8 kg	16 kg	32 kg
4.	Rice flour	8 grams	8 kg	32 kg	32 kg
5.	Tapioca/ kanci/ cassava flour	5 grams	5 kg	10 kg	20 kg
6.	Fish/livestock vitamins	1 gram	1 kg	3kg	6 kg
7.	Yeast	2 grams	2kg	4kg	8 kg
8.	Molasses/Sugar/Honey	10 ML	1 liter	2 liters	4 liters
9.	EM4 Fisheries	10 ML	1 liter	2 liters	4 liters
10.	Lamtoro leaf powder, or lamtoro leaves, or cassava leaves	1 gram	1 kg	2 kg	4 kg

2. Freshwater Fish Feed Pellet Manufacturing and Management Techniques
 - 2.1. Prepare the raw materials for making fish feed, the raw materials that are still coarse need to be ground first using a grinding machine, then the grinding results are sifted until you get bran/flour with a fine structure.
 - 2.2. Insert the adhesive made from tapioca flour or cassava flour according to the required measurements.
 - 2.3. Add enough water to bind the dough and put all the ingredients together and mix until smooth, you can use a mixer in large quantities to get an even mixture.
 - 2.4. Print the dough using a pellet molding machine to make it faster and easier to produce pellets.
 - 2.5. Dry the molded feed under sunlight or using a drying oven in large quantities or during the rainy season.
 - 2.6. After drying, pack the feed in a waterproof plastic bag and place it in a room with good air circulation Vivi Lestari Bastiar, 2022

Research Methods

This research uses a qualitative research approach. "*quality'tive* Approach method", which refers to the view of Bogdan and Biklen, 1982;31, which among other things states that "a qualitative approach seeks to understand and interpret the meaning of an event of human behavioral interaction in a certain situation according to the researcher's own perspective". This study took place in Klabat Village, Dimembe District, North Minahasa Regency, from September to December 15, 2024. The informants of this study were divided into two, namely the main informants, namely 4 freshwater fish farmers who carried out independent learning activities in the freshwater fish feed pellet making business, and supporting informants are PPL fisheries officers and officers of the Tatelu Freshwater Fish Cultivation Center, Klabat village government, community leaders and the community who collect/retail freshwater fish production at the research location. The required data were obtained through observation and in-depth interviews designed in the form of observation guidelines and interview guidelines referring to the focus and formulation of research problems are supported by related documentation data. In the data collection process, it is accompanied by a data analysis process. Each data that is successfully collected in one stage is analyzed by referring to the Bogdan and Biklen 1998; 189 pattern, namely reviewing data, sorting it into units or giving certain codes, making a synthesis, trying to find patterns, trying to find something important "big and unique" so that it is interesting and needs to be studied scientifically, and finally making a decision and then written systematically in the research report accompanied by supporting data attachments. Data analysis is carried out in an inductive abstractive manner. For data validity, there are several criteria set in this study, namely; credibility for internal validity, transferability for external validity, and dependability for data reliability, and confirmability for the objectivity of research results.

RESEARCH RESULT

Klabat Village is one of nine villages in Dimembe District, North Minahasa Regency, which is 22 km from the center of Manado and is located at the foot of Mount Klabat. This village has a number of potential natural resources including sand, coconut, fisheries, and plantations which have an altitude of 600 meters above sea level. The people's jobs are generally farmers, some of them are engaged in freshwater fish farming. For freshwater fish farmers, they are concentrated on cultivating carp, tilapia and nile tilapia which are the main consumption of the community at happy and sad events as well as culinary restaurants in the village and surrounding villages. The water source for this freshwater fish farming business is a spring as the main water source and a river with a drainage system that originates from the

spring. Farmers manage freshwater fish farming businesses through calm water ponds (rice field plots) and some through fast-flowing water ponds. The obstacles faced by farmers are generally fish feed in the form of factory pellets which are quite expensive and tend to be unaffordable by farmers so that some fail and switch to other livelihoods while others return to traditional businesses with harvests for their own consumption which tend to be 6 months or annually. In the development of fisheries industry technology, including the existence of technological products producing pellet printing machines and the discovery of pellet feed menu recipes in social media and other learning resources, the freshwater fish farming business is developing its business in a professional direction by optimizing the concentration of freshwater fish farming harvest productivity every four months by independently printing freshwater fish feed in the form of pellets.

Research Findings

Based on the results of data analysis, it was found that:

1. The motivation for independent learning by farmers in learning how to make freshwater fish feed pellets includes; a. curiosity to learn how to make carp, tilapia and mujair feed pellets, b. accelerating the fish growth process, c. increasing fish harvest production and d. increasing farmers' business income.
2. The independent learning process of making freshwater fish feed pellets includes; learning through YouTube videos, b. Observing the pellet-making process at the Freshwater Fish Cultivation Center in Tatelu Village, Dimembe District, North Minahasa Regency, c. Seeing friends making freshwater fish feed pellets, d. Reading books on freshwater fish feed pellet-making techniques and e. Group study.
3. The results of independent learning in making freshwater fish feed pellets are; a. the acquisition of knowledge, experience and insight as well as farmer skills to make freshwater fish feed pellets independently in togetherness. b. The existence of farmers who are ready to be a source of learning for other farmers, c. There is an acceleration of maintenance time and increased harvest production of carp and tilapia cultivation from the aspect of fish weight and farmer income as informants. d. An independent freshwater fish feed pellet production farmer group has been formed at the research location.

Discussion

That the motivation for independent learning to make freshwater fish feed pellets by farmers as found, namely; a. curiosity to learn how to make carp, tilapia and mujair fish feed pellets, b. accelerating the fish growth process, c. increasing fish harvest production and d. increasing farmer's business income, then this finding falls into the realm of achievement motivation. It is said so because farmers as research informants have shifted from traditional learning patterns in the process of cultivating freshwater fish to modern learning patterns for cultivating freshwater fish by printing freshwater fish feed pellets as a form of innovative learning process. This concept is supported by James Botkin's view, developed by M. Wullur, 2022, that "learning innovative must be realized through anticipatory learning processes and participatory learning processes" and this has been realized by farmers as informants. The process independent learning to make freshwater fish feed pellets as found in the research results which include; learning through YouTube videos, b. Observing the pellet making process at the Freshwater Fish Cultivation Center in Tatelu Village, Dimembe District, North Minahasa Regency, c. Seeing friends making freshwater fish feed pellets, d. Reading books on freshwater fish feed pellet making techniques and e. Group learning, then this finding falls into the realm of independent learning by Stephen Brookfield, 2019, which is reinforced by Lyra Srinivasan, in Wullur M, 2021 stating that adults learn centered on the learning needs they want, so that independent learning for adults is done by reading, listening, seeing, and

practicing learning materials in work to meet the needs of their personal and family lives. While the results of independent learning to make freshwater fish feed pellets are; a. the acquisition of knowledge, experience and insight as well as farmer skills for making freshwater fish feed pellets independently in togetherness. b. The existence of farmers who are ready to be a source of learning for other farmers, c. There is an acceleration of maintenance time and increased production of carp and tilapia cultivation harvests from the aspect of fish weight and farmer income as informants. d. An independent freshwater fish feed pellet production farmer group has been formed at the research location, so the findings of this study are included in the scope of village community development which by Suzanne Kindervatter in Wullur M. 2021 the process of strengthening the potential of natural resources and local community resources 'Empowering process of local human and natural resources'. Thus the results of the farmer learning process have occurred the process of mutual learning where among the farmers there are those who are willing to be a source of learning among those who by ivan illich in pinontoan m. 2023 have created learning networks 'learning webs'. The results of learning the production of freshwater fish feed pellets show an increase in farmer income as one of the family livelihood business areas which by Wullur M. 2021 is known as the concept of Livelihood Education for families. In its implementation, farmers must apply the principle of Akal Budi Crari Duit, which means that farmers must have Akal which is obtained through knowledge, insight and skills in the production of freshwater fish feed pellets. Farmers must also have a budi, namely services so that farmers must work is not idle and lazy but must work hard. Next, Search is that farmers must be proactive, pick up the ball and pursue market opportunities, and Money is a means of economic transaction to fulfill human life needs, especially for workers who help the service business of freshwater fish feed pellets and farmers and the development of family businesses. It is realized that money or money from this business because we are given health and strength which are divine gifts, so for farmers also set aside money for alms, offerings, tithes for alms for others as a form of our charity.

Conclusion

The results of data analysis, findings and discussion of research results concluded that: 1) Motivation for independent learning to make freshwater fish feed pellets by farmers, namely; a. curiosity to learn how to make carp, tilapia and mujair feed pellets, b. accelerating the fish growth process, c. increasing fish harvest production and d. increasing farmer's business income, so this finding falls into the realm of achievement motivation; 2) The independent learning process for making freshwater fish feed pellets includes; learning through YouTube videos, b. Observing the pellet making process at the Freshwater Fish Cultivation Center in Tatelu Village, Dimembe District, North Minahasa Regency, c. Seeing friends making freshwater fish feed pellets, d. Reading technical books making freshwater fish feed pellets and e. Group learning; and 3) Independent learning outcomes of making freshwater fish feed pellets, namely; a. the acquisition of knowledge, experience and insight as well as farmer skills for making freshwater fish feed pellets independently in togetherness. b. The existence of farmers who are ready to be a source of learning for other farmers, c. The acceleration of maintenance time and increased harvest production of carp and tilapia cultivation from the aspect of fish weight and farmer income as informants. d. An independent freshwater fish feed pellet production farmer group has been formed at the research location. It is recommended to each party that the motivation, process and learning outcomes of freshwater fish feed pellet production that have been achieved by farmers continue to be improved and developed towards independent production marketing in the form of farmer groups through the support of the village government and the government of the agriculture/fisheries service, the labor service and the social service and the trade service, while UNIMA universities continue to provide assistance in the form of fostered villages through fostered groups.

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