

CONSULTANCY WORK IN THE FRAME OF LAO-HUNGARIAN 3rd TIED AID LOAN PROGRAM

Develop aquaculture and culture-based fisheries for the better use of abundant aquatic resources for food supply

CONSULTANCY REPORT



Prepared by:

Dr. Emese Békefi Bozánne
marketing expert

Szarvas, Hungary
2022

I. Name of expert: Emese Békefi Bozáné, PhD

II. Project Component/Work Package/Task

PC: Develop aquaculture and culture-based fisheries for the better use of abundant of aquatic resources for food supply

WP: WP2 (Task: 2.3, 2.4); WP3

III. Main goals of the mission:

The main objective of the consultancy work is to assist project activities related to fish value chain development with special regards fish to marketing and also to assist the R&D collaboration in aquaculture. The consultancy work includes the followings specific activities:

- Collect marketing data for the Value Chain Analysis (VCA) from fish hatcheries, growout farms and also from relevant authorities on export and import.
- Complete and evaluate consumers surveys.
- Survey existing artisanal fish processing activities in Vang Vieng
- Assist the elaboration of fish processing technologies that will be applied in the newly built fish processing plant.
- Assist promotion of local aquaculture products (through media, brochures and leaflets, fish tastings) with special regards to certified fish products.
- Assist the development of joint activities between Lao R&D partners (LARReC and NAFDEC) and MATE-AKI-HAKI considering possible tri-lateral collaborations (e.g. with Vietnam and Thailand)
- Explore the opportunity of the development of multifunctional aquaculture in Laos with Hungarian assistance.
- Training of value chain development, fish marketing and promotion of local fish products

IV. Duration of the mission: 29.10.2022 – 12.12.2022

V. Description of activities and achievements:

1 November – 10 December: Consultancy period

Since this consultancy work is not site specific, activities and achievements are described by main thematic areas indicating the link to relevant Work Packages and Tasks. The Itinerary of the consultancy work is shown in *Annex 1*.

Summary

Value chain concept is a basic principle of the 3rd Hungarian agriculture tied aid loan program, that is applied for the two main value chains: fish and cattle. Project activities have been focused on infrastructure and technology development so far, however as the project is proceeding it is very important to include marketing aspects into the value chain development. Marketing is a relatively new area of aquaculture development in Laos, therefore special efforts are needed to improve local resources that are required to meet consumers needs that is also beneficial to stakeholders of the aquaculture sectors in particular producers.

During the six-week consultancy, progress has been made in the exploration of fish value chain realities in the Lao PDR, and various means and actions have been identified and elaborated to respond some specific issues of fish marketing. I explained the objectives and the workplan of my aquaculture expert consultancy program during the first technical meeting after my arrival to Laos (*Annex 2*).

1. Collect marketing data for the Value Chain Analysis (VCA) from fish hatcheries, growout farms and also from relevant authorities on export and import

Aquaculture development in Lao PDR is slower than in neighbouring countries in Southeast Asia, however production has been growing in the past years, whilst imports of farmed fish from Thailand, China and Vietnam remain high. Systematic fish value chain development approach is new in Lao aquaculture, however value chain analysis (VCA) can contribute to the exploration of the significant potential for growth and diversification of species and fish farming systems, in order to supply the domestic and regional markets more efficiently.

Value chain analysis considers every step, an aquaculture and fisheries business goes through, from raw materials to the eventual end user. The goal is to deliver maximum value for the least possible total cost. The model also reveals how the value chain activities are tied together to ultimately create value for the consumer. Value chain analysis could be a good basis of development plans and actions that can improve local market supply and also export of Lao fish and fish products and to make the sector more competitive. Smooth functioning of value chain requires not only efficient production technologies and farms, it requires additional important elements such as efficient transport, market information systems and management. The four Ps, Product (quality fish production), Place (transport and logistics), Price and Promotion should also be considered when creating marketing plans and strategies.

The operation of fish hatcheries and the supply of high-quality fish fingerling is a key element of all fish value chains. Therefore, special attention has been given to the survey of fish hatcheries and fish seed (larvae, fry and fingerling) supply. In tilapia seed supply the Aquaculture Development Company (ADC) is a key farm in Vientiane region, where ADC provides about 60% of the needs for tilapia fingerling. ADC also supplies tilapia larvae to provincial fish hatcheries in the target provinces of the Hungarian 3rd Agriculture tied aid loan project. During my consultancy four provincial fish hatcheries (aquaculture stations) were visited in Oudomxay, Luang Prabang and Xayaboury provinces. I evaluated the possible role of these hatcheries/stations in the regional fish value chains. Short summary of the results of these surveys is provided in *Annex 3*. Collection of data and relevant information on fish seed

supply will be continued and their analysis will be an important part of the overall fish value chain analysis (VCA) focus on Functional Analysis, that will be completed by the end of July.

2. Complete and evaluate consumers surveys

During my previous consultancy work in 2021, I identified that different market surveys are needed at each point of the value chain in order to evaluate and determine which elements are needed to be further developed. There is a growing number of consumers who are ready to buy more modern, processed, packed, high-quality fish products from fish processing plants. It is important to examine which values are important to Lao consumers, especially for young generation (represents 18-25 ages students) and which final products of value chain they are interested in most. Accordingly, a primary market survey has been made in connection with the market introduction of new products in Laos using quantitative methods and standardized online questionnaires, that is primarily focusing on the young generation. The questionnaire was distributed to the students by NUoL, which was available to them in both English and Lao languages. Finally, 168 questionnaires were filled in by the young people. During the statistical evaluation $p=5\%$ standard error was allowed. The evaluation of the questionnaires was done with SPSS program containing descriptive statistics (minimum, maximum, average, standard deviation, distribution) and non-parametric statistical calculations (Pearson Chi2 test, Mann-Whitney U-test, Kruskal-Wallis Test). Based on the results (*Annex 4.*) a general finding is that the young generation is open to new products and they are ready to buy them.

It can also be concluded from the survey results, that the market introduction of new products in Laos should be supported and communication with consumers improved considering consumers' behavior, their interest in new food items and growing needs for product quality. The new products can meet the expectations on the Lao market when it comes together with adequate promotion and acceptable price policy.

3. Survey existing artisanal fish processing activities in Vang Vien

Fish processing is an important element in the value chain and the construction of a new, modern fish processing plant is a special part of the aquaculture component of the Hungarian project. This will be the first modern fish processing factory in Laos, since for the time being there are only a couple of artisanal fish processing companies in regions where water resources for capture fisheries are available. These companies buy the fresh fish directly from the fishermen usually through middlemen. The processing in most of the cases includes, drying (by sun), smoking, and fermentation. However, various types of formatted and packed aquatic products including clams and crustaceans are available on the markets. In most of the markets fresh fish are cleaned and gutted at the site before selling. Most of the artisanal fish processing plant operates selling stands, usually along main roads and restaurants. During my consultancy a relatively well-developed artisanal fish processing company was visited in Vang Vieng. The visit was organised by the Fisheries Division of the Department of Livestock and Fisheries. Major findings of the visit and local discussion are summarised in *Annex 5.*

Just like in the case of fish seed supply, data and collection of new information on fish artisanal processing will be continued, that will be used during the fish value chain analysis.

4. Assist the elaboration of fish processing technologies that will be applied in the newly built fish processing plant

Since the operation of a modern fish processing plant is a unique activity in Laos, my consultancy work besides the promotion of new high-quality and safe fish products also includes the assistance of the elaboration of fish processing technology that can provide innovative fish products to meet local market demand. I have been in contact with the chief engineer of VAA who designed the facility and also with key members of Verkhnam Cooperatives that will operate the fish processing plant. In the *Table 1*. I summarised my comments and suggestions related to the operation of the fish processing plant, with special regards to the work of some key equipment.

Table 1. Key equipment of the fish processing plant with comments and suggestions on their operation.

Equipment	Main parameters	Comments and suggestions
Fish filleting machine	Model: OBFS-180. Capacity: 160-250 kg/hour Slice thickness: 2,3,6 mm (can be customized)	High-quality tilapia fillet will be produced from controlled fish sources. Training is needed to operate the machine efficiently and product development will be an important initial activity that should be based on products tests and consumers' feedback.
Fish bone and meat separator	Model: OBFS-150 Capacity: 180 kg/hour	The machine will make possible to utilize fish flash efficiently separating the flesh from the otherwise wasted bone-full pieces. The separated fish flesh can be used to make fish balls, fish noodles, fish dumplings, etc. Training is needed to operate the machine efficiently and product development will be an important initial activity that should be based on products tests and consumers' feedback.
Fish ball making machine	Model: OBZV-280 Capacity: 300 fish balls/min	Even if fish ball is a traditional product in Laos and in the region, the fish ball produced in a modern factory will be high quality and competitive with import products. Training is needed to operate the machine efficiently and product development will be an important initial activity that should be based on products tests and consumers' feedback.

The use of the other equipment in the processing plant including shocking device, ice flake production equipment, scales, fish skin remover, smoking device, meat mixer, meat chopper, vacuum packaging machine, refrigerators and freezers also need special training and proper maintenance, however their use doesn't require as special skill as the three key equipment listed in Table 1.

Fish processing also includes handwork especially in the preparatory phase that includes cleaning, scale removal, beheading, gutting. The proper and safe work also needs training. Training on the use of general equipment (e.g. cleaning and washing equipment, refrigerators and freezers) and hand tools (e.g. knives) can also be organised in slaughterhouses, or can be combined with special training programs that will be organised for the staff of the slaughterhouses that are under construction in the frame of the Hungarian tied aid loan project.

The construction of the fish processing plant is proceeding well and according to the plan it will be ready for trial operation in in the middle of March. The figures below show the actual situation of the construction work that also includes the construction of the wastewater treatment system.



Construction of the fish processing plant at the site of Verkhnam Cooperatives



The steel structure of the building of the processing plant

Since the fish processing plant is the first one in Laos where innovative new products will be produced there is a need for a systematic consumer survey already in the initial product development stage. Therefore, an expert consultancy can be considered after the hand-over of the plant to assist the quick collection and processing of consumers feedback to assist product development. The consultancy work would also facilitate the promotion and marketing of new fish products and also the certification process.

5. Assist promotion of local aquaculture products (through media, brochures and leaflets, fish tastings) with special regards to certified fish products

Together with the post-harvest expert (Mr. Hársvölgyi), I visited the site of the processing plant during the first week. We had a discussion about the challenges and new opportunities with the Verkhnam Aquaculture and Fisheries Co. experts who participated in the visit (Dr. Chanta, Mrs Chanta). Taking into account their professional opinion, the following considerations can be made:

- The goal is to finish the construction of processing plant as soon as possible;
- The 2 products (one traditional: fish ball and one modern: fish fillet) must be produced and placed to the market as soon as possible;
- The first trial production of the new products should take place before the end of the project.
- Developing and selling new processed products may be the future goal, taking into account the market demand.

After putting the processing plant in operation, the promotion of the new products will be essential. During the market introduction of processed products, it is completely necessary to carry out various promotional activities within marketing. For this purpose, I recommend the design and production of brochures, leaflets which are also available in printed and electronic form. Together with Dr. Chanta I revised the content of the draft brochure, which I designed based on an existing Polish promotional material. The brochure would contain the most

important Lao fish species will be processed, which would be out of nine fish species (*Annex 6*. – This annex prepared by Mr. Janos Szakáli and myself). The brochure would also include products made from processed fish species and recipes for dishes that can be prepared from them. The *Annex 7*. contains the first visual design of the brochure cover. The final form of the brochure will be prepared after the handover of the processing plant, so that photos of the processed products there can be included.

In order to make the products known to consumers, it is also necessary to organize product demonstrations and fish tastings with special regards to certified fish products. It is completely necessary to determine their locations and time in consultation with Laotian experts.

6. Assist the development of joint activities between Lao R&D partners (LARReC and NAFDEC) and MATE-AKI-HAKI considering possible tri-lateral collaborations (e.g. with Thailand and Vietnam)

Institutional cooperation in aquaculture research and development has a long tradition with Laos. HAKI has also been active in various aquaculture development programs in South East Asia. Working in Laos as expert of VAA and also in my capacity as Deputy Director of HAKI I did my best to contribute to maintaining and even strengthening collaboration in the field of aquaculture research and development. I think that the cooperation in this area is important to make the results of the aquaculture component of the Hungarian tied aid loan project sustainable. Main activities have been carried out during my expert work are summarized in the followings:

- Together with Dr. Laszlo Varadi, who works also as advisor of HAKI in international relations the MoU with LARReC and the proposed MoU with NAFDEC have been surveyed and slightly modified. After my return to Hungary, these MoUs will be revised, finalized and prepared for signing after discussion with HAKI leadership. Then I will follow the procedure and assist the implementation of the workplan in the frame of the MoUs.
- During my consultancy in Laos, I attended the Lao-Hungary-Vietnam Freshwater Aquaculture Workshop and delivered a presentation on fish value chain development (*Annex 8*.). Details of the workshop are provided in Dr. Varadi's consultancy report. In my capacity as deputy director of HAKI I will assist the development of the planned trilateral collaboration even after closing the Hungarian tied aid loan project.
- The cooperation with Thailand in the frame of a revised MoU between HAKI and the Thai Department of Fisheries (DoF) was also discussed with leaders of the Fisheries Division of DLF together with Dr. Varadi. Future trilateral cooperation between Hungary, Laos and Thailand is also an opportunity to contribute to aquaculture development in Laos taking into account that both DLF and HAKI have cooperation with the Thai DoF. During my consultancy, I also assisted the elaboration of a plan for a consultancy program of Thai aquaculture experts in Laos in the frame of the Hungarian tied aid loan project. More information on the development of the collaboration with Thailand is provided in Dr. Varadi's consultancy report.

7. Explore the opportunity of the development of multifunctional aquaculture in Laos with Hungarian assistance

Although the development of multi-functional aquaculture has not been a specific objective of the aquaculture component of the Hungarian tied aid loan program, it was found to be useful to explore the opportunity of the development of multifunctional aquaculture in Laos taking into account the followings:

- A recent study (2021) prepared jointly by the Asian Development Bank (ADB) and the Lao Ministry of Planning and Investment on developing agriculture and tourism for inclusive growth in the Lao PDR concluded that “Over the medium and long term, the Lao PDR must seek to raise the competitiveness of its agriculture and tourism sectors, while strengthening the linkages between them.”
- There are positive examples of agrotourism in Laos that contributes to the improvement of rural livelihood, responsible use of resources and marketing of unique Lao food products, including: the “Green Earth Demonstration Farm, Training Center, and Agritourism Destination on the Bolaven Plateau, in Lao Ngam District, Salavan Province”; and the “Phutawen Farm” at Ban Hai, Pak-Ngum district. There are also some projects that contribute to the development of agro-tourism such as the Switch Asia project “Sustour” Promoting Sustainable Tourism by Integrating MSMEs into Sustainable Supply Chains and Raising Consumer Awareness.
- Hungary is a leading European country in the development of multifunctional pond fish culture and the mother company of ADC, the “Aranypony” Co. has been acknowledged as a successful multifunctional fish farm. Since ADC has a stable position in Laos, can assist the future development of multifunctional aquaculture utilizing the results and experiences of “Aranypony” Co.

During my consultancy I also visited some tourist attractions where tourism was linked to some agriculture activities (*Annex 9*). Even is fish and aquaculture being not in the focus of agro-touristic initiatives, fish and aquaculture can be considered as a promising future element of agro-tourism taking into account the availability of rich aquatic resources and the importance of fisheries and aquaculture in rural life and rural economy. Fish farms could also be starting points for development of agro-tourism with “fish component”, including tourism in their activity. In Hungary the first step of such development was the provision of angling services by pond fish farms. This could also be a future step towards the development of multi-functional pond fish culture. I initiated a survey by questionnaire to explore future opportunities in the development of multi-functional pond fish farming. A questionnaire was elaborated (*Annex 10*.) that will be sent to some competent farms and companies that has been identified as potential participant of a future multi-functional aquaculture development program including Lao Green Development Sole Co.; ADC Co.; “Oum Huck” Organic Farm.

8. Training of value chain development, fish marketing and promotion of local fish products

Human Resources Development (HRD) including training is a crucial part of agriculture development in Laos in general. The training in some new areas such as “value chain concept and value chain development” requires extra efforts. Few local trainings through presentations during the expert consultancies seems not enough. I have prepared written

training materials and also an E-learning program on fish value chain development during my consultancies in Laos, however I think that training should be continued after the termination of the program. The use of the E-learning program developed in the frame of the Hungarian tied aid loan project, including “value chain development” is a good tool to introduce this special topic to professionals. However, the training material of the E-learning program should be extended with related topics such as fish marketing and promotion of fish products. The institutional cooperation between Hungarian and Lao institutions (e.g. MATE-NUoL or HAKI-LARReC/NAFDEC) can provide a framework for the extension of the E-learning program and also some other types of aquaculture training (e.g. post graduate, BSc, MSc and PhD trainings). I do hope that it will be possible to start new projects in the future for aquaculture development in Laos. I will be ready to elaborate and implement trainings in value chain development and fish marketing in new projects. Another channel to make value chain concept and its use in the development of aquaculture strategies and plans is the training that ADC provides to partners including the staff of provincial fish hatcheries. I am ready to assist this activity of ADC by providing simple training materials for them.

VI. Irregularities if any:

I could complete the mission without any difficulties thanks to the organization of VAA local staff and also the good cooperation with DLF and Lao experts.

VII. Comments to the Project Management if any:

Since the DG, and the Financial Director of VAA were working in Laos during the time of my consultancy, I could share my findings and suggestions with them at the site.

VIII. Persons met:

- **VAA local staff:** Dr. István Lénárt project manager; Mr. János Szakali, project assistant; Mr. Siphon, office assistant; Ms. Mong, secretary.
- **DG of VAA and VAA experts:** Dr. László Váradi DG of VAA, Mr. Károly Valentinyi FD of VAA; Mr. Istvan Harsvölgyi, post-harvest expert; Mr. Gyula Kovács, aquaculture expert; Dr. Gyula Kasza FCS expert; Dr. Attila Kunszabó FCS expert; Dr. Dávid Szakos FCS expert.
- **Advisers:** Dr. Phouangparisak Pravongviengkham; Dr. Somphanh Chanpengxay, Dr. Sithong Phiphakhavong, Mr. Anonh K.
- **Department of Livestock and Fisheries (DLF):** Dr. Akhane Phomsouvanh, Head of Fisheries Division; Mr. Udon, Deputy Head of Fisheries Division; Dr. Panthavong, DDG; Dr. Intha Phouangsomat, DDG, Head of PMU;
- **PAFOs**
DG of Xayabouri province and DDGs of Oudomxay and Luang Prabang provinces
Key experts in livestock and fisheries at PAFOs and DAFOs in Oudomxay, Luang Prabang and Xayabouri provinces
- **Private sector representatives:**
ADC: Mr. Ferenc Lévai, Managing Director
Verkhnam Fisheries Co. Quality Tilapia Fishfarm: Dr. Chanta, Mrs. Chanta
Aura Co.: Mr. Bee Phouthakeo, Managing Director
APD Co.: Mr. Khuanchai Siphakanlaya, co-owner
Pak Pa slaughterhouse: Mr. Seng, Owner and Managing Director
Arctech Lao Co.: Mr. Ato, Managing Director

IX. Attachments:

Annex 1.: Itinerary

Annex 2.: Presentation on the first technical meeting

Annex 3.: Visit to Provincial Fish Hatcheries and evaluation their role in the fish value chain

Annex 4.: Short results of the questionnaire for young people in Laos

Annex 5.: Vang Vieng artisanal fish processing and fish marketing company

Annex 6.: Important Laotian farmed fish species

Annex 7.: Visual design of the brochure cover

Annex 8.: Presentation on the LAO-HUNGARY-VIETNAM Freshwater Aquaculture Workshop

Annex 9. Visit agro-touristic sites in Luang Prabang

Annex 10. Questionnaire on multi-functional pond fish farming

Szarvas, 18/01/2023




Dr. Emese Békefi Bozánne

**Tentative program for Dr. Emese Bekefi in the Lao PDR
between 29th of October – 12th of December 2022**


Date	Program
29 October	Travel: BUD-DOH
30 October	Travel: DOH-BKK-VTE
31 October	Discussion with project management
1 November	Kick Off meeting. Discussion with counterparts at DLF (Dr.Akhane, Ms.Monenaly, Mr.Szakáli)
2 November	Collect market data for the VCA
3 November	Visit “Verknham” Cooperatives
4 November	Preparation of fish promotion materials
5 November	Visit fish markets
6 November	
7 November	Collect market data for the VCA
8 November	Preparation of fish promotion materials
9 November	Evaluation of fish consumption survey
10 November	Discussion with counterparts at DLF VAA-AURA Brainstorming about running the Nongteng feed mill
11 November	Testing the Aquaculture E-learning program
12 November	Discussion with aquaculture experts
13 November	
14 November	Aquaculture Workshop 1 st day: 9:00-16:00, Venue: DLF
15 November	Aquaculture Workshop 2 nd day: 8:00-13:00, Site visit to Namhoum (ADC)
16 November	Discussion with FCS counterparts on VC development, fish marketing and promotion
17 November	Arrive Mr. Gyula Kovács, fish expert Kick off meeting (fish component)
18 November	Visit Nongnok (Fisheries Cooperatives)
19 November	Discussion with FCS counterparts on VC development, fish marketing and promotion
20 November	
21 November	Discussion with project management
22 November	Visit artisanal processing in Vang Vien
23 November	Discussion with FCS counterparts on VC development, fish marketing and promotion
24 November	Preparation of fish promotion materials
25 November	Meeting with Dr. Parisak
26 November	Travel: VTE - Oudomxay by train – Váradi, Valentinyi, Békefi, Szakáli, Kovács, DLF team
27 November	Meeting with DDG of PAFO Oudomxay; visit slaughterhouse construction site, Don Keo and Nam Hin fish hatcheries

28 November	Travel from Oudomxay to Luang Prabang. Visit Nambak feed mill extension work, construction sites of the orange processing plant and Pak Pa slaughterhouse.
29 November	Meeting with DDG of PAFO Luang Prabang, visit Thin Som fish hatchery
30 November	Meeting with DDG of PAFO Xayabouri, visit slaughterhouse construction site and Nam Tien fish hatchery
1 December	Expert discussion on technical and financial issues
2 December	Visit rice farm and multifunctional farms
3 December	Travel from Luang Prabang to Vientiane by train
4 December	
5 December	Preparation of fish promotion materials
6 December	Evaluation of fish consumption survey
7 December	Meeting of the project management
8 December	Evaluation of fish consumption survey
9 December	Lunch for the DPM (H.E. Saleumxay Kommasith) in Budapest Bistro; Farwell lunch with leadership of DLF:
10 December	Travel from Vientiane to Bangkok
11 December	
12 December	Travel: BKK-DOH-BUD


AQUACULTURE COMPONENT OF THE 3RD HUNGARIAN TIED AID LOAN PROGRAM
01ST NOVEMBER 2022, MAF DLF, Vientiane





Workplan on fish marketing



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HAKI

Some major concepts:

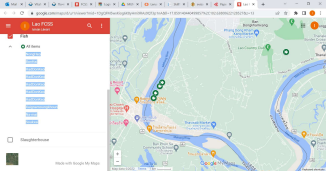
- Fish is a priority value chain in the program besides cattle;
- VCA is applied to improve efficiency of aquaculture (through the improvement of both primary and support activities);
- Processing and marketing (meet the needs) are critical issues to make aquaculture successful;
- There is a need to explore interlinkages between project components (Aquaculture with Post-harvest, and Food Chain Safety System).






1. Collect marketing data for the Value Chain Analysis (VCA) from fish hatcheries, growout farms and also from relevant authorities on export and import

Framework:
Aquaculture Component:
Work Package 2. Development of elements of the aquaculture value chain in cooperation with model/private farms.

Ultimate objective:
Elaboration of a VCA study (*Functional Analysis*) with recommendations by the end of the project

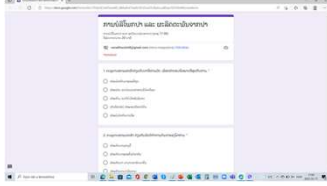







2. Complete and evaluate consumers surveys

Framework:
Aquaculture Component:
Work Package 2. Development of elements of the aquaculture value chain in cooperation with model farms.

Ultimate objective:
Elaboration of a VCA study with recommendations by the end of the project





3. Survey existing artisanal fish processing activities in Vang Vieng

Framework:
Aquaculture Component:
Work Package 2. Development of elements of the aquaculture value chain in cooperation with model farms

Ultimate objective:
Explore new development direction within the fish value chain

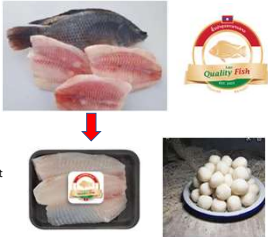





4. Assist the elaboration of fish processing technologies that will be applied in the newly built fish processing plant

Framework:
Aquaculture Component:
Work Package 2. Development of elements of the aquaculture value chain in cooperation with model farms

Post-harvest Component:
Work Package 5. Establishment of fish processing plants in Vientiane Prefecture

Ultimate objective:
Supply high quality and safe certified fish products to the market



5. Assist promotion of local aquaculture products (through media, brochures and leaflets, fish tastings) with special regards to certified fish products

Framework:

Aquaculture Component:

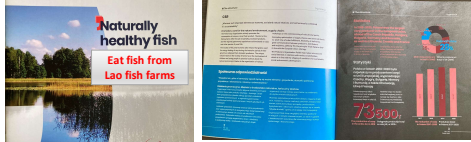
Work Package 2. Development of elements of the aquaculture value chain in cooperation with model farms

Post-harvest Component:

Work Package 5. Establishment of fish processing plants in Vientiane Prefecture

Food Chain Safety Component:

Work Package 4. Development of Registration System and Trademark's system in DLF



5. Assist promotion of local aquaculture products (through media, brochures and leaflets, fish tastings) with special regards to certified fish products



6. Assist the development of joint activities between Lao R&D partners (LARReC and NAFDEC) and MATE-AKI-HAKI considering possible tri-lateral collaborations (e.g. with Vietnam and Thailand)

Framework:

Aquaculture Component:

Work package 1. Development of aquaculture research, innovation, knowledge and technology transfer

HRD Component:

Work Package 3. Development of international relations, organisation of national conferences and study tours, participation on international conferences

Ultimate objective:

Develop support activities of the fish VC

- breeding and propagation of indigenous and commercially important fish species;
- fingerling rearing technologies based on the use of high quality feed;
- elaboration of a long-term R&D strategy to provide scientific support to aquaculture development programs;
- study on fish marketing and the role of fish in the value chain;
- contribution of aquaculture to the development of culture-based fisheries

7. Explore the opportunity of the development of multifunctional aquaculture in Laos with Hungarian assistance

Framework:

Aquaculture Component:

Work package 1. Development of aquaculture research, innovation, knowledge and technology transfer

Work Package 2. Development of elements of the aquaculture value chain in cooperation with model farms

Ultimate objective:

Explore new development direction within the fish value chain

8. Training of value chain development, fish marketing and promotion of local fish products

8. Training of value chain development, fish marketing and promotion of local fish products

Framework:

Aquaculture Component:

Work package 1. Development of aquaculture research, innovation, knowledge and technology transfer

Work Package 2. Development of elements of the aquaculture value chain in cooperation with model farms

Ultimate objective:

Develop support activities of the fish VC

E-learning program; aquaculture training

Thanks for your attention!
ຂອບໃຈ!

Visit to Provincial Fish Hatcheries and evaluation their role in the fish value chain

1. Oudomxay Province

1.1. Nam Hin Station of PAFO

The station was established in 1960 with financial assistance of the Vietnamese government. The station that employs 11 persons (only males) has four division as follows: (1) technical and planning; (2) fish production; (3) poultry and other animals; (4) crop/horticulture. The total area of the station is 18 ha, of which 2 ha (11 fishponds) used for fish culture. The main produced species are: tilapia, silver barb, common carp, Indian carps, gourami, catfish, pangasius. The annual production is 3 million fingerlings and 2000 kg of market size fish. The fish is sold in Oudomxay and nearby provinces. Besides fish culture, the station is doing cattle farming (they have 16 animals) and crop production.

The station has cooperation with other divisions of Oudomxay PAFO, Dien Binh province in Vietnam, ADC Company Namhoum, Bee Production Cooperatives in Oudomxay and also with the Politechnic Station of Oudomxay.

Cooperation with ADC is an important one. The station received 1 million tilapia larvae from the company, and also some revolving fund for the facilitation of continues production, ADC is also provided some equipment and training in the framework of the Hungarian tied aid loan project. The project also carried out experimental work to facilitate the value chain development, when the fish larvae (tilapia) from ADC was provided to Nam Hin Station where fingering was produced that was reared to market size in Don Keo government fish farm.

The station is looking for support to build new nursing ponds and receive training in fish culture, livestock- and plant production. The station manager had a remarkable comment that “they don't need money, but knowledge, the utilization of which will result in income”.



Meeting with the leaders of the station and well built and operated nursing ponds.

My conclusion: The management of the station is on a higher level than in other government organisations. They are aware of the importance of market concept and also staff training and collaboration. The station can be considered as an important element of the fish value chain in

Oudomxay region. The station can be considered as a good provincial partner in possible future cooperation programs. It is highly advised to provide training to the staff not only in technology development but also value chain development. The work initiated by the Hungarian tied aid loan project aiming at the development of tilapia value chain is highly advised to continue with technical assistance of ADC even after the project is terminated.

1.2. Don Keo Fish Hatchery

Limitations in water supply at this station has been mentioned even by the DDG of PAFO, however this may be managed through better control of water use (e.g. water recirculation). Taking into account various conditions (facilities and human resources) this fish farm unit is not really suitable for efficient production of high-quality fish fingerling. However, there is good possibilities for the production of market size fish if rearing technology will be improved. The Hungarian tied aid loan project assisted a grow out experience, when 20.000 of tilapia fingerling (0.6 g) was reared up to market size in two ponds of 2000 m² and 2700 m² respectively. The experience (Janos Szakali: Earthen pond model works at Don Keo Government Fish Station, 2021) indicated the opportunities in market size fish rearing but also the needs for further technology development (pond preparation water quality management and feeding).



Relatively large size earthen fishponds at Don Keo station

My conclusion: Don Keo station could play a role as market size fish production unit in the tilapia value chain when the larvae is provided by ADC to Nam Hin station where fingerling is produced for stocking in fishponds at Don Keo station. However, further training and technical assistance is needed that can be provided by ADC even after the termination of the Hungarian tied aid loan program.

2. Luang Prabang Province

2.1. Thin Som Fish Hatchery

The head of the provincial fish hatchery Mr. Bountham Souriyakham informed the visiting delegation that the center moved from Naluang to this site in 2015. Until 2021 there was a double ownership by Luang Prabang DAFO and PAFO, however the center is under the supervision of PAFO since 2021.

The Hungarian tied aid loan program provided equipment (e.g. aerator, nets/hapas, water quality test kits) and ADC also provided training in Namhoum and 250.000 tilapia fry with revolving fund. One of their staff members is working on his MSc at NUoL.

The center produces fish both for the market and restocking of natural waters. Main species are silver barb and gourami.

Serious limitation of the farm operation is the water supply during the dry season. The Hungarian project provided support to drill a new well that is still under construction.



Discussion in the office of the station and broodstock pond with aerator provided by the project

My conclusion: After visiting the site and having discussion with staff, this station can also be considered as an important element of the fish value chain in Luang Prabang region. However, further efforts are needed to explore how the station could be integrated into a value chain focusing on the rearing and marketing of indigenous fish species. TA and training activities could be included into the institutional collaboration between Lao and Hungarian aquaculture institutions.

3. Xayabouri Province

3.1. Nam Tien Fish Hatchery

We had a very short visit at Nam Tien station that is located 7 km from the provincial capital, very close to the Nam Tien reservoir that is source of supply water to the station. Nam Tien station was developed by a JICA project, approximately 15 years ago. The total area of the station is 1.2 ha, which includes 12 fishponds, hatchery, offices, and staff facilities. In the hatchery, there are 8

smaller (2m x 4m x 1m) and 2 larger (4m x 4m x 1.5m) concrete tanks, which are ideal for nursing fingerlings, however some upgrading works is needed with special regards to appropriate water supply.

Nam Tien station could be an important component of the regional value chain by producing fingerling and selling them to the households together with providing expert advice and practical trainings focusing on the rearing and marketing of indigenous species. The station also had good results with tilapia rearing (larvae was provided by ADC), however they have difficulties in selling. The station plans to buy *pa kheung*, *pa eun*, *pa phone* and *pa pia* broodfish for breeding to improve their capacity as a supplier of fingerling of indigenous species.



Concrete tanks in the fish hatchery

My conclusion: Nam Tien station has all basic conditions to be an important component of indigenous fish value chain in the region. The development of brood fish stock may be solved using local financial resources, external assistance is needed for technical assistance in the propagation and fingerling rearing of indigenous species. Besides technical training, special training in value chain development including marketing is also important. TA and training activities could be included into the institutional collaboration between Lao and Hungarian aquaculture institutions.

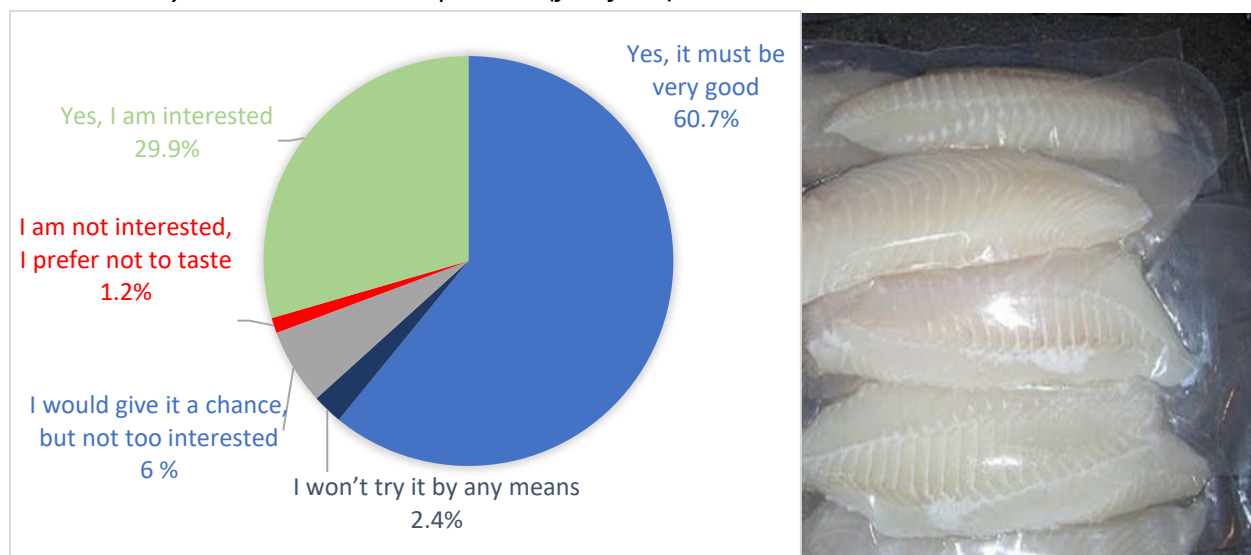
Short results of the questionnaire for young people in Laos

Fish supply is based on traditional production and marketing of various fish species that is not always meet the changing consumers' needs in the modernizing Laos. The survey on consumers' awareness is an important contribution to the design and implementation of targeted activities aiming at the development of fish production, processing, and marketing in Laos.

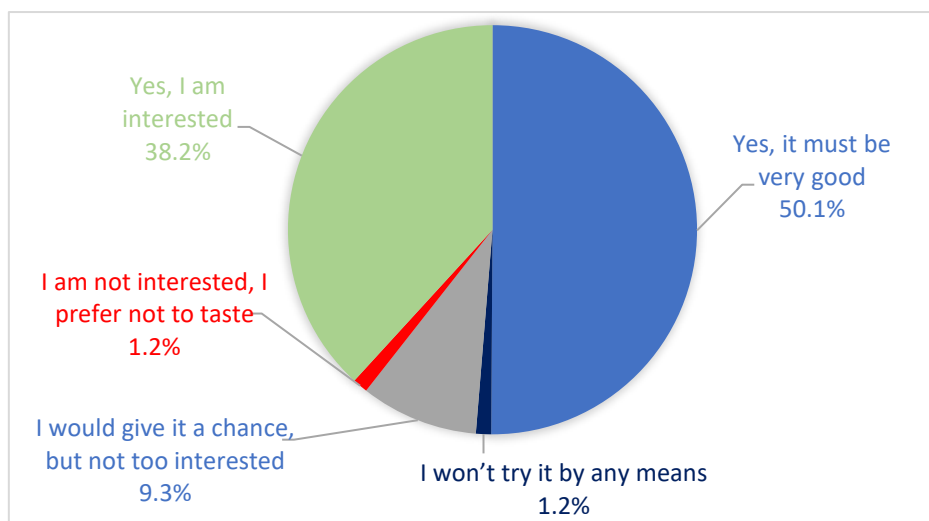
During this survey 175 online questionnaires were completed, after data recording 168 pieces could be assessed. The questionnaires were evaluated by the SPSS statistical package. Data recording was followed by the basic descriptive statistical methods (minimum, maximum, average, standard deviation and distribution). The respondents were segmented based on multiple criteria to carry the significance tests out.

The survey included 33 questions (Q1–Q33) 25 enquired fish consumption habits and 8 were of segmentation types. The processed new products are key significance so some question asked about the new fish products (fillet and fish-ball) illustrated by a visual image. (Q11-Q16: *Would you like to taste these products? If it would be available at the shops near you, would you buy it? What is the reasonable price for this product for you?*) From the product development point of view, the answers were positive, as 61% and 50% of the respondents would willingly buy fillet and fish ball respectively.

Q11: *Would you like to taste this product (fish fillet)?*



Q14: Would you like to taste this product (fish ball)?



The question related to origin of the products was the following (Q21: *We list some countries, from where fish can come from. Please rate the according to your preference*). According to the results, 68.5% of them would like to buy mainly Lao fish and fish products, while 21.8% would buy from other Asian countries, and 9.7% would also buy from European countries and the United States.

The description of the evaluation for all the questions is beyond the extent of this annex. The detailed results will be published in a separate scientific journal.

Vang Vieng artisanal fish processing and fish marketing company



We visited a private "artisanal freshwater fish processing" and sales company in the outskirts of Vang Vieng, in Tha Heua on November 22. organized by Dr. Akhane.

On the left side, you can see the business card of the restaurant and fish shop operated by the company, which indicates that the company is trying to increase its publicity.

During the visit, we held a short meeting with the deputy-manager, and we visited the company's facilities. I will report on the experiences below.

The deputy director reported that her company, which employs about 60 people, deals with mainly the processing and sale of processed and fresh fish as well. About 1.2-1.3 tons of fish are bought daily from local fishermen, mostly through "middlemen" who deliver the fish to the markets. Most of the fish (mainly cyprinids) come from surface waters of the area, primarily from the Nam Ngum reservoir. In addition to fish, crustaceans and molluscs are also bought in smaller batches.

The processing is simple, people manually peeling, slicing, drying, smoking and fermenting the purchased fish. They use simple facilities and primitive tools for processing which meet very limited hygienic conditions. The business has a very limited refrigeration capacity and a low-capacity simple ice-making machine. Some of the products are formatted, decorated and packaged with which they try to improve their appearance to be more attractive for consumers.

Processed products are mainly sold at market stands next to the main road, but fish dishes made from fresh fish are also available in their own restaurant. In addition, the company supplies fish to fish markets of Vang Vieng and Vientiane.

The demand for fish is high and even shows increasing tendency, so there is a lot of competition in the field of fish sales. New fish selling places (stands and restaurants are being built) in road areas close to the water bought by businessmen. The rental fee for the stands is 15 million KIP (nearly 1,000 USD) per month, which is expected to be increased.

Photos of the company and their work:



Meeting with the deputy -director and the fish delivered by the trader.



Weighing and washing the received fresh fish.



Fish drying along the road and a simple ice machine.



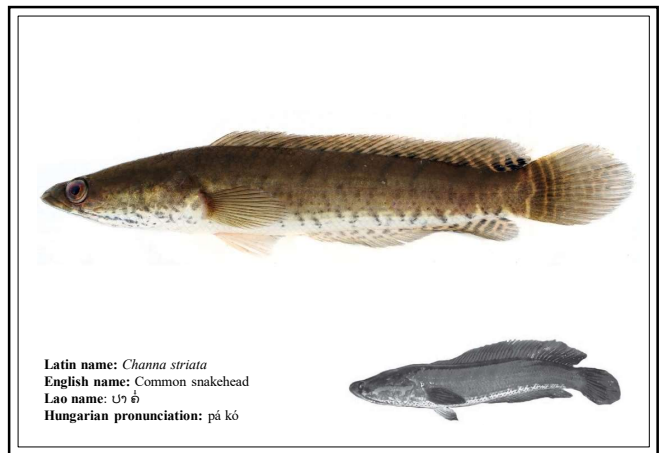
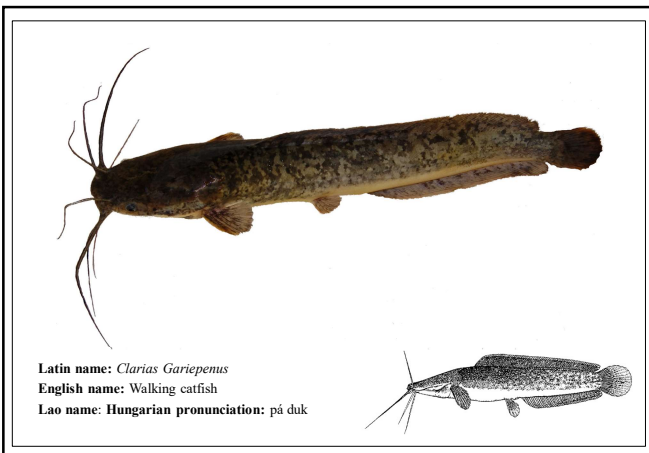
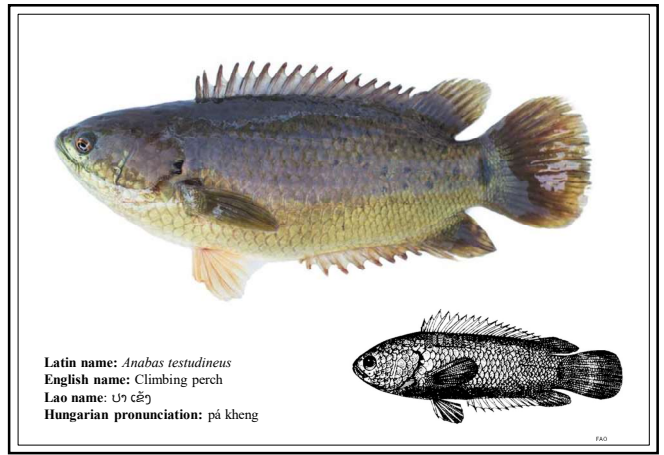
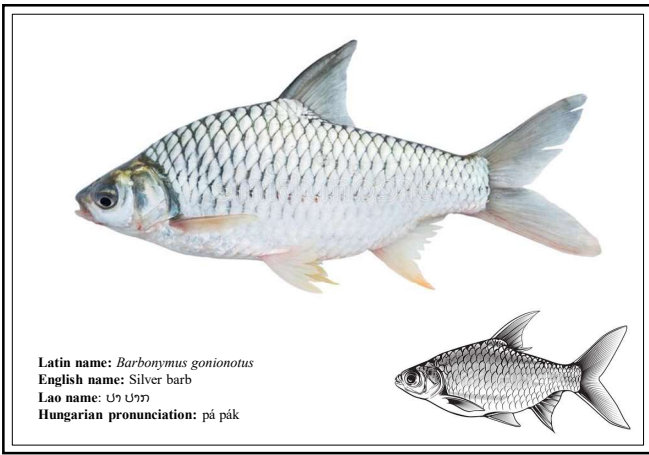
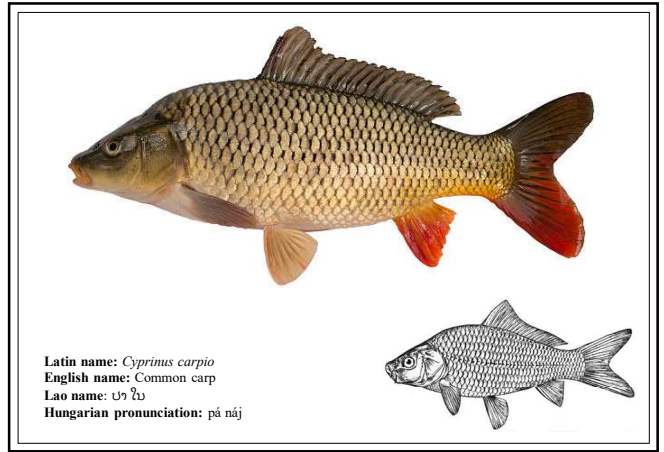
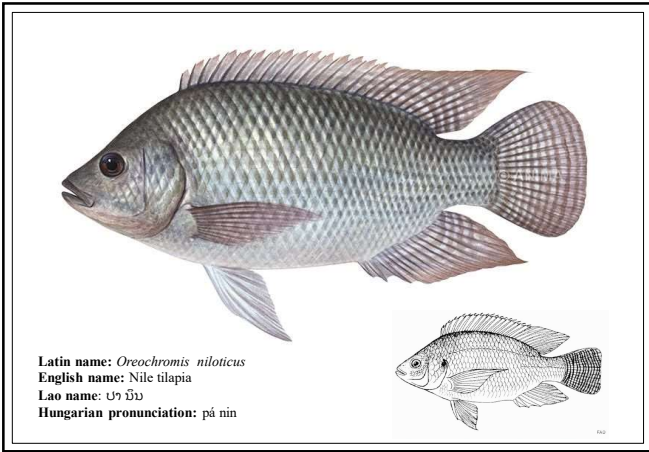
Selling fish products along the main road, where payment by phone is also possible.

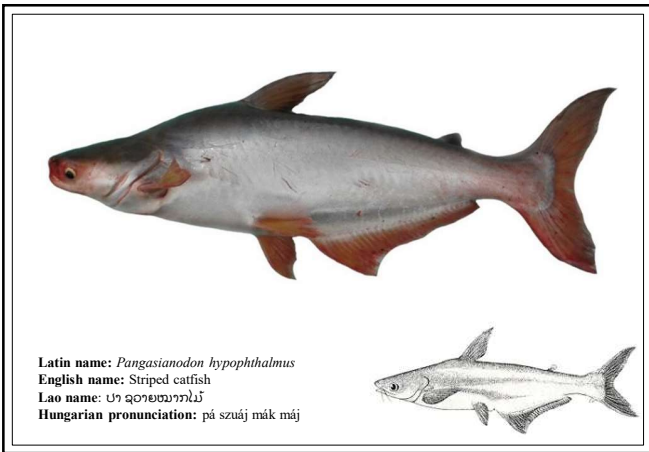
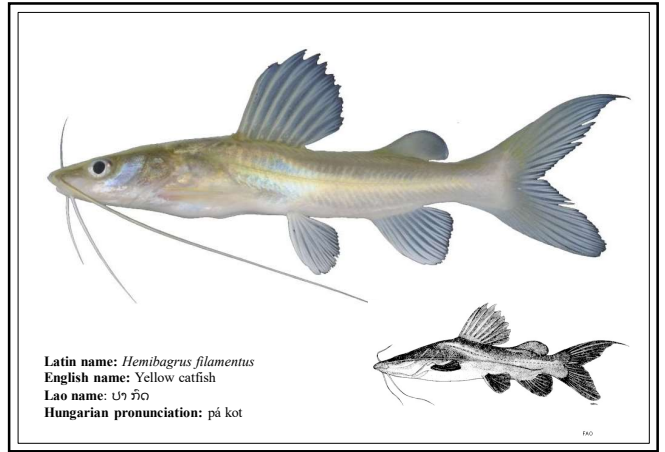
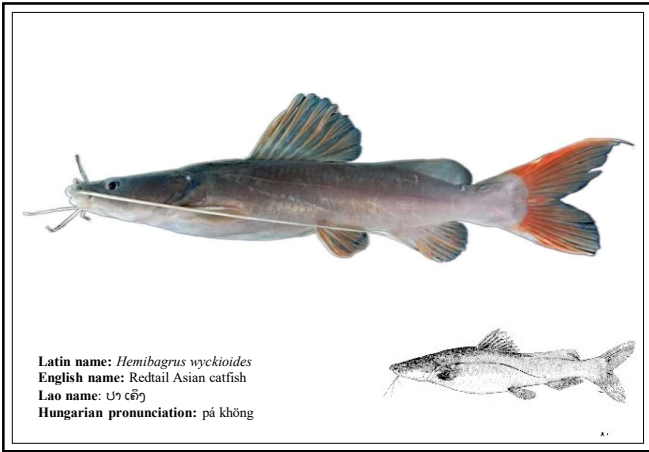


A wide selection of processed products is available to customers at the booths.



The fish restaurant and its kitchen along the reservoir.





The brochure cover of local aquaculture products promotion
(under design)





LAO-HUNGARY-VIETNAM Freshwater Aquaculture Workshop
14-15th November, 2022



FISH VALUE CHAIN DEVELOPMENT

Dr. Emese Békefi

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Importance of the Value Chain concept

The market is increasingly complex and competitive.

There is a need for holistic approach to evaluate business activities and to explore how to provide the most value to customers while maintaining good profit.

A value chain is a series of activities to create and deliver value to the customers. It provides company/companies a competitive advantage by providing consumers with products exactly what they want.

Value chain concept and value chain analysis (VCA) is a useful technic to evaluate business processes and identify chances for innovation.

Value Chain Analysis (VCA) helps small-scale farmers to link them to markets

Small-scale farmers can be incorporated into existing or new value chains or can extract greater value from the chain, either by increasing efficiency or by also carrying out activities further along the chain.

Some main issues of the agriculture value chain concept

SUPPLY CHAIN VERSUS VALUE CHAIN

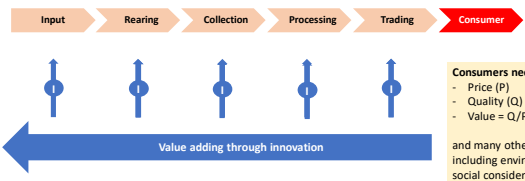
SUPPLY CHAIN covers the activities from supplier to consumer. Supply chain is a conveyance, that is, a commodity or material is taken from one business and sent to the other. The focus of supply chain is integrating the suppliers and producers, decreasing costs and improving efficiency.

Supply chain = supplying products (without adding value)

VALUE CHAIN flows reverse i.e., from consumer to supplier. This is also referred as „demand chain” since consumers are the source of value. Value chain is focusing on innovative product development and marketing.

Value chain = delivering value

Buyer-driven approach




Consumers needs

- Price (P)
- Quality (Q)
- Value = Q/P

and many other criteria including environmental and social considerations

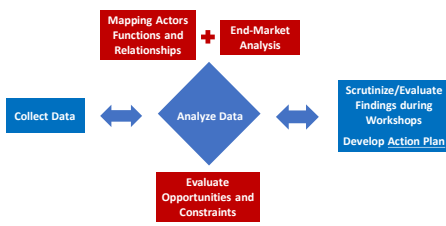
The Value Chain concept



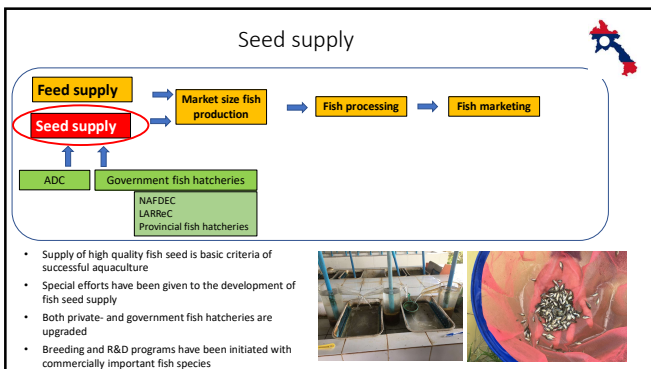
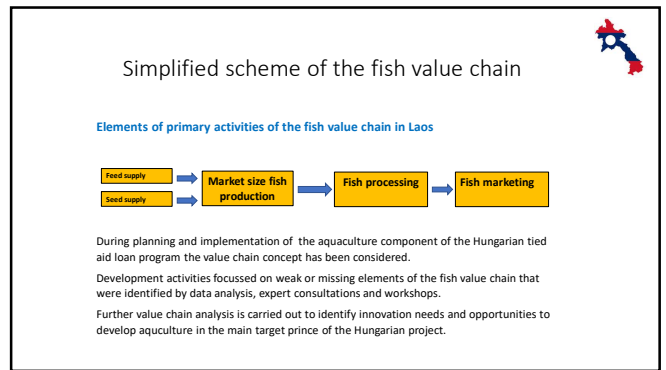
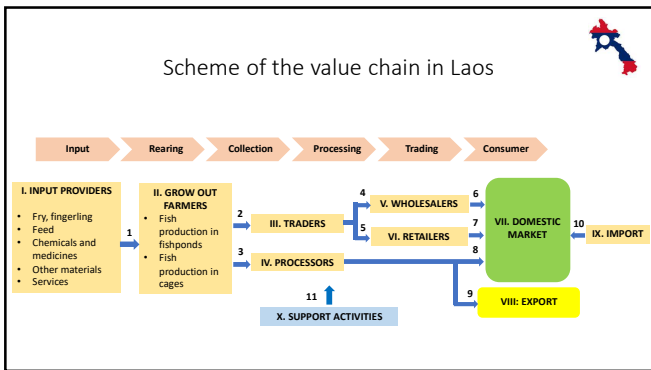
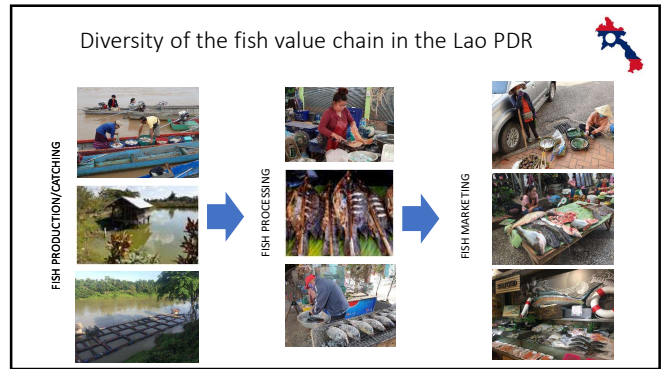
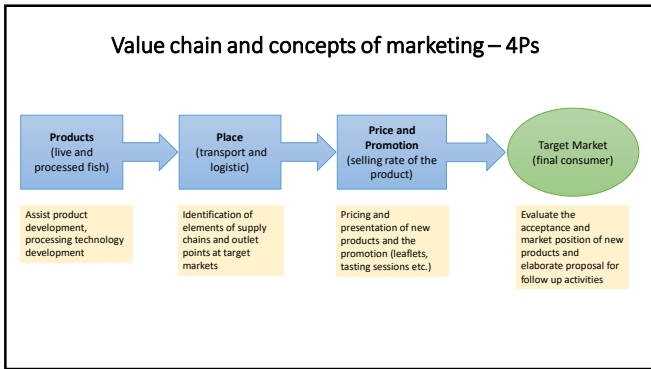
The revenue earned by the value chain is referred to as margins.
Margin = Value Created and Captured – Cost needed of Creating that Value

Source: Michael Porter, 1985

Steps of the Value Chain Analysis



Source: <https://www.marketlinks.org/>



Feed supply

```

    graph LR
      AURA[AURA Co.] --> FS[Feed supply]
      AURA --> SS[Seed supply]
      FS --> MSFP[Market size fish production]
      SS --> MSFP
      MSFP --> FP[Fish processing]
      FP --> FM[Fish marketing]
  
```

- Modern feed factory is built in Nongteng, specialized for the production of high quality feed for fish fingerling
- The feed mill also facilitate the development of feed formula using alternative protein sources
- The feed mill also serves a basis for training and demonstration

Nutrient supply in rural fish ponds

Rice bran

Cassava

Grains, organic by products and wastes

Dissolving organic manure in fish pond

Poultry house above the fishpond

Market size fish production

```

    graph LR
      FS[Feed supply] --> MSFP[Market size fish production]
      SS[Seed supply] --> MSFP
      PF[Pilot farms] --> MSFP
      MSFP --> FP[Fish processing]
      FP --> FM[Fish marketing]
  
```

- Market size fish production development is focussing on pond- and cage fish farming
- Selected pilot farms will apply Good Aquaculture Practice (GAP)
- Results of GAP will be demonstrated and disseminated by extension activities

Fish processing

```

    graph LR
      FS[Feed supply] --> MSFP[Market size fish production]
      SS[Seed supply] --> MSFP
      MSFP --> FP[Fish processing]
      FPP[Fish processing plant] --> FP
      FP --> FM[Fish marketing]
  
```

- First modern fish processing plant is built in Laos
- Type of products are identified by consumer survey
- Products will be certified by „Lao Fish Quality“ label

LAO QUALITY fish certification system for fish farms and fish processing plants

- Description of the company
- Eligibility criteria
- Onsite inspection (assessment of specific criteria)
- Sensory assessment (in processing plant)

Marketing

```

    graph LR
      FS[Feed supply] --> MSFP[Market size fish production]
      SS[Seed supply] --> MSFP
      MSFP --> FP[Fish processing]
      FP --> FM[Fish marketing]
      FM -- FEEDBACK --> FS
      FM -- FEEDBACK --> SS
      MS[Market survey]
  
```

Marketing is a complex activity, that includes sales and services.

Advertising, promotion, and pricing are important elements of sales, while service includes programs to maintain products and enhance the consumer experience, like customer service, refund, and exchange.

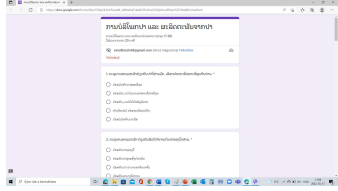
Market survey is an important element of Value Chain Analysis.

End-market analysis as an important step in VCA



Personal interviews with sellers and buyers in traditional fish markets

(300 consumers in 10 markets, 10 restaurants and 10 hotels were interviewed).



On-line questionnaire survey for young consumers (students, NuOL)

(At this time 142 students filled in the survey).

Support activities of the fish value chain



Science and technology support

- NAFRI- MATE collaboration (LARReC-HAKI collaboration)
- NUoL- MATE collaboration
- International collaboration (FFRC, China; RIA1, Vietnam)

Food Chain Safety support:

- Inspection
- Certification
- Laboratory services



Extension services

Human Resources Development

Thanks for your attention!
ຂອບໃຈ!

Visit agro-touristic sites in Luang Prabang



Oum Huck Organic Farm, that is famous for „civet cat” coffee, but water with ornamental fish is a part of the tourist center of the farm



„Buffalo Dairy” farm where products made of buffalo milk is also sold for tourists, but the farm is also assisting buffalo breeding of small-scale farms in the region. Fishpond is also a part of the complex.



Angling is becoming a popular pastime among urban people in Laos, however there is no well organised angling tourism, and appropriate angling sites are also missing. Pond fish farms that offer angling services may have good business opportunities in the future in some regions.

QUESTIONNAIRE
on multi-functional pond fish farming (MFPFF)

1. Is MFPFF acknowledged as a special subsector of pond fish farming sector?

Please chose one:

Yes	
it is not known by many people what it is exactly	
no, a multi-functional pond fish farm is just like other fish farms	

Comments:

2. Is multifunctional use of fish ponds strengthening in the pond fish farming sector?

Please chose one:

Yes	
No	
I don't know	

Comments

3. If multifunctional use of fish pond is strengthening, what is the main driving force to develop multifunctional fish farming?

Please indicate the importance of the role (1 is least important, 5 is most important)

Driving force	1	2	3	4	5
economic stability through diversification of activities					
to increase profit					
the need for harmony between fish production and the natural environment					
to utilize the availability of government supports					
others:					

Comments:

4. If multifunctionality is not developing, what could be the reason?

Please indicate the importance of the role (1 is least important, 5 is most important)

Reason why multifunctionality is not developing	1	2	3	4	5
conventional pond fish farming seems to be viable for a long run					
no natural resources are available that would be necessary for such type of farming system (e.g. forest, green area)					
no potential in local tourism					
lack of financial resources or support					
lack of human resources that are need for various services					
lack of information and knowledge that are needed for the development					
Others					

Comments:

5. In your opinion, what element of multifunctionality will get stronger in the future?

Please indicate the importance of the role (1 is least important, 5 is most important)

Element that will get stronger in the future	1	2	3	4	5
conventional fish production					
new type of fish production technologies (fit to the natural aquatic					
touristic services					
dissemination of information, training and education					
ecosystem services					
Others					

Comments:

6. Contribution of MFPPF to the better social acceptability of aquaculture?

Please chose one:

very good	
Good	
same like other pond fish farm	

Comments:

7. Contribution of MFPPF to the increase of fish consumption?

Please chose one:

yes through providing information on fish and aquatic environment on a wide scale	
yes through the diversification of product variety (e.g. organic fish)	
no or at the same rate as any other pond fish farms	

Comments:

8. Is it expected that the role of MFPPF will increase in aquaculture in the future?

Please chose one:

no, opportunities have been used where conditions were available	
no, because this is not an attractive option for conventional pond fish farmers	
yes, because there are unexplored opportunities	
yes, because there are new information regarding the structure and function of FPPF	

Comments:

9. The research on MFPPF should focus on what areas?

Please chose one:

investigation of structure and function of MFPPF (in order to increase efficiency)	
comparison of MFPPF and multifunctional farming in other areas of agriculture (e.g. forestry)	
calculation of the value of ecosystem services (in order to receive appropriate compensation)	
Others	

Comments:

10. Would international cooperation in this field help the development of MFPPF and wider acknowledgement of multifunctionality even on international scale?

Please chose one:

yes, through the establishment of an international network	
yes, through organising workshop(s)	
no, because the importance of MFPPF is not that high in fish farming that would justify international cooperation	
no, because MFPPF is part of pond fish farming where international cooperation already exists	

Comments: