

NORGES VEL

Tilapia de l'EST

Mid-Term review of the Project “Producer Steered
Tilapia Farming, Organisation and Sales in
Tamatave, Madagascar, Phase II 2016-2019”

Evaluation Report **(Final version)**

February 2019

Delta Associés

Etudes - Conseil - Développement

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Antananarivo, 28 February 2019

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Subject: Evaluation Report related to "Mid-Term review of the Project "Producer Steered Tilapia Farming, Organisation and Sales in Tamatave, Madagascar, Phase II 2016-2019"

Dear Madam,

We are pleased to submit you the final report related to "Mid-Term review of the Project "Producer Steered Tilapia Farming, Organisation and Sales in Tamatave, Madagascar, phase II 2016-2019" in accordance with the terms of contract and taking into account the comments you made on the draft report.

This report includes five parts:

- An introduction with a brief overview of the assignment background;
- The second part describes our methodological approach for the assignment implementation;
- The third part sets out the "THE PRODUCER STEERED FISH FARMING" Project;
- The fourth part illustrates the inventory situation and the project evaluation results;
- The fifth part includes conclusions and recommendations.

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We would like to thank you, your team and partners for their collaboration since the beginning of the assignment.

Sincerely yours,



Sahondra RASOARISOA
Managing Director
Delta Associés

ACRONYMS AND ABBREVIATIONS

ADEFI	:	Agence de Développement des Finances (Finance Development Agency)
AGRIVAL	:	Société industrielle dans la production industrielle de l'alimentation animale (Industrial company in the industrial production of animal feed)
APDRA	:	Association Pisciculture et Développement Rural en Afrique (Fish Farming Association and Rural Development in Africa)
ASH	:	Autorité sanitaire Halieutique (Halieutic health authority)
BoD	:	Board of Directors
CGA	:	Constitutive General Assembly
CAADP	:	Comprehensive Africa Agriculture Development Program
CITE	:	Economical and Technical Information Center
CREAM	:	Centre de Recherches, d'Etudes et d'Appui à l'Analyse Economique à Madagascar (Center of Research , Studies and Support to Economic Analysis in Madagascar)
CIRAD	:	Centre de coopération International en Recherche Agronomique pour le Développement (International Cooperation Center for Agronomic Research for Development)
CSA	:	Centre de Services Agricoles (Center for Agricultural Services)
CSP	:	Centre de surveillance des pêches (Fisheries Monitoring Center)
CTD	:	Collectivité territoriale décentralisée (Decentralized territorial collectivity)
COFAD	:	Consultants for Fishery, Aquaculture and Regional Development
DEA	:	Diplôme d'études approfondies (Post graduate Diploma of Advanced Studies)
DRPRH/DRRHP	:	Direction Régionale des Ressources Halieutiques et de la Pêche (Regional Department of Fishery and Halieutic Resources)
EGA	:	Extraordinary General Assembly
EUR	:	Euros
FAO	:	Food and Agriculture Organization
FCR	:	Feed Conversion Ratio
FOFIFA	:	Foibe Fikarohana momba ny Fampandrosoana (Development Research Center)
FORMAPROD	:	Programme de Formation Professionnelle et d'Alimentation de la Productivité Agricole (Professional Training and Food Program of Agricultural Productivity)
GA	:	General Assembly
GBP	:	Great Britain Pound
GIZ	:	Gesellschaft für Internationale Zusammenarbeit
JICA	:	Japan International Cooperation Agency
LFL	:	Livestock Feed Ltd
MGA	:	Malagasy Ariary
MICROCRED	:	Microfinance & Credit Group (Microfinance Institution)
MIDEM	:	Independent Mission for Development and Education in Madagascar
M&E	:	Monitoring and Evaluation
NDP	:	National Development Plan
NCBA CLUSA	:	National Cooperative Business Association
NGO	:	Non Gouvernemental Organisation
NOK	:	Norwegian Kroner
NORAD	:	Norwegian Agency for Development
NORGES VEL	:	Royal Norwegian Society for Development

ACRONYMS AND ABBREVIATIONS (continued)

OTIV	:	Ombona Tahiry Ifampindramana Vola (Microfinance Institution)
PADM	:	Projet d'Aquaculture Durable à Madagascar (Sustainable Aquaculture Project in Madagascar)
PATIMA	:	Projet d'Aquaculture de Tilapia à Majunga (Tilapia Aquaculture Project in Majunga)
PDDAA	:	Detailed development Program of Africa Agriculture
PROSPERER	:	Programme de soutien aux pôles de micro-entreprises rurales et aux économies régionales (Support Program to Poles of Rural Micro Firms and to Regional Economics)
ProDéciCID	:	Projet Développement Inclusif et de Décentralisation (Inclusive Development and Decentralization Project)
PPP	:	Partenariat Public Privé (Private public partnership)
PSFF	:	Producer Steered Fish Farming Project
RDP	:	Regional Development Plan
SA	:	Société Anonyme (Joint-stock Company)
SABMA	:	Société d'Aliments du Bétail Marotia (Animal Feeds Company of Marotia)
SARL	:	Société Anonyme à Responsabilité Limitée (Limited Liability Company)
SARLU	:	Société Anonyme à Responsabilité Limitée Unipersonnelle (Sole Owner Private Limited Company)
SWOT	:	Strength, Weaknesses, Opportunity and Threat
TDE	:	Tilapia de l'Est
UCO	:	Union of Cooperatives
US\$:	United States Dollar

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EXECUTIVE SUMMARY

1. SUMMARY OF OBJECTIVE AND METHODOLOGY

Norges Vel (The Royal Norwegian Society for Development) obtained a grant from NORAD (the Norwegian Agency for Development Cooperation) for implementing a frame agreement with a set of country programs: "Local business development and poverty reduction through sustainable and climate sensitive productive activities". This frame agreement includes 4 country programmes whereof Madagascar Programme: "Sustainable and improved coastal smallholder livelihoods" is one.

For Atsinanana region, in Tamatave, the "Project Producer Steered Tilapia Farming, Organisation and Sales" was born following a study of fish farming potential in the region.

In the first phase, Norges Vel collaborated with the NGO MIDEM, its cooperating partner, for the project implementation from 2011 to 2015. Structuring and organization needs were identified during the feasibility study (2010) and worked on from 2011. A Tilapia farmer's Cooperative Union was established to facilitate access to inputs and the joint selling of products.

From 2015, TDE Union took charge of the management and coordination of activities planned by the project as well as the supply chain control. TDE and Norges Vel collaborate to achieve the project objectives according to pre-established cooperation conditions accepted by NORAD.

The project aims to increase farmers' income in Atsinanana region, to enable them to better withstand climate change, create sustainable jobs for women and men, and increase access to marine proteins.

According to the framework agreement between Norges Vel and NORAD, a mid-term evaluation of a project within the frame agreement 2016-2019 was planned. The project with TDE was chosen with focus on:

- Evaluating the organisation and business model of Tilapia farming supported by TDE cooperatives Union in Madagascar;
- Contributing to build the sustainability of the model with relevant recommendations;
- Documenting and providing the best practices for sustainable models of tilapia business development;
- Providing elements enabling to scale up the fish farming business model (learning and accountability).

Delta Associés was entrusted to ensure this mid-term evaluation composed of four steps:

- preparation and scoping of assignment;
- information collection and situational analysis;
- indepth understanding, data processing and analysis;
- survey outcomes and report finalization.

2. FINDINGS

Project Relevance

From the results of our analysis, the project is relevant and in line with the national aquaculture policy and the adequacy of the activities and approaches adopted with regard to the real problems encountered by the fish farmers was also confirmed:

Fish farming is characterized by a quick return on investment and plays an undeniable role as a main source of income or an additional source of income. As a result, the project contributes to job creation and fish farmers' income improvement. There was a marked improvement in income per pond and per cycle from MGA 915,207¹ in 2016 to MGA 1,393,393 in 2018, and a monthly average income increase from MGA 183,000 to MGA 278,000 for a production cycle of 5 months, which exceeded national minimum wage at MGA 168,000² in 2018.

In November 2018, the project has created jobs for 329 producers through the establishment of 374 ponds operated out of a total of 459 ponds (84 under construction and 1 new). On the 459 ponds, 410 are safe and 49 are seasonal. On average, according to the information collected during the focus groups, 30% of producers are women.

With production surplus, fish farmers and the local population will be able to consume fish and improve their protein intake. Thus, the project contributes to the production development and nutrition security in its areas of intervention. In 2018, there was an increase in average production per pond of 503 Kg in 2016 to 566 Kg in 2018, and an increase in total production of 231,654.5 Kg³ on November 2018 as compared to 90,326 Kg in 2016.

- The project's approach of facilitating producers' access to fingerlings and inputs (fertilizers, feed, equipment, etc.) responds to the fishing and aquaculture sector strategies advocated by the "Lettre de la Politique BLEUE"⁴, which also takes into account the Pan-African policy defined by the Policy and Strategic Framework for Fisheries and Aquaculture Reform in Africa, and adopts the process of the Comprehensive Africa Agriculture Development Program (CAADP) seeking to achieve an average annual growth of 6% in Agriculture, including Livestock, Fisheries and Aquaculture, through (i) extension of the area under sustainable management, (ii) increased market access, (iii) increasing the food supply and reducing famine;
- The opening of sales outlets in Toamasina as well as the targeting of Antananarivo as product outlets (opening of sales outlets in Antananarivo also with authorized resellers) contributes to meeting the needs of the national fish market which is stated in the "Lettre de la Politique BLEUE";
- The approaches used met the fish farmers' expectations: selection criteria, credit application of revolving inputs, improved technical training, coaching and support, pond building technique, inputs system supply, evacuation of products for sale, products marketing.

¹ This is a gross average income, that is Turnover deducted from intermediate consumption including the participation of 8% for TDE functioning

² Guaranteed Minimum Interprofessional Salary in 2018

³ Source : TDE data

⁴ Lettre de la Politique BLEUE (Blue Policy Letter) established in 2015, develops the strategic orientations of the sector for the ten coming years. It is in line with (i) the State policy vision, defined by the General Government Policy and implemented through the National Development Program (PND 2015), et (ii) to main challenges under « CAADP ».

Beneficiaries' Satisfaction

The satisfaction expressed by all the actors concerned by the project, especially the direct beneficiaries (fish farmers) is tangible despite some dysfunctions mentioned regarding the delivery of input orders, and the delivery points.

It is undeniable that the approach adopted by the project to organize the value chain from production to products marketing is unprecedented and that the consideration of beneficiaries' expectations is noticeable.

Relevance and complementarity with other projects

Several actors have been visited to assess the synergy and complementarity with other actors, but at this evaluation stage, the project has not yet established a partnership agreement with other projects involved in fish farming field. Indeed, the TDE covers all links in the value chain. However, a complementarity of actions is possible for certain links reinforcement, and more particularly:

- Fish feed requirements by a large number of users in different projects with fish farmers they support justifies the need for sufficient quantity and quality feed production locally by specialized companies in the field, thus sparing them from being imported. This is a mid – long term vision but to be launched straight away;
- Up to standards of infrastructure and equipment for processing and packaging/ transportation of products, the products processing infrastructure conditions currently used which do not meet the standards (wastewater evacuation problem) as well as the transport conditions by common national transport which are not appropriate. For example, a project financed by JICA in Mahajanga which has set up a cold chain made up of ice factories, freezing rooms, storage and a fleet of refrigerated truck, which cold chain is usable by all interested private operators. It is a project that the Ministry of Fisheries Resources and Fishing could develop in partnership with donors as part of a project and that TDE could benefit for the products transportation to Antananarivo;
- Capacity building in production techniques by sharing experiences mostly from TDE;
- Strengthening the Unions / Federations structuring.

Operational and organizational Capacity

TDE's organizational structure corresponds to the missions entrusted to it and reflects the value chain organization. In addition, the unity of command principle is respected.

Despite this, our analysis shows that the Boards' current functions are still limited to making decisions based on the reports or information provided by the Executive Management. Due to lack of sufficient qualification, the members are not yet able to make an in-depth reflection on TDE's orientation.

Impacts

Indeed, the project enabled:

- Facilitating the access to inputs including fingerlings, feeding and fertilizer as the inputs supply organization is ensured by TDE. Fish farmers are not required to have start-up funds because TDE has adopted the principle of "revolving input credit" which consists of receiving fingerlings, feeding and fertilizer at the beginning of activities and return them at harvest time;

Impacts (continued)

- The improvement of fish farming technique coupled with the introduction of monosex Tilapia of good performance which constitutes an opportunity to the producers to increase their production;
- Ensuring product outlets through the sales organization under TDE’s responsibility: the producers are no longer worried about the search for customers and the products outlet (their routing to markets).

a) Effects produced directly to the active/ producing tilapia members of TDE with their families and difference that the activity has made to the beneficiaries:

Positive effects produced on TDE members and their families are perceptible.

The adoption and application of a new fish farming technique with technological advances, as well as the entire value chain control, have made it possible to better control the production and product validation cycle. An improvement in yield and productivity was obtained through a variety of successful introduced fish, a new technical route, and a significant contribution of complementary feed.

Fish farming has boosted the economy and the fish farmers’ motivations by crediting everybody's hope for a better living condition.

A clear improvement of living conditions: enabling to support the children education costs, medical care fees in case of illness, household equipment acquisition, house building (changing the sheet metal roof) ... was mentioned by the fish farmers. An income improvement from the fishfarming activity has led to living conditions improvement, the possibility of being treated in the event of illness, the possibility of sending the children to school, improvement of the animal protein intake.

b) People affected by the project

Production Evolution, producers number and ponds number from 2016 to 2018

	2015	Nov 2018
<i>Production in kg</i>	38 745	231 654,5 (in november 2018)
<i>Number of producers</i>	61*	329
<i>Number of ponds</i>	48 functional ponds*	459 ponds
	54 under construction*	- 374 functional ponds
	8 functional cages*	- 84 under construction and 1 new

*source: PSSF Project evaluation, Air Consult, Final report/TDE

According to this table, compared to 2015, production and the number of producers increased more than 5 times while the number of functional and stocked ponds in 2018 was 8 times higher than in 2015.

Profitability is observed by fish farmers who have gone through production cycles thus attracting the rice farmers to transform their rice fields into ponds. However, as the goal is not to turn rice fields into ponds to increase fish production to the detriment of rice, TDE should encourage the construction of new ponds on areas not used for cultivation. The project also had a positive impact for environment as the majority of fish farmers have stopped producing coal since the project existence.

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- c) Effects produced indirectly to the local villages, wholesalers/ retailers buying from TDE, consumers, others in the surrounding society

The impacts produced on the indirect beneficiaries, in particular the local villages, the retailers; the consumers are appreciated regarding the evolution of the quantities ordered and the quantities sold.

- For local villages: fish farmers are allowed to take 5 Kg of fish at each harvest and sell their products to the local population or eat them. As a result, access to animal protein is improved.
- For wholesalers / retailers buying from TDE: increase of the number of TDE products wholesalers / retailers.

For Antananarivo, 1 point of sale was set up in November 2016. It sells only fresh and frozen Tilapia from TDE Toamasina to resellers, restaurants and direct consumers. According to the responsible, in 2016, this point of sale ordered 40Kg of fish and currently, it manages to sell around 200 Kg to 250 Kg of fish per day.

Recently, another point of sale in Antananarivo is working with TDE, according to the Manager. Given that Toamasina market is starting to be a little saturated according to the Manager, TDE plans to expand the market in Antananarivo.

For Toamasina, the number of resellers is currently around 20. According to statistics, TDE daily sales increased from 479Kg per day in 2017 to 831 Kg/day in 2018⁵. About 80% are sold in bulk and 20% at retail.

In this situation, it can be said that the value chain has created jobs for direct and indirect beneficiaries to improve their income and diversify the products offered on the market. During our visit, however, it was noted that some customers prefer wild and live fish. A thorough market study is needed to know the consumers' preferences.

- d) Effects on the cross-cutting issues gender, human rights, climate and the environment and corruption

The project also had a positive impact for environment as the majority of fish farmers have stopped producing coal since the project existence.

In order to reduce the risk of pollution of the discharge spills from fish in the ecosystem, a physiological analysis of the discharges will have to be carried out periodically to follow the evolution of their physiological and chemical quality.

Validation criteria for new membership for each TDE member co-op are well established. A new membership is based on well-defined technical criteria and passes the members General Assembly approval. There is no exclusion in terms of gender or social criteria. The membership criteria are well established and the mode of governance of each cooperative restricts any type of corruption.

For the gender mainstreaming and development of women's involvement: on average, according to the information collected during the focus groups as well as the data collected from TDE, 30% of the producers are women. Women have their role in local cooperatives, often as treasurers, because they manage money efficiently and are well organized. The majority of women members in a cooperative have a relatively low level of education. Besides, in most places in Madagascar, there is often a cultural barrier to having a woman as a leader. This does not allow them to properly manage the members who are composed mainly of men.

⁵ Source : TDE, average of daily sales evolution

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Compared to the principle of non-exclusion, the validation criterion of new farmer integration to a cooperative is very clear and does not exclude anyone:

- Capacity to build up to 3 ponds at least,
- Location of the ponds near the ponds located in the zones of TDE Union technicians' intervention.

From the observations made, it has been estimated that tilapia farming is more resilient compared to agriculture in the event that temperature rises are favorable to the activity and the latter is less sensitive to rainfall disturbances. Moreover, it is less harmful to climate change because the pond construction is only one time and therefore does not require plowing or fire of culture at each crop year.

Moreover, for the pond design, grids at the overflow gates of each pond should be installed and working, to ensure correct outflow of water during heavy rains. It also strengthens the resilience of ponds/farmers.

Efficiency and effectiveness

Development of production quantity as compared to development of operating expenses (Part: sustainability)

	2016	2017	Nov 2018
Production in Kg	90,326.60	151,994.70	231,654.50
Turnover in MGA	653,345,693.16	1,208,116,778.60	2,102,329,309
Expenditures in MGA	1,530,467,214.41	1,831,066,343.78	1,034,938,560.51

Source: Auditor's report for 2016 and 2017, TDE for 2018

From 2016 to 2017, an increase of 14.36% in expenditures results in an increase of 68% in production, and an improvement of 84% in turnover.

From 2017 to 2018, a decrease of (-43.47%) in expenditures results in an increase of 52.41% in production, and an improvement of 74% in turnover.

Referring to the results obtained, we can say that TDE has been able to optimize its resources while improving its performance.

The resources made available to TDE are in line with the results obtained, the technicians and the socio-organizer are well integrated into the producer community and their capacity has been positively appreciated by a large majority of respondents. Their mission frequency for monitoring /coaching was considered as satisfactory although this frequency was spaced with the operations extension.

Despite this, the following facts should be noted:

Some interviewees have raised some non compliant feeds deliveries the last months of 2018: delivery of feeding for finishing instead of feeding for growth. This non compliance of deliveries to farmers is due to a delivery non compliant with the order of the suppliers. There was also late arrival of fingerlings orders sometimes not allowing the fish farmers to do two production cycles in the year. In this case, it is important to reinforce the follow-up so that fish farmers observe the technical instructions and thus have the ponds ready to be stocked in time and also sensitize them to choose non-floodable sites allowing the development of ponds usable even in rainy season. It should also be considered if there is no other cause that would slow stocking fingerlings in grow out ponds, such as the ability of the products to absorb the market, according to the producers.

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Although trainings and capacity building on the functioning, structure and organization of a cooperative have been provided to board members and other members, some challenges remain to be met so that producers can effectively manage their activities. Some members expect to be paid by attending meetings arguing that it would take a lot of time. Actually, members do not think they have a good enough analytical capacity to validate the reports submitted by the executive management. They appear to lack the skills and knowledge to guide and manage the cooperative union

Sustainability

– Technical Sustainability:

From the technical feasibility point of view, all the conditions to develop this activity are met, namely: the availability of suitable land for ponds construction, water availability throughout the year, establishment of a technical responsible at cooperative level.

In terms of financial viability, production activities have enabled co-op members to set aside a 5% of their sale as savings to set up a fund to generate the revenue they need to operate as well as to acquire goods and services. 8% of income is in addition taken by TDE to cover part of TDE expenses (all TDE expensed will be covered by the 8% when production is around double from today). Until TDE has managed to grow TDE members' total production to this point, Norges Vel will support TDE's costs as relevant – pending continuous good results and Norad's further approval of project support.

It should be noted that all these findings are still at their beginning. The measures taken by TDE seem likely to generate considerable effects with planned sustainability as well. However, time remains the major issue.

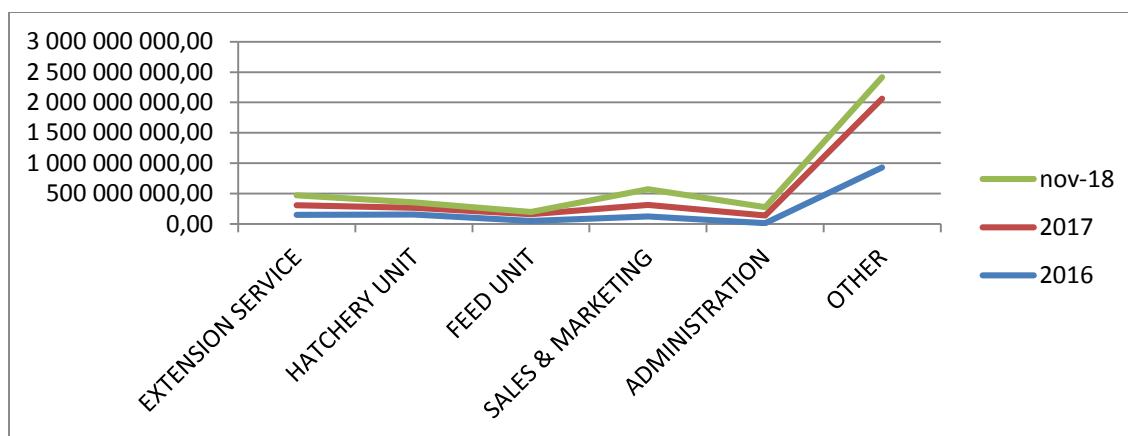
In fact, more time of the intervention would have allowed a better maturity of the actors as well as a massification of the target group and the local actors positive experiences caused a better motivation and a better operational independence.

– Financial Viability

Development of operating costs per unit

	2016	2017	Nov-18
<i>EXTENSION SERVICE</i>	151,449,191.39	158,151,185.13	161,153,333.81
<i>HATCHERY UNIT</i>	155,609,057.27	108,290,389.27	93,338,575.18
<i>FEED UNIT</i>	47,312,611.58	113,253,089.22	34,182,051.70
<i>SALES & MARKETING</i>	120,274,799.60	190,343,344.20	258,283,624.26
<i>ADMINISTRATION</i>	12,714,325.08	127,700,573.91	133,665,726.72
<i>OTHER</i>	929,107,229.49	1,133,327,762.05	354,315,248.84
Total of Expenditures	1,530,467,214.41	1,831,066,343.78	1,034,938,560.51
<i>Funding by Norges Vel</i>	662,643,851.00	703,407,436.81	869,008,918.00
<i>Ratio :</i>			
<i>NV funding /TDE expenditures</i>	43%	38%	84%

Sustainability (continued)



Source: Auditors report, NV and TDE data

According to this table, an improvement of expenditure financing capacity by TDE through a diminution of the expenditure part funded by Norges Vel from 43% in 2016 to 38% in 2017 is noted. For 2018, it was noted that Norges Vel financed 84% of TDE expenditures. This increase is due to an increase of 107% for the Feed Unit as well as an increase of 106% for the Sales and marketing Unit. Those increases are due to the acquisition of a refrigerating truck, the acquisition of a land for building a new storage location, and the acquisition of a new sale point.

As compared to the financial sustainability, the production activities have enabled the cooperative members to put aside a percentage of 5% of their sale as savings for the purpose to set up a fund enabling them to generate income needed for their functioning as well as acquisition of goods and services.

It needs to be noted that all these findings are still at their commencement. The arrangements made by the project are likely to generate significant effects including sustainability that was also scheduled. However, the major matter is time.

The major concern after withdrawal of NorgesVel funding is the operation of TDE team:

- Payment of the technical team salaries (management),
- Renewal of heavy equipment (cars, ice making...).

The objective is that, both income and turnover for TDE is sufficient to cover both for all salaries and other operational costs. Currently, production covers 77% of operating/ administrative costs in relation to the goal to reach 60% in 2018.

For farmers, the purchase of inputs and the cost of pond construction remain quite high. In relation to the risks represented by the activity (theft, flooding, etc.) and the lending conditions of the microfinance institutions, producers are less favorable with addressing to microfinance institutions despite the fact that the activity is profitable. Savings and mutual aid remain the options for which the producers are favorable.

The pre-financing system of inputs by TDE is actually less expensive, with a repayment schedule more adapted to producers' situation and which further contributes to the financing of TDE's operating costs (like the production of fingerlings, the inputs delivery, harvest and the production sale ...).

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At the level of microfinance institutions, credit is more expensive, requires a guarantee of 133% to 150% of the requested amount, repayment must be made right from the first month following the fund release and the maintenance of TDE's various services would still be an additional cost.

TDE, however, may have difficulty recovering the funds invested in case of production problems. In order to reduce this risk, the monitoring and support system should be strengthened to ensure that all technical measures to secure and maximize production are applied.

However, the credit that TDE obtained from LFL for feeds purchase is a very good point and allows to continue the "revolving input credit".

- Environmental sustainability and climate resilience of ponds:
 - To avoid any escape of species raised in the ecosystem, TDE harvests the fish before they mature
 - For plastic waste management, including feeds and fertilizers packagings, they are re-used by producers until they are out of use. Packaging is used mainly for transporting production to the collection point during harvesting. There is however no specific process of treatment
 - In relation to water resources management, as TDE uses imported feed, one should be vigilant and put in place a light system of water quality control to avoid or minimize the negative impacts of the use of these feeds as well as chemical fertilizers on the environment as well as on the ecosystem
 - Based on experience in other localities, fish viability may be affected by plant protection products used by farmers near ponds, hence the need to continue monitoring production and physiological parameters with a risk to lose the investments made
 - Considering rainfall irregularities as well as temperature increase, fish farming is a resilient activity. Temperature rise is favorable for fish farming, however, it is necessary to set up a system for monitoring physiological parameters such as water temperature and its characteristic by the producers themselves
 - For the activity sustainability, reforestation and bank protection activities have been carried out by some fish farmers and should be reinforced by the farmers themselves in order to protect the sources supplying the ponds, however TDE has not cut down trees
 - As far as possible, especially for fish farmers who are also raising livestock, use organic fertilizers along with chemical fertilizers to minimize the negative effects of chemical fertilizers on soil quality.

3. RECOMMENDATIONS

To consolidate the achievements and correct the dysfunctions noted, we have the following recommendations:

Synergy with others and communication

- Improving the complementarity of actions to strengthen certain links, and more particularly developing partnerships with various institutions and projects directly or indirectly involved in fish farming:
 - Fish feeds (in Madagascar) because of the considerable needs for feed to justify the local feed production, thus sparing them from being imported.
Indeed, several projects are generally involved in fish farming development and particularly in monosex Tilapia and there would be fish feed needs justifying the relevance of local production. Indeed, it should be pointed out that there are companies that produce fish feed (AGRIVAL, SABMA, and AMI) and other ones that has produced the same (TIKO FEED MILL), which shows the speculation feasibility but whose performance should still be improved. Collaboration with research institutions such as FOFIFA, which makes monosex Tilapia farming, will allow the experimentation of different provende formulas. This is not necessarily by TDE but in the context of projects under MRHP supervision, requested by the fish farmers platform.
The problem of insufficient raw materials can be solved by the PPP system between Communes - Food Manufacturing Companies - Farmer Cooperatives. To ensure the need for raw materials, private public partnerships can always be established with communes that have land to be exploited by producer cooperatives (this is a type of PPP developed by the "Local Economic Development" component of the Communal Inclusive Development and Decentralization (ProDéCID), Project financed by the German Cooperation and implemented in three Regions of Madagascar.
 - ⊖ Compliance with standards of infrastructure and equipment for products processing to prevent product contamination by microbes and to limit the ruptures of cold affecting the quality of the products.
 - Collaboration with universities can be carried out for studies to be done by students who prepare graduation memoirs(engineering, master ...) to see the effects / impacts of the exclusive use of chemical fertilizers and other inputs used by the farm on the soil (soil analysis, ...) as well as on water resources, and also study of erosion and erosion control strategy development.
- Encourage the communes to set up a local support system that is accessible and viable for TDE. Actually, in the communal development plan implementation, the commune has technicians who will help for the communes' priorities achievement.
Through the rebate paid to the commune thanks to TDE activity, the commune is winning when the TDE activity is doing well. In order to strengthen the activity viability and thus develop the commune, the technicians from the commune could sensitize the producers to respect the recommended production techniques. TDE's technicians could for this purpose, provide them technical training so that the commune's technicians can adequately accompany and follow up TDE members' activities. TDE activity would be good and the commune as well.

Evaluation Report

- Strengthening the collaboration with deconcentrated technical services, namely:
 - The Regional Department of Fisheries Resources and fishing with its divisions which issue the compliance visas
 - And the Regional Department of Livestock which issues the certificates of origin and health certificates of products shipped outside the Region.

The technical services can coordinate the actions involving several actors concerned by the sector: estimation of the feed needs of all the fish farming projects / entrepreneurs - implementation of economic intelligence informing on the prices used, the fish productions with the quantities marketed by region / national ... These data are interesting and would help in decision making on the outlets extension for example.

The DRRHP and the Official Veterinarian / Fisheries Authority could support TDE in designing the new treatment infrastructure plan to comply with the standards.

It is also their role to:

- inform TDE and fish farmers about the legislation in force and / or any new administrative procedures,
 - support the establishment and formalization of a platform for the promotion of monosex tilapia breeding. Promoting synergies and complementarities of actions with other projects working for the development of monosex tilapia breeding: exchange of experiences on technical itineraries, on broodstock management, on approaches to improve the producers' investment capacities (ponds extension...).
- Improving communication between the administrative team and producers so that they can better manage situations:
 - By putting in place an interlocutor for each site in relation with the co-op presidents and the socio-organizer to help him transmit the information or to announce any changes without waiting for the official meeting,
 - By posterizing at the defined locations identified at local cooperatives level,
 - By introducing a proper database and software instead of the use of the monitoring excel based system which is labour intensive.

Capacity Building

- Building the capacity of Board members and if necessary using external resources in case of problems of understanding and analysis of files.

Technique

- Maintain hygienic standards for farm visits and hatchery in particular is also recommended for a better fish health management and to avoid fish disease
- Observance of the hygiene and sanitary conditions of the products reception and processing unit currently used and taking the opinion of the Regional Department of fisheries Resources as well as the veterinary service (Regional Department of Agriculture and Livestock) for designing the plan of the new processing unit to be installed.

Evaluation Report

- Training of the handling, transportation and product processing team on hygiene in general (vehicles and means of packaging / transportation of products, personnel, fish handling equipment and tools) and on hygiene products, not only to reduce post-harvest losses but also to provide consumers with safe, hygienic and quality products.
- Training of the processing and marketing unit team on the use of cold in products conservation.
- Increased ice-making capacity, preferably in flakes: purchases of a new ice-making machine and repair of the existing machine.
- Conducting diversification tests, the products presentation to be offered on the market for their valorisation: live fish, fish fillet, ... It should be noted that the tilapia skin can be tanned and used in leather goods. Actually, fish fillets and smoked fish can be sold at a high price by targeting other types of customers (refer to products sold in supermarkets). Similarly, live fish are highly valued and the only point of sale of live fish of Toamasina under this assignment fails to meet the demands. These technical and financial feasibility tests may be conducted by TDE through a contractual agreement with specialists in product processing.
- Ensuring the preservation and restoration of water sources through reforestation activities, improved infiltration of rainwater and cleaning of sources: reforestation targeting fast-growing species (e.g. *Accaciamangium*) is recommended given that eucalyptus appears to be big consumer of water).
- Considering the use of organic fertilizers⁶ simultaneously with chemical fertilizers for ponds fertilization (use of composter) to minimize the negative effects of chemical fertilizers on soil quality. In fact, some fish farmers interviewed mentioned that the fertilizer response to pond fertilization no longer lasts as long as it did in the beginning. This is also an aspect to be verified.

Organisation and Management

- Strengthening the Board of directors and its members so that they can develop TDE;
- Strengthening the savings and mutual aid systems at local cooperatives level and TDE union which enable to facilitate the access of farmers to inputs and to put in place a credit system;
- Strengthening the constitution of common reserve at TDE union level for the enterprise development;
- Improvement of ponds and farmers monitoring system as well as coaching of responsables at local cooperatives level. A reinforcement of coaching/supervision should enable the respect of technical instructions and thus secure and increase the production;
- Analysis of the efficiency of monitoring-support by technical officers from local cooperative in order to bring readjustments if necessary;
- Clarifications of the attributions of the Operational Manager who at the same time ensures the monitoring of one part of farmers and ponds. Its supervision role and technical coordination role related to monitoring-support performed by technicians run the risk of being a secondary importance;

⁶ The doses ordinarily recommended: 10 to 20 kg/are as dose of funds and 2.5 to 5kg/are/week as dose of maintenance

Evaluation Report

- Strengthening the availability and leadership capacity of local responsables to fill the lack of technicians' staff and especially preparing them technically to be independent;
- Extending the inputs storage capacity and providing a stock to limit the risk of stock out;
- Planning a replacement plan for heavy equipment;
- Taking into account the needs, it needs to opt for equipment that members will not have much problem to maintain (accessibility of spare parts, competence for maintenance and repair ...): such as the use of insulated box, rolling stocks for the deliveries in very remote sites ...;
- Encouraging the taking of responsibilities by fish farmers:
 - Recording of activity data (number of fingerlings / quantity of feed and fertilizer received) to allow cross-checking of information at time of counting and also for monitoring fish growth and feed adjustment;
 - Giving a strategic role to women;
- Strengthening the entrepreneurial competences of members in order for them to manage efficiently their business;
- Development of TDE inputs Pre-financing system: financing method contributing to TDE's operation and less expensive for producers with a repayment method adapted to their situation;
- Development of partnerships:
 - for selling the production which enables to sell possible production increase : through agreements with wholesalers in Tanà,
 - for transportation,
 - for feed supply: in perspective, with a large investor that needs 7-10,000 tons of production and much capital. This requires a more in-depth analysis: the absorptive capacity of the market, the risks that could arise from possible competition ...,
 - for the pre-financing of inputs: to have more accessible conditions for farmers and better develop TDE activity;
- Clarify with the Ministry of Fisheries Resources and Aquaculture TDE situation regarding its obligation to pay or not taxes on product collections. Normally, having a collection permit assumes that taxes have to be paid. It's the role of technical services to inform TDE and fish farmers about the legislation in force and / or any new administrative procedures, to support the establishment and formalization of a platform for the promotion of monosex tilapia breeding.

Commercial Aspects

- Conducting a market study to properly assess the market's ability to absorb products (both in Toamasina and Antananarivo) and assessing consumer's appreciation of the products...
- Strengthening market expansion in Antananarivo to support increased production in order to strengthen the distribution chains.

Improving the points of sale visibility by increasing billboards in town of Tamatave to raise awareness of TDE products and especially to make known the point of sale which moved in September 2018. During the mission to Toamasina, the team of evaluators had difficulties to find the salespoint and had to ask several people before finding one who knows the new location.

Evaluation Report

- Improving the packaging of products for transportation (from production sites to Toamasina): complying with the layout and hygiene standards of the products packaging / transport by using insulated boxes with appropriate display technique ice (in flakes preferably to avoid crushed fish) and of sufficient quantity (at least 1 Kg of ice for 1 to 2 Kg of fish to ensure a better conservation).⁷

Preferably, ice flakes should be made as ice bars should be crushed (ice bars crush the fish).

Use insulated boxes for the products transportation from production sites to Tamatave, especially in hot season: we have seen fish delivered in large plastic cans with insufficient ice.

Financing Access

- Faced with the problems of insufficient financial means for their investments extension, measures such as credit facilitation must be taken so that they can increase the number of their ponds. Their connection with microfinance organizations such as OTIV, MICROCRED is thus recommended. TDE could play the role of guarantor in the operation. Actually, a pond development takes up to one year for some, limiting their ability to achieve the production objectives being set for their autonomy.

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⁷ Standard provided for in CODEX alimentarius, taken in the guidelines for conserving halieutic products published by FAO

1

Introduction

1. Introduction

1.1. BACKGROUND AND OBJECTIVE

After a feasibility study by Norges Vel in 2010, which evaluated mainly the possibility for fish farming in Tamatave, the "Producer steered fish farming" project was developed in collaboration with a Malagasy NGO, MIDEM ("Mission Indépendante pour l'Éducation et de Développement à Madagascar") with Norad financing.

The project started in 2011 and will end in 2019. The first phase implemented in collaboration with MIDEM ended in 2016. From 2015 the Union of Producer Cooperatives called Tilapia de l'Est (TDE) took over the management and coordination of the activities planned by the project and thus takes control of the supply chain "from the egg to the market". It was officially incorporated in 2014 by 5 cooperatives and currently has 7 cooperatives members.

In 2016-2019, the objective is to continue improving the efficiency, production levels and profits of tilapia producers in cooperatives and working with TDE. The tilapia fish farm was set up with the aim of increasing the income of Tamatave producers in the Atsinanana region, enabling them to better withstand climate change, create sustainable jobs for women and men and increase access to marine proteins. The project aims to improve the ability of small-scale aquaculture producers to use natural and human resources in a cost-effective and sustainable way and to play a professional role in markets.

With reference to the project logical framework, at least 210 tilapia producers are targeted by the project for 2018, 50% of whom are women. In 2018, monthly average incomes are expected to increase by 75% from the baseline situation where income was US \$ 60 to an average monthly income of US \$ 105⁸ or 367,500 MGA.

For this purpose, various activities have been implemented in order to reinforce the know-how of TDE Union and its members in business, organization, and technical skills for tilapia farming and management. Through the project, the initiative ensured an improvement in fingerlings quality, feed, technical management, production and commercial and organizational skills of the target groups.

Over the years, there has been development of production profitability, the TDE General Assembly and Board of Directors are in place, the members of the local cooperative Boards are functional and TDE is gradually covering its own administrative costs, from a portion of the members' sale. Emphasis is on increasing the number of ponds per family for targeted producers, capacity building of all targeted producers in production techniques, business management and co-operative development, gender mainstreaming and climate adaptation. Resilience to climate change, environmentally friendly technologies and businesses are fostered, as well as gender equality and equity in all work supported.

These objectives should be achieved through a strong and dynamic partnership between Norges Vel and TDE.

⁸ This is a gross average income, that is Turnover deducted from intermediate consumption including the participation of 8% for TDE functioning, 1 USD in November 2018=3,500Ar

1.2. OVERVIEW

According to the framework agreement between Norges Vel and Norad, a mid-term evaluation of a project within the frame agreement 2016-2019 was planned. The project with TDE was chosen with a view to:

- Evaluating the organisation and business model of Tilapia farming supported by TDE cooperatives Union in Madagascar;
- Contributing to build the sustainability of the model with relevant recommendations;
- Documenting and providing the best practices for sustainable models of tilapia business development;
- Providing elements enabling to scale up the fish farming business model (learning and accountability).

In addition, this assignment will enable to evaluate a new application of Norges Vel with partners for a new framework agreement starting from 2020.

The assignment objective is to evaluate the "Producer Steered Tilapia Farming, Organisation and sales in Tamatave, Madagascar" project by Norges Vel in collaboration with "Tilapia de l'Est" (TDE) for the period 2016-2018.

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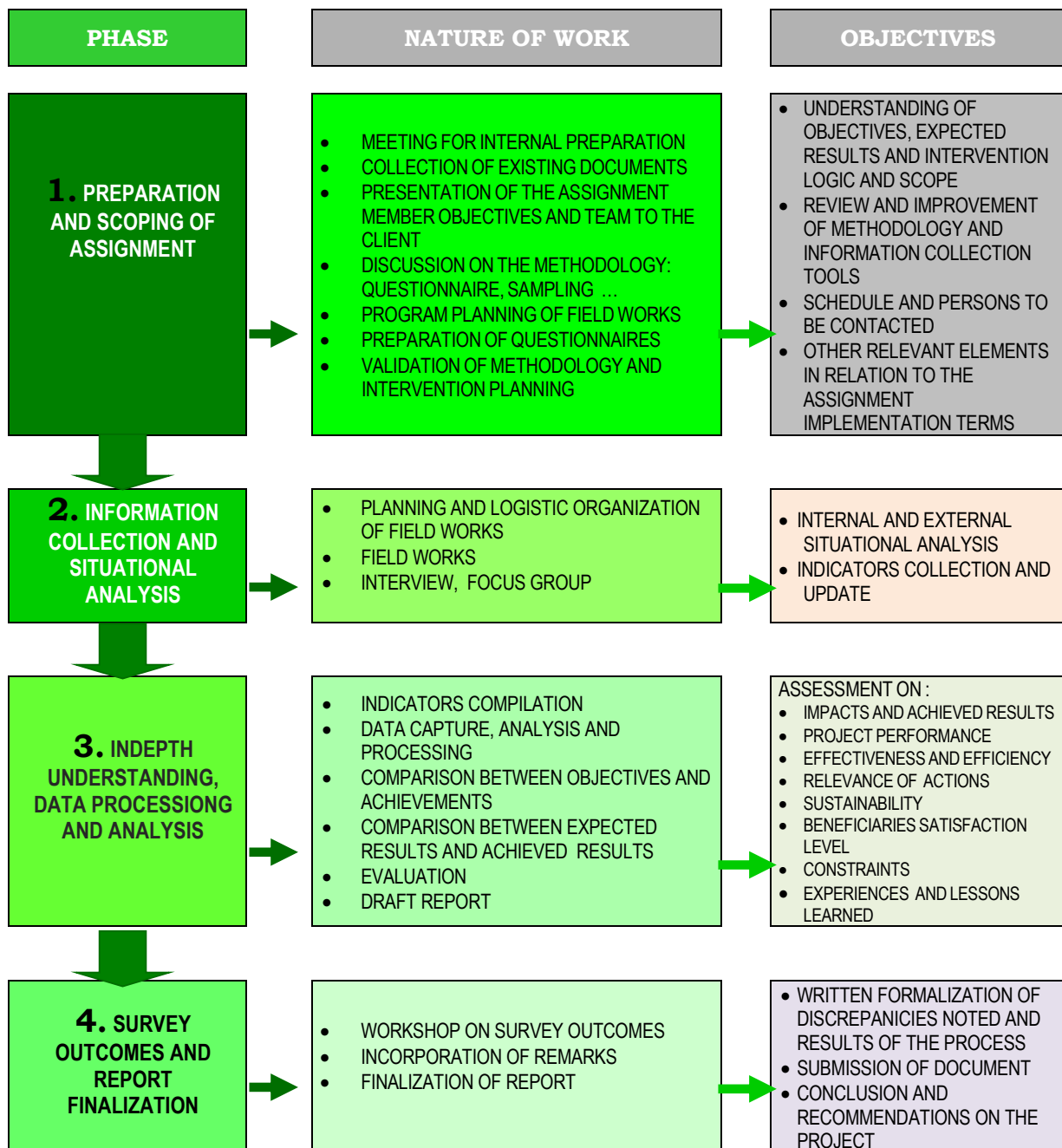


Methodological Approach

2. Methodological Approach

2.1. OVERALL METHODOLOGY

The evaluation includes four (4) phases according to the diagram below:



2.2. COLLABORATION WITH THE PROJECT TEAM

The whole TDE team collaboration is particularly appreciated, especially with regard to the availability of the basic documents, informative interviews, logistical arrangements and support during site visits:

- The documents collected from the TDE executive officer and the exchanges enabled the consultants to have the first details on Norges Vel's expectations within the mandate scope and to better understand the project, the administrative context of its implementation, as well as the different points of view of the managers and experts involved in the project;
- Consultations were also held with the members of the Board of Directors, the field team (socio-organizer, technicians) as well as the main partners on site (mayors, district, STD or "Decentralized Technical Departments"). From these consultations, the consultants have identified the points of view of the team directly responsible for the implementation, as well as the actors who live the local realities everyday with the various opportunities and constraints that arise.

In addition, consultations were prioritized with all stakeholders at the local level throughout data collection in the field (Focus Group Discussion) and their analysis. The consultations with the beneficiaries allowed to have the own perception of the first involved by the project activities (collection of testimonies). The organization by TDE, regarding the actors to be interviewed, which consisted in balancing the number of men and women to meet, enabled to appreciate the perception as well as the point of view of both men and women.

2.3. DIFFERENT ACTORS ENCOUNTERED

The team met and talked with many actors according to the following table.

The detailed list of people met is in Appendix 1 of the report. Structure/entity	Subject	Encountered person	Location
TDE Board of Directors	TDE Orientation Structure	The 8 members	TDE Office
Local technicians	Site of inputs preparation and delivery, receiving and preparation site of productions for sale	Operational Manager and Commercial Officer	TDE Office
TDE Executive Team	Conduct and coordination of activities, report to Board of Directors	Executive Director, Financial and Administrative Manager, Operational Manager	TDE Office
Regional Direction under Ministry of Fisheries (DRRHP)	Aquaculture regulations	Regional Director of Aquatic Resources and Fisheries Chief of Regional Aquaculture Service	DRRHP Office
PROSPERER	Structuring of supported cooperatives.	Responsible for monitoring	PROSPERER Office
Anjara Environment	Lived experiences in aquaculture, feeding, farming in cage	Deputy Director General	"Anjara Environment" Office
Rural Commune Tamatave II and Vohitranivona	Perception on the project	1 st Deputy Mayor and the Mayor	Office of "Commune"
Brickaville District	Law related to resources of Decentralized local authorities or CTD	Mr Henri Fidèle Benoit, 1 st Deputy of the Chief of District	Office of District
Team of Hatchery	The infrastructure put in place by the project	Technician Hatchery Responsible	Ambohimangakely
7 TDE cooperatives members	Checking collected information/data, producers' opinions	Board Members and other members	Grouping Sites
Ministry of Aquatic Resources and Fisheries (MRHP)	Aquaculture in fresh water	Chief of Aquaculture in fresh water Service	Ampandrianomby, Antananarivo MRHP
Antananarivo salespoint	Evolution of sales, deliveries, clients	Salespoint Responsible	Antananarivo, TDE salespoint
FORMAPROD ⁹	Potential offer of training or capacity building	National coordinator	Antananarivo, FORMAPROD
APDRA ¹⁰	Experiences in fish farming: constraints, the production model, feeds, the monitoring and support system of beneficiaries	Regional Director (in charge of Fénériveest)	Antananarivo, Miarinarivo

⁹ FORMAPROD : Programme de Formation Professionnelle et d'Amélioration de la Productivité Agricole

¹⁰ APDRA : Association Pisciculture et Développement Rural en Afrique tropicale humide

2.4. ASSIGNMENT CONSTRAINTS AND LIMITATIONS

The study is limited by:

- The fact that the information obtained is based only on the statements of the interviewed persons;
- All the cooperatives members could not attend the data collection meetings;
- Because of lack of time, the team could see only the ponds located along the national road and the hatchery;
- The local cooperatives do not have data on their annual production.

Despite this, the systematic meeting with all cooperatives was prioritized.

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Project Overview

3. Project Overview

3.1. BACKGROUND

Country	Madagascar
Project Name 1	Producer Steered Tilapia Farming, Processing and Commercialization in the Tamatave Region (PSFFP)
Total Project Duration 1	05/05/2011 – 12/31/2015
Initial Budget	NOK 4.6 Million
Revised Amount	NOK 6.5 Million
Implementing Organization	MIDEM
External evaluation performed by AIR Consult	August 2015
Project Name 2	Producer Steered Tilapia Farming, Organisation and Sales in Tamatave, Madagascar, phase II 2016 -2019
Total Project Duration 2	36 months (2016 – 2019)
Funding by NorgesVel	2016: NOK 1,774,998 or MGA 662,643,851 2017: NOK 1,886,179 or MGA 703,407,436.81 2018: NOK 2,145,913.81 or MGA 869,008,918: to be audited but seen as in compliance with each other and generally correct.
End of collaboration with MIDEM	2016
Implementing Organization	Tilapia de l'Est "TDE"

3.2. DESCRIPTION OF ACTIVITIES AND COMPONENTS

The following table shows the project logical framework.

OUTCOME	OUTPUT	ACTIVITIES
Expected Impact: Sustainable Tilapia farming Increased availability of fish on the markets of Tamatave and Tanà		
Outcome 1: Improved Tilapia farming business operations	Output 1-1: Integrated training + coaching in sustainable production and management techniques implemented for women and men	A111- Training and coaching in integrated and sustainable and climate-resilient aquaculture production techniques A112- Technical and in-depth management training of responsible persons A113- Development and regular update of procedures/formats and manual for tilapia producers
	Output 1-2: Sustainable and climate resilient production sites established by tilapia producers	A122- Digging /making ponds and having ponds, tilapia hatchery operational A123- Continuous Control and coaching in all supported work
Outcome 2: Well functioning producer steered cooperatives	Output 2-1: TDE and local cooperative business and organizational plans established and updated	A211- Training in business and organizational plans development A212- Monitoring / coaching and other advice for developing and updating business and organizational plans
	Output 2-2: Training+coaching implemented in sustainable cooperative business steering and management for women and men producers	A221. Developing a cooperation handbook for Tilapia cooperative union + training programs for organizational, business steering /financial and gender mainstreaming trainings A222. Training in management, cooperative management and leadership, trade/finance and organization A223. Training in gender mainstreaming for all producers A224. Literacy training of 60 tilapia producers selected to follow developments A225. Monitoring / coaching in all trained /relevant fields for all producers
Outcome 3: Improved market integration of small tilapia farmers	Output 3-1: Increased marketing of existing products to new/existing markets	A311. Marketing planning developed per tilapia Cooperative Union A312. Regular meetings between private partners, local NGO partners and aquaculture organizations in order to coordinate the sales and coverage of additional costs by private partners
	Output 3-2: Improved coordination of/with the needed value chain operators	A321. Contribution of the organization/logistics to the operational planning and implementation of hatchery units, livestock feeding, outreach and marketing/ sale A322. Improvement of tilapia value chain logistic capacity for further growth (this project / other partner)

3.3. PROJECT AREAS

Local Cooperatives	Year of creation	Number of active members (Nov 2018)				Number of ponds	Fokontany covered	Communes covered	District
		Men	Women	% Women	Total				
VONONA	2016	48	16	25%	64	90	Ampasimadinika Ranofotsy Ambodisovoka	Ampasimadinika	Brickaville
TSARADIA	2017	22	12	35.29%	34	43	Ambodisovoka	Ambinaninony	Brickaville
TSIMIVAHA	2014	60	32	34.78%	92	133	Ambarimilambana Manambolo	Ampasimadinika	Tamatave II
VITASOA	2014	49	23	31.94%	72	101	Ambalahasy	Ambinaninony	Brickaville
TSARAFARA	2017	24	9	27.27%	33	42	Sahavalaina Marofody Ambodirafia	Ambinaninony	Brickaville
KOFIAMIT	2014	11	3	21.43%	14	18	Ampasimadinika Ambodisovoka	Ampasimadinika Ambinaninony	Tamatave II Brickaville
IVOLOINA	2015	16	4	20%	20	32	Farafaty Ivoloina Antetezambaro Ampangarinatelo	Tamatave suburbaine Antetezambaro	Tamatave II
Total number		230	99	30%	329	459	13	4	2

Source: TDE and local cooperatives members of TDE

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Analysis and Evaluation Results

4. Analysis and Evaluation Results

4.1.

PROJECT SITUATIONAL ANALYSIS AND EVALUATION

The project appropriateness is measured through its objectives that must address appropriately the identified problems or meet the real needs of beneficiaries. In practice terms, this is an evaluation of the project objectives adequacy regarding the problems to be solved and the background of its operation.

Various activities were carried out to reach the project objectives. So the evaluation scope is to check whether those activities have actually met the real implementation background.

4.1.1. PROJECT EVALUATION ADEQUACY WITH NATIONAL AND INTERNATIONAL FISHING AND AQUACULTURE POLICY

The Blue Policy letter issued by the Ministry of Fisheries Resources and fishing in 2015 provides a reference framework for the coming decade, sets out the principles that should underlie long-term public action, and provides the main guidelines until 2025 for fisheries and aquaculture (Part 6 relates to inland aquaculture including fish farming). It is in line with the state general policy and aligns with the orientations of the National Development Program setting the paths of sustainable and inclusive growth, poverty reduction and job creation at sectorial level.

In addition, it is in line with the guidelines defined by the Feed Security National Strategy, the agriculture sector service strategies and the strategies of Adaptation to Climate Change.

In view of the above, the project adequacy with the national aquaculture policy is obvious because:

- The project objectives are to create jobs and improve fish farmers' income with the impact of population poverty reduction. In fact, fish farming is characterized by a quick return on investment and plays an undeniable role as a source of income or an additional source of income.
- The increased development of activities for aquaculture producers, which is also one of the project objectives, will enable a production increase, thus contributing to food and nutritional security. Indeed, with surplus production, fish farmers and the local population will be able to consume fish and improve their protein intake.
- The project's approach of facilitating producers' access to fingerlings and inputs (fertilizers, feed, equipment, etc.) also responds to the agricultural service strategies advocated by the Blue Policy letter.
- The opening of sales outlets in Toamasina as well as the targeting of Antananarivo as product outlets (opening of sales outlets in Antananarivo also with authorized resellers) contributes to meeting the needs of the national fish market which is stated in the blue policy.

4.1. PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)

Certain key recommendations of Blue Policy are followed by the project. These mainly include:

- Sustainable development and support to rural fish farming activity;
- Support to structuring of aquaculture producers;
- The choice of TILAPIA for farming in ponds to be developed by small and medium-sized firms and Industry to cover 70% of the inland aquaculture program of the Ministry of Fisheries Resources and Fishing (MRHP) under its development policy over 10 years.

Finally, the project is in line with international policy for fishing and aquaculture since it complies with the Blue Policy which takes into account the Pan African Policy defined by the policy and strategic framework of fishing and Aquaculture Reform in Africa, and adopts the detailed development Program of African Agriculture (PDDAA). This aims to achieve an average annual growth rate of 6% in Agriculture, including Livestock and Fisheries, through (i) extension of the area under sustainable management, (ii) increased access markets, (iii) increasing feed supply and famine reduction, (iv) improving agricultural research, and (v) technology dissemination.

4.1.2. EVALUATION OF ADEQUACY WITH THE TARGET GROUP NEEDS

Overall Evaluation

The activities adequacy and approaches adopted related to the real problems encountered by the fish farmers was confirmed by the majority of the respondents during the interviews. Indeed:

- For operation success, criteria were set for selecting the production sites depending on the importance of their characteristics: proximity, accessibility, water availability and location compared to existing operation sites;
- Farmers have low technical fish farming knowledge (most of them have never used such technique and others used rather traditional methods), the project prioritized the training of farmers on improved fish farming techniques and assigned technicians by area to ensure the supervision /coaching of fish farmers;
- Given the limited number of technicians, the project adopted the supervision/support of new speculators by the old farmers (technical officers), members of cooperatives and who master the techniques from the ponds construction until the products harvest. This is how some new groups are currently able to build ponds without having received training;
- Given the difficulty faced by producers in the routing of inputs and the transportation of products, an input and fingerlings delivery system was put in place and also for collecting fish during harvest;

4.1. PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)

- Given the difficulty faced by farmers when building ponds, 2 types of aids are provided to farmers when the pond is achieved over 50%:
 - One by providing foodstuffs by TDE
 - And the other one through a community aid by other neighbouring farmers and members of the local cooperative.
- Compared to the existence of illiterate producers, to better convey the introduced techniques, the messages and the sensitizations, the project has made functional literacy; Given the farmers' low education level affecting their understanding capacity, the project favoured the "school field" approach: observation of what is happening on the neighbours' farms. In fact, this approach based on discussions and practical exchanges from direct experience at the fish farmer's own farms, enables them to see first-hand what is being discussed, which facilitates their understanding and memorization of the discussions' content. The understanding of messages (technical and other) is thus facilitated;
- The project has designed and implemented a monitoring and capacity building system for fish farmers: there are activity monitoring sheets and coaching sheets done by technicians as well as achievement record books to be completed by the fish farmers. Those tools are very important to enable to follow up the progress of their activities since due to their rather low intellectual level, they do not manage to remember all that they undertook in their operational activities (particularly, the quantities of fertilizer and feed used, fish growth ...). Unfortunately, this registration practice was abandoned since it is considered as too heavy by the fish farmers. This situation reflects a culture of excellence and professionalism not yet fully adequate for the adopters;
- Since the producers lack professionalism, they are organized and structured into cooperatives (07 cooperatives are created to date) thus facilitating their supervision.

Regarding the adequacy of available resources as compared to the local physical conditions, almost the whole team of TDE Management is recruited locally, knowing perfectly well the intervention areas as well as the local socio-economic and cultural background. Indeed, the technicians and the socio-organizer are well integrated into the producers' community and their capacity has been positively appreciated by a large majority of respondents. Their mission frequencies for the follow-up / coaching were considered as satisfactory although this frequency was spaced with the extension of the operations.

Evaluation of beneficiaries' satisfaction

Various actions were undertaken under the Project. In this respect, it seems essential after its implementation to evaluate the beneficiaries' satisfaction level, their perception of the Project input for their problem resolution.

The satisfaction is the beneficiaries' opinion resulting from the difference between their perception of the project inputs and their expectations. It is therefore important to analyze the data related to their expectations, differences and consequently their satisfactions.

4.1.**PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)**

In this approach, our objectives are:

- First to know their expectations, their needs, their preferences, the priorities and the reasons for dissatisfaction;
- Then, to evaluate on a criteria grid the beneficiaries' satisfaction level.

This evaluation is to be done on a five (5) level scale:

1. Very satisfied : Exceeds their expectations
2. Satisfied : meets appropriately their expectations
3. Somewhat satisfied : partly meets their expectations or unsatisfied
4. Unsatisfied : does not meet at all their expectations
5. Indifferent

Our assessment focused on trends of positioning the beneficiaries in relation to this scale, but this is not measuring their level of satisfaction in exact quantitative terms.

We also want to point out that given the various parameters noted within the intervention limits, the data came from the focus group with the beneficiaries whose number of those present varied from one cooperative to another.

The four (4) main parameters under evaluation are:

- Approach adopted by the project: input supply system, beneficiary selection criteria, formal group structuring
- Supervision and support
- Transport, inputs system supply : delivery point
- Marketing of products.

4.1.	PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)
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Satisfaction surveys provided the following overall results:

▪ **Adopted approach**

– <i>Structuring into official group</i>	: Grouping into cooperative, mutual group
– <i>Beneficiary selection criteria</i>	: Proximity, accessibility, possibility to build at least 3 ponds, water availability and location compared to already existing operational sites
– <i>Input supply system</i>	: Purchase of prefunded inputs by the project and refunded by fish farmers after sale

Table 1: Level of satisfaction compared to the adopted approach

	TS	S	PS	NS	IN
Structuring into official group					
Beneficiary selection criteria					
Input supply system					

TS: very satisfied S: satisfied PS: somewhat satisfied NS: unsatisfied IN: indifferent

Observations:

Satisfied:

This level concerns official group structuring (Cooperatives), selection criteria and the input supply system.

- As a whole, the approach satisfied everyone, formal group structuring allowed them to help each other and facilitate their activity implementation.
- The criteria for selecting beneficiaries were well received by producers, especially those who received the Project support
- The input supply system satisfies everyone to the extent that the inputs quantities and qualities have met their needs, except in recent times.

4.1.	PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)
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▪ **Coaching and technical support**

– <i>Training and capacity building</i>	: Simplified training in cooperative management and general management
– <i>Monitoring</i>	: According to internal organisation, the monitoring visit should take place every two weeks for new farmers but less often for established farmer
– <i>Technical support</i>	: Throughout the production (from fingerlings production up to sale)

Table 2: Level of satisfaction compared to coaching and support

	TS	S	PS	NS	IN
Training and capacity building					
Monitoring					
Technical support					

TS: very satisfied S: satisfied PS: somewhat satisfied NS: unsatisfied IN: indifferent

Observations:

Very satisfied:

This level concerns training and capacity building of producers.

- Members received adequate training to manage their activities

Satisfied:

This level concerns technical support which corresponds to their expectations from ponds construction to their products sale.

Somewhat satisfied:

This level concerns monitoring.

- Monitoring is spaced due to lack of sufficient number of technicians

4.1.	PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)
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▪ ***Transport, routing of inputs and outlet of products : delivery point, quantity and quality delivered***

– <i>Inputs quantity and quality</i>	:	According to production step (start-up, growth)
– <i>Means of transport and routing of inputs</i>	:	By the project car, contract with the carrier for the sale point in Antananarivo
– <i>Point of delivery</i>	:	Reorganized and taking into account the location accessibility

Table 3: *Level of satisfaction in relation to transport, routing of inputs and outlets of products: point of delivery, quantity and quality delivered*

	TS	S	PS	NS	IN
Inputs Quantity and quality					
Means of transport and inputs routing					
Delivery Point					

TS: very satisfied S: satisfied PS: somewhat satisfied NS: unsatisfied IN: indifferent

Observations:

Satisfied:

- The quantities and quality of inputs were considered as sufficient since they arrive to cover their needs.
- This is the same for the means of transport and routing used by the project given that all related costs are borne by the project.

Somewhat satisfied:

- In certain locations, the delivery points are far from the production sites resulting in additional cost to producers.

4.1. PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)

4.1.3. EVALUATION OF COMPLEMENTARITY AND RELEVANCE WITH OTHER PROJECTS OF ADEQUACY TO TARGET GROUP NEEDS

The projects involved in fish farming:

Inland aquaculture mainly developed in 1988 on central uplands by the project FAO/MAG/88/005/94 (axe Fianarantsoa – Antsirabe) with carp (*Cyprinus carpio* Linné, royal variety). Farming outreach. Then several projects are interested in developing this fish farming field, namely:

JICA (Japan International Cooperation Agency) Project (in 2003 – 2005)

It is a project carried out along the road of Manjakandriana (Analamanga Region) – Ambatondrazaka (Alaotra Mangoro Region) and related to making fish farming technical assistance available. The objective is to render dynamic fish farming development by increasing the tilapia and carp fingerlings production to be disseminated in the growing ponds and in rice field fish farming.

APDRA or Association of Fish Farmers and Development in Africa

APDRA or Association of Fish Farmers and Development in Africa is an NGO specialized in fish farming which has been introduced in Madagascar since 2001. Its interventions' objectives are to contribute to the rural development and to increase the fish availability, to contribute to the food security reinforcement and to improve vulnerable populations' income.

APDRA continues its interventions with new extensions of intervention areas (to date) with results:

- On the East coast, in addition to the outreach of damponds where the polyculture adapted to the agro-environmental context of family plantations is set up and developed, experimentations of pond culture of "gouramis" are currently carried out at Ivoloina station; this species starts becoming rare according to fishermen ...
- In the highlands: technical and economic carp production performance in rice fields increases sustainably.
- The capacities of local actors to support the fish (rice) dynamics are reinforced.

4.1.**PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)**

The producers are grouped but informally (mutual aid group), and the production is rather extensive but will develop towards a semi-extensive exploitation which is the optimal mode of production according to technicians. Although the marketing and availability of the fingerlings slow down a little the project development, technicians remain persuaded of the sustainability of the model developed by the NGO for the following reasons:

- The appropriation by the fish farmers thanks to the almost permanent presence of polyvalent technicians (socio-organizer and technician at the same time) in the production sites. Technicians stay on sites for a week;
- Putting in place at least two ponds for each farmer: a service pond and a production pond to make them independent;
- Lack of financial support from the project throughout the project but only start-up support (provision of fingerlings) and technical support during the project implementation;
- Instilling the mutual aid and autonomy culture within the group;
- Close collaboration with other actors such as FOFIFA, CIRAD for research work to improve their intervention.

PATIMA Project (2011-2014): implemented in Boeny Region for tilapia monosex fish farming with funding from JICA

The project main results are:

- Fingerlings production techniques tailored to the Region conditions are developed by:
 - The method of constructing appropriate fingerlings ponds
 - Production of low-cost fingerlings through the use of fertilizers
 - The technique of intermediate breeding, that is to say, the phase of enlargement of fingerlings before they are sorted
 - The method of sight sorting of male fish (sexing without hormone treatment) with an accuracy of 92 - 94%
 - The breeding technique of NiloJicabroodstock and native tilapia by model fish farmers
 - The elucidation of the reproductive behavior of NiloJica and native tilapia in farm ponds
 - And the carp fingerlings production technique.
- Aquaculture techniques tailored to the Region conditions are focused by:
 - The method of constructing appropriate fingerling ponds
 - Retention pond aquaculture
 - Water management and flood control measures
 - Verification of the growth capacity of NiloJica and native tilapia
 - Polyculture with carp
 - Rice-fish culture
 - And the possibility of breeding with formulated feed (intensive farming).
- Extension agents are trained and their aquaculture extension skills are strengthened
 - A farmer-to-farmer extension approach is developed
 - A development of the regional plan for tilapia aquaculture development.

4.1.**PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)****Sustainable Fisheries and Aquaculture project in Madagascar or "PADM" funded by GIZ (2017-2021)**

The project's objective is to contribute to food security and the assurance of the local population's living base. It will be implemented in the regions of Analamanga, Itasy, Vakinankaratra, Amoron'i Mania and Atsinanana with an improvement of the supply of sustainable produced freshwater fish by small and medium-sized enterprises to the population in these regions.

The main activities to be carried out are:

Improving the conditions of the strategic frameworks to promote sustainable freshwater aquaculture, including: updating the national strategy for aquaculture development in Madagascar, supporting the Administration of Aquaculture in equipment and rolling stock, capacity building of the agents and technicians of the unit at central and regional level)

- Creating sustainable fish production conditions in rice fields in the highlands (Itasy, Vakinankaratra, Amoron'i Mania and Haute Matsiatra) and on the East Coast (Atsinanana) including identification of favorable sites for aquaculture in freshwater at the level of the areas concerned, the establishment of centers for broodstock improvement and management and for the installation of feed production units, the establishment of point of sale for aquaculture equipment, training / recycling of fingerlings producers, establishment of steering farms for improved fish farming techniques extension and identification / selection and training of farmer-leaders. This component is implemented by APDRA
- Sustainable production of pond fish in Analamanga Region and on the East Coast (Atsinanana) for the supply of the local population and the Urban Commune of Antananarivo with the outreach of improved fish farming techniques, support to feed factories to facilitate access to quality feed and the establishment of a fish market in the areas concerned with an ice-making and sales unit. COFAD ensures the implementation of this second component
- Promotion of models for the up-scaling of freshwater aquaculture value chains in the selected regions: organization and capacity building of producers (network, federation, cooperative, group), upgrading of water supply equipment transport and collection and training on fish products conservation and processing, establishment of a consultation platform for all actors in the sector.

Complementarity and relevance with other projects

The projects mentioned above work or have worked in the aquaculture development and some target *Tilapia nilotica*. The activities carried out or to be carried out (for PADM project) all aim to remove the blockages to which the various actors concerned by the sector are confronted. Synergies and complementarities of actions are therefore to be favored for the objective achievement, most of which are identical.

4.1.	PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)
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At this stage of the evaluation, the project has not yet established a partnership agreement with other projects involved in fish farming. Indeed, TDE project covers all links in the value chain. However, a complementarity of actions is possible for certain links reinforcement, and particularly:

- Making available locally produced fish feeds (in Madagascar) because of the considerable need for feed to justify the installation of a feed manufacturing unit, or to encourage currently existing feed manufacturing companies to improve their product quality, thus sparing them from being imported
- Upgrading of infrastructure and equipment for products treatment and packaging / transport
- Capacity building in production techniques through sharing experiences mostly from TDE
- Strengthening the Unions / Federations structuring.

4.1.4. RESULT SUMMARY ACCORDING TO SWOT

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Input supply system including fingerlings, feed and manure (mineral fertilizer and urea) in place and operational - Satisfactory fingerlings production capacity - Unsaturated markets (local and outside the Region) - Farming technique easy to master by fish farmers - Technicians mastering improved fish farming techniques - Intake protein improvement of local population - Supply of feed exported from Mauritius, meeting tilapia needs at different development stages - Project contribution to food security and poverty fight 	<ul style="list-style-type: none"> - Insufficient resources of fish farmers for the pond construction, limiting the possibility of ponds extending despite the project support and their mutual assistance: on average, the construction period lasts between 4 to 6 months depending on the size of the work - Insufficient land for extension (case of some fish farmers) - Currently, there is only a limited capacity for supervision and training - Inadequate production infrastructure (isolation of certain areas suitable for fish farming) - Risk of broodstock degeneration - Low collaboration with the DRRHP: Addressed by the new Director who says not knowing enough the project as he does not have the project document (as long as there is a donor support, it is a project according to him). Before, TDE paid allowances of DRRHP officers who perform monitoring; it is not anymore the case today according to the Director. As a proposal: entering into a partnership agreement with DRRHP stating each party's roles and functions - Lack of complementarity/synergy with other projects - Low investment capacity of fish farmers - Usage conflict with other sectors of activity, mainly agriculture (access to water) - Dependence on imported fish feed which is very expensive: price adjusted according to exchange rates for feed - Delay in feed order arrival (availability of boat for transport, various formalities including veto visa, embargo...) - Ability of the administration to play its sovereign role being very limited due to lack of resources: Operationally, the Atsinanana DRRHP is often limited to the statistics collection
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> - Availability of suitable land for fish farming - Other projects in fish farming area in progress in the Atsinanana Region for action synergies 	<ul style="list-style-type: none"> - Climate and environmental change (watersheds degradation resulting in water sources dry-up) - Tavy (burning cultivation) practice and uncontrolled coal production - Natural disasters including cyclones

4.1.**PROJECT SITUATIONAL ANALYSIS AND EVALUATION (continued)****4.1.5. RECOMMENDATIONS**

- Promote actions synergies and complementarities with other projects operating for the male monosex tilapia breeding development;
- Establish a forecasted functioning method according to future feed needs and the risk of feed unavailability due to a possible feed import problem encountered in 2017.
- Maintain as criteria for new TDE's members the capacity to build up to 3 ponds at least

As a reference: Law 2015 – 053 related to Fisheries and Aquaculture.

In its book II, related to the general provisions of aquaculture, the second chapter regarding production systems and types of aquaculture deals in its first title with aquaculture development and management. Therefore, in respect of commercial aquaculture¹¹, subject of TDE activities, it is stated under its:

- Article 105: Commercial aquaculture activities are carried out on natural and/or developed sites recognised as favourable by the Ministry of Fisheries and Aquaculture for the chosen species.
- Article 106: The location, delimitation, hosting capacity and minimum distance between two aquaculture establishments are defined in the aquaculture development plans and management plans, validated by the Ministry in charge of Fisheries and Aquaculture and the other Ministries concerned.

The provisions are stipulated in the specifications prepared by the Ministry of Fisheries and Aquaculture when issuing authorizations for the establishment of any aquaculture activity and therefore, differ from one farm to another. In principle, any operator must dispose of it and refer to it.

- Article 107: All aquaculture activities must comply with the conditions defined in the aquaculture specifications drawn up by the Ministry of Fisheries and Aquaculture.

Decree No. 2016-1493 regulating aquaculture activities stipulates that the Ministry updates the "Aquaculture Management Plan", hence the need for collaboration with the Ministry. The Ministry has all the regulations in force around the Aquaculture activity establishments and it is essential to consult it before establishing any fish farm.

¹¹ In its article one, the law 2015-053 related to fishing and aquaculture code defines commercial fishing as all production activities of aquatic organizations whose products are intended for sales /marketing .

4.2. ORGANIZATIONAL AND OPERATIONAL EVALUATION

Organizational and Operational capacity is assessed through the following elements:

- TDE organisation structure;
- Ability to manage resources (financial, human, material, logistical, etc.);
- Interpersonal and communication skills.

4.2.1. ORGANISATION STRUCTURE

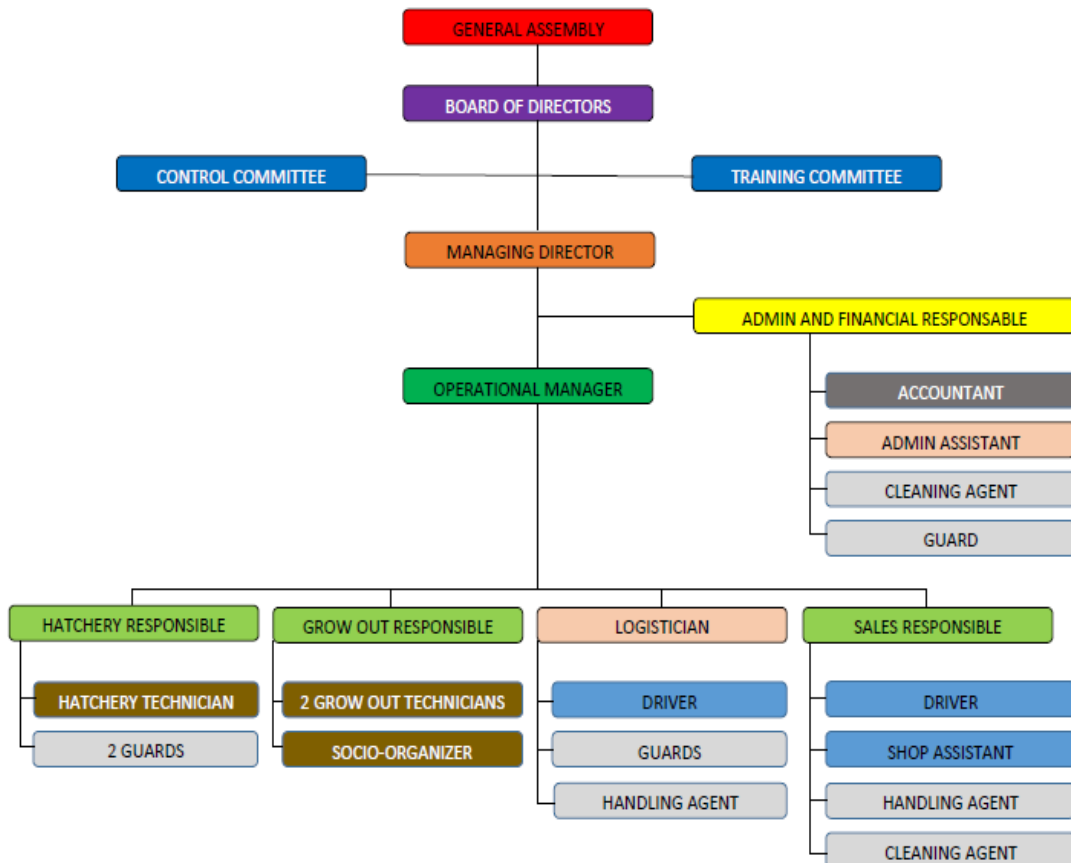
TDE's mission is to implement the project activities in accordance with the framework agreements defined with its partner NORGES VEL.

Therefore, it deploys resources in its intervention areas, in close coordination with member producers.

TDE is composed of three main bodies as follows:

1. General Assembly
2. Board of Director
3. Administration

TDE's organization chart is presented hereafter:



4.2.**ORGANIZATIONAL AND OPERATIONAL EVALUATION** (continued)**Cooperative Union**

Tilapia de l'Est UCO (**TDE**) is governed by Act No. 99-004 of 21 April 1999 on cooperatives and consists of 7 cooperative members.

Each Cooperative Board is constituted by:

- A president;
- A vice-president;
- A treasurer mainly held by women;
- A secretary;
- and one or two advisors

At the end of updated training in cooperative principles, 2 new cooperatives were created in 2017. A socio-organizer supports cooperative life at the local level.

General Assembly

The General Assembly is the supreme organ of the Union. The General Assembly is made up of all formally constituted cooperatives, each of which is represented by two members.

The General Assembly normally meets once a year and elects the Board of Directors members. The GA ensures TDE overall management and strategic direction in accordance with its articles of association, and approves annually the budget, results and financial reports after approval by the Board.

Board of Directors

The Union's second deliberative body is the Board of Directors (BOD) formed by the representatives of the member cooperatives.

The BOD is currently formed by 7 cooperative chairmen and one representative of the Executive Management.

The BOD role is to ensure that the General Assembly guidelines are followed. It recruits the Executive Manager also called General Manager and approves the annual action plans, financial and technical reports submitted by the Executive Manager.

As specified by the by-law, 2 committees were put in place:

- An oversight committee elected by the General Assembly to ensure financial control, oversight on membership principles as well as respect of the status. He submits annual reports to the General Assembly;
- A training committee elected by the General Assembly whose role consists in prioritizing the members' needs for training, contributing to the choice of trainers, and providing if necessary their input when developing training tools. They also submit annual reports to the General Assembly.

4.2.**ORGANIZATIONAL AND OPERATIONAL EVALUATION (continued)****Executive Management**

Led by its General Manager, TDE executive management is responsible for the coordination of the value chain, defines annual plans and budgets, and provides an activity report and a financial report.

In terms of organizational structure, we noted that:

- the structure matches with the tasks entrusted to the TDE and reflects the value chain principles adopted in connection with the project;
- the principle of unity of command is followed as the staff members depend only on a one superior.

Despite of that, it comes from our analysis that the BOD current functions are still limited to decision-making based on reports and information provided by the Executive Management. Due to insufficient qualification, the members are not yet in a position to conduct a thorough reflection on the TDE orientation.

4.2.2. CAPACITY TO MANAGE RESOURCES**Human Resources**

The evolution of the staff number as compared to the workload or the development of the situation in which the TDE activities conducted reflects the way the latter optimizes its resources.

4.2.

ORGANIZATIONAL AND OPERATIONAL EVALUATION (continued)

The relevant details are provided below:

Management team	Position 2016/2017		Position 2018/2019	
Administration	Managing director	01	Managing director	01
	Accountant	01	Accountant	01
	Administrative assistant	01	Administrative assistant	01
	Cleaning agent	01	Cleaning agent	01
	Guard	01	Financial and administrative responsible	01
			Guard	01
Sub-total		05		06
Sales and marketing	Operational manager	01	Operational manager	01
	Driver	01	Driver	01
	Sale responsible	01	Sale responsible	01
			Shop assistant	01
			Guard	01
			Handling agent	01
			Cleaning agent	01
Sub-total	03	03	05	07
Hatchery	Technicians	02	Hatchery responsible	01
			Hatchery Technician	01
	Guard	01	Guard	02
Sub-total		03		04
Extension services	Technicians	02	Grow out responsible	01
			Grow out technicians	02
			Socio orga	01
Sub-total		02		04
	Logistician 01	01	Logistician	01
	Guard 01	01	Guards	02
	Driver 01	01	Driver	01
			Handling agent	01
Sub-total		03		05
	Total	16		26

Source: TDE

By referring to this situation, it can be said that the TDE was able to optimize its resources while improving its performances. Technical premises have started to be improved: a new plot is bought, currently being developed to cater for the increased and further expected increase in production from farmers and treatment of the fish for sales, feed storage capacity increase etc ... However, it should not be omitted to take the DRRHP and ASH¹² connection for the plan design and infrastructure construction.

¹²ASH: Autorité Sanitaire Halieutique (Halieutic health authority)

4.2.**ORGANIZATIONAL AND OPERATIONAL EVALUATION (continued)**

Despite of that, the following facts must be pointed out:

- The number of technicians does not follow anymore the number of members, as a result, the frequency of monitoring by the technicians is very spaced and the training of new fish farmers is delayed.
- 15 trained and operational technical officers were planned to be put in place to reinforce the technicians, but only 4 cooperatives have a technical officer. This insufficiency has an impact on some activities, including monitoring activities that occur only every two months.
- Lately, irregularities appear such as delivery not complying with the fish farmers' needs (it is the case of feed to be finished instead of growth feed), late arrival of fingerlings orders for those who could not develop on a timely basis their ponds and/or have ponds that can be flooded, which sometimes does not enable the fish farmers to do two production cycles in the year.

According to the explanations, the irregularities are due to unexpected factors such as delivery errors during feed orders with the supplier, climatic variations resulting in insufficiency of fingerlings produced as compared to needs received.

- In respect of the cooperative steering by the producers, though trainings and capacity buildings about a cooperative running, structure and organization were provided to the BOD members and other members, some challenges remain to be taken up so that the producers can efficiently steer their activities, specifically their analysis capacity building, their capacity to analyze the scope of an investment or of an additional operating cost, as well as a capacity to use strategically the networks and relationship with the stakeholders.

Management Tools

After analyzing the management tools and processes, it can be found that the existing tools and functions enable to ensure the current management of the TDE activities:

- Use of database and various activity management dashboards;
- Use of IT tools for monitoring of various activities...

Material Resources

In respect of materials and equipments, what is essential to enable to work exists: water point, electric power, meeting room, offices, vehicles...

4.2. ORGANIZATIONAL AND OPERATIONAL EVALUATION (continued)

However, the current infrastructure shows some shortcomings:

- Tiny, uncomfortable and insufficiently maintained premises;
- The means made available to ensure a convenient implementation of some function are not appropriate: inappropriate storage room, limited capacity of machine for ice making...;
- The premise for receipt/sorting/handling of products does not meet the standards the enable to ensure their cleanliness;
- Security and hygiene measures are not sufficient : the premise for storing feed is made of wood but no fire extinguisher is installed;
- The warehouse storage capacity is limited and feed storage conditions do not meet protection, insulation and bio-security requirements so that there are risks of product destruction;
- With respect to transport, TDE uses four vehicles, including a refrigerated truck for harvesting, and all-terrain vehicles for delivery of inputs. Conveyance of fish to the selling point in Antananarivo is entrusted to a common national transport resulting sometimes in late arrival of goods and non delivery of all orders in case of insufficient available cars as one car can only transport 10 to 12 boxes of 40Kg while TDE has to ship 25 to 40 boxes daily.

4.2.3. RELATIONAL SYSTEM AND COMMUNICATION

The internal communication groups together the communication actions as a whole implemented within the TDE to its members.

Several means are used by the TDE for the internal communication:

- A work meeting among the staff members or between the executive Management and the cooperatives.

In this case, the BOD members as an interface with the Executive Management and producers are in charge of information transmission to each cooperative during the meetings. A socio-organizer is also assigned to ensure communication of information, specifically information related to the cooperative running.

The technicians also contribute to the flow of information between producers and the Executive Management.

- An SMS: the fish farmers use the SMS by communicating with the technicians to transmit information that enable to calculate fish feed.

Communication about the Income Statement per producer is very clear, and each producer has the possibility to bring claims in case of non-compliance of the established situation as compared to the actual situation.

4.2.**ORGANIZATIONAL AND OPERATIONAL EVALUATION (continued)**

Despite of that, it was addressed during the site visits that the producers are not informed about the increase in the fingerlings price.

External communication includes the forms and process of information transmission or relationship of TDE with the outside world. The external communication plays a fundamental role for the TDE image and reputation. As a result of the external communication actions, the partners, customers and prospects make their opinion and their attitude towards TDE.

Relationship with Local Authorities

The TDE has been introduced by a simple courtesy visit. Therefore, the relationship with local authorities is very limited (District, mayors). However, communication with the authorities could be very useful to improve TDE activities (security, road construction...). In this sense, the relationship with the authorities is to be improved.

Relationship with the Actors Intervening in the Fish Farming Field

Good communication with the actors enables to exchange experiences and lessons to improve the project running. This communication seems insufficient for us due to the information communicated by the actors. The synergy with the other actors is to be developed, specifically with the regional Directorate in charge of fisheries.

In Terms of Visibility

The TDE undertook efforts for its visibility: clothing, equipment's used (vehicles), and panels with its logo. TDE participates in various fairs in Antananarivo and Tamatave under the Ministry and others. It has a communication strategy, too.

Despite of that, the TDE selling point is moderately known.

4.2.

ORGANIZATIONAL AND OPERATIONAL EVALUATION (continued)

4.2.4. RESULT SUMMARY ACCORDING TO SWOT

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> – Structuring of producers: increased number of cooperatives (number from 5 in 2015 to 7 in 2018) – Cohesion, mutual aid among the members (specifically for the pond construction, harvesting), producers' good will to go ahead – Organizational structure of the Union structure reflecting a good governance – Management and oversight committees in place – Functional and dynamic administrative team – Action plan and budget developed and transparency between the administrative team and the BOD – Very well located new selling point in Toamasina, successful sale extension to Antananarivo with a selling point and 2 resellers – Good communication between the BOD and member cooperatives – Formalized organization chart highlighting reporting relationship – Respect of the unity of command – Executives' competence for the Project implementation and success – Existence of one-off basis training enabling the capacity building of the technical staff – Transparency of actions undertaken – Good reputation of the TDE – Input supply system, including fingerlings, feed and fertiliser (mineral fertilizer and urea), put in place and operational – Hatchery with the capacity to function without funding or grant 	<ul style="list-style-type: none"> – For women's participation in the cooperatives governance: no woman among the BOD members of the TDE. – Capacity of the BOD members not enabling them yet to steer efficiently their business – Some irregularities noted in the value chain functioning for feed and harvesting planning – The TDE selling point is moderately known – Lack of communication flow of the administrative team to producers – Insufficient resources (material, human, logistic) – Fish farmers' insufficient means for construction thus limiting the possibility to extend the ponds despite the project support and their mutual aid: the construction of a pond takes a fairly long time (up to 1 year for some ponds) – No plan for replacement of heavy equipments requiring large investment
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> – Membership in various national and international platforms (cluster...) – Possibility to extend selling points mainly in Antananarivo and in other regions 	<ul style="list-style-type: none"> – Transportation of products to Tananarive by common national transport, sometimes leading to delay of the delivery goods to the point of sale and affecting the freshness of fish – People are used to be assisted – Toamasina market saturation – Extension of the « bio » label

4.2.6. RECOMMENDATIONS

- Multiplying advertisement panels in the town of Toamasina to further promote the TDE products
 - Reviewing how to enable the producers to steer efficiently their cooperative business
 - Improving communication between the administrative team and producers in order for the latter to manage better the situations
 - Reinforcing the number and supervision capacity of local responsables at sites level to meet the producers' needs for support
 - Reinforcing the expansion of the market in Antananarivo to support the production growth
 - Developing a replacement plan for heavy equipments
- Introduce proper database and software for the operational team.

4.3.**EVALUATION OF THE PROJECT EFFECTS AND IMPACTS**

Regarding the evaluation of the project effects and impacts, the consultants verified if: (i) the specific objectives and expected results were actually achieved, (ii) the expected activity programs were actually implemented and (iii) there were tangible effects at the beneficiaries' level. Hence, the effects and impacts will be discerned from the changes noted on:

- Beneficiaries' living conditions in general (living conditions, income improvement);
- Production factors and techniques;
- Behavior/mentality towards women.

Overall Appreciation

The "activities and approaches adopted" adequacy, as compared to issues of the difficult access in material equipments and inputs (non availability and difficult access due to lack of investment funds), control of new technologies, sales outlets for products to which most of the fish farmers face, thus limiting the industry development, was confirmed by most of those who responded during the interviews.

Indeed, the project has enabled:

- Easy access in inputs including fingerlings feed and fertilizers as the organization of the input supply is ensured by TDE. The fish farmers are not obliged to have start-up funds as the project adopted the "revolving input credit" principle that consists in receiving fingerlings, feed and fertilizers free of charge when starting the activities and in returning their cost after harvest.
- The improvement of the fish farming technique coupled with the introduction of the male mono sex *nilotica* tilapia of good performance and affordable quality input supply is an opportunity to producers to improve their production. It needs to be noted that, as mentioned above, it is an activity that could bring in a substantial additional income to those who perform it. According to our inquiry, fresh water fish is sold about 12,000 Ariary per kilo (more expensive than sea fish).

To ensure product outlets through organization of sales that is TDE's responsibility: the producers do not have to care anymore about searching for customers nor for logistics in transporting the product to markets.

4.3.**EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)****4.3.1. RESULT ACHIEVEMENT LEVEL**

The table detailing the results achieved from 2016 until the implementation of the mid-term evaluation in December 2018 is in **Appendix 2**.

Generally, the actors as a whole affected by the project, including specifically the direct beneficiaries (fish farmers), expressed their satisfaction. On the assignment side, a net improvement of the current situation was noted as compared to that established during the evaluation conducted in 2015.

OVERALL IMPACT: Sustainable Tilapia farmers' Livelihoods in the East coast of Madagascar, contributing to increased availability of fish on the markets of Toamasina and Antananarivo.

The overall impact aimed by the project was more than 100% achieved:

- The number of fish farmers reaches 329 out of the 250 expected till the end of the project that is an achievement rate of 131%. Among those producers, 30% or 99 are women. This fact testifies that the farmers are interested in the speculation that disseminated rapidly. In parallel, the number of constructed ponds significantly increased and exceeded the projection: 459 ponds out of the 400 expected;
- The improvement of fish farmers' average monthly income per farmer to USD 108¹³ or MGA 378,116 and exceeded the planned objective of USD 105, that is 75% in addition to the USD 60 at the initial situation. The set result was 103% achieved. This income improvement is significant in the sense that currently, they can improve their living conditions and support the expenses that they could not make before;
- It also helped the increased activity development of tilapia producers by 36.3% who could extend the number of their ponds that is an achievement of 239% as compared to the result set.

Pond construction is the most significant expense for the producers; it can take 4 to 6 months, even more, depending on availability of financial resources to finance its construction and on the size of the work. According to exchanges with the farmers, the cost for construction of a 700m² pond currently is around MGA 1,400,000 to MGA 2,000,000.

¹³ This is a gross average income, that is Turnover deducted from intermediate consumption including the participation of 8% for TDE functioning

4.3. EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)

- Given this difficulty, and as mentioned before, 2 types of aids are provided to farmers when the pond is achieved over 50%:
 - o One by providing foodstuffs by TDE for the construction of the first 2 ponds,
 - o And the other one through a community aid by other neighbouring farmers and members of the local cooperative, with modalities which vary from one cooperative to another.

The objective is that the fish farmers can build their ponds by themselves by accumulating their sale savings. As per the data received, only 3% of producers have 3 ponds and 0.3% has 4 ponds. It can be said that these rates are low if we refer to the fact that 33% of producers have 2 ponds. This can be explained by the fish farmers' reluctance to take out a credit, against the interest rate (3% per month), the guarantee needed for taking out a loan (133% to 150% of the amount requested) and the risk that the activity represents (theft, cyclone...). However, while calculating the return on investment, with an average net income of MGA 1,393,393¹⁴ per cycle per pond, the return on investment is obtained in less than 2 cycles, with an average production of 566 Kg per pond sold at MGA 7,840¹⁵ in average. According to exchanges with the producers, they prefer extend their pond number by their own means.

Outcome 1: *Improved Tilapia farming business operations*

The objective to improve the operations related to the tilapia farming was not achieved. The production quantity as well as the FCR rate were not achieved. The production in november 2018 was 231,645 tons that is 77% of the targeted value and the FCR is 1.5, without the flooded ponds, the FCR is 1.44. In 2018, the FCR was less performing than in 2016 and 2017. This can be explained by the flooded ponds after the cyclones, or by issues related to the delivery of feed (delay and non-compliant deliveries as compared to the established order).

However, this should not raise issues as the overall trend goes to an improvement.

This objective is split in 2 expected results, including:

- Output 1-1: Integrated training + coaching in sustainable production and management techniques implemented for women and men

In terms of number of technicians trained with a completion rate of 100% (5 technicians trained), the results meets the set objectives. It is not the case for the training of producers and technical officers with 4 cooperatives out of the 7 have their technical officers.

¹⁴ This is a gross average income, that is Turnover deducted from intermediate consumption including the participation of 8% for TDE functioning

¹⁵ This sales price is the price the farmer receives

4.3.**EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)**

The trainings resulted in an improvement of management techniques the producers are convinced that each step must be performed in accordance with the rules to have a good production. They learned through the trainings and are convinced after facing failures.

- Output 1-2: Sustainable and climate resilient production sites established by tilapia producers

The results set were achieved or even exceeded because 459 ponds were built, representing a completion rate of 115%, and the new hatchery was set up, functional and autonomous.

Outcome 2:***Well functioning producer steered cooperatives***

This outcome is made up of two outputs:

- Output 2-1: TDE and local cooperative business and organizational plans established and updated

The business plans were developed and updated.

- Output 2-2: Training and coaching implemented in sustainable cooperative business steering and management for women and men producers
 - All Board Members have received training in cooperative management and steering, but only 61% of producers have been trained. Despite this, the impact of training on the life and functioning of cooperatives is perceptible.
 - The Board of Directors meets regularly and information is shared with members of local cooperatives. The Union obtains authorisation for the collected fish transport, to import feed and broodstock, and performs dialogues with the relevant authorities for the correct payment of taxes to the municipality and region. In addition, they lobby to create an environment conducive to the cooperative development in Madagascar. Through its Managing Director, the Union met with the Ministry of Fisheries, the CSP¹⁶, the NCBA CLUSA, and the Ministry of Farming.

¹⁶CSP: Centre de Surveillance des Pêches (Fisheries Monitoring)

4.3.**EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)**

- Although the objectives have generally been achieved, some challenges remain for producers to effectively manage their cooperatives. They should have good analytical skills, the ability to identify new opportunities, the ability to analyse the scope of an investment or an additional operating cost, as well as the ability to make strategic use of networks and third-party relationships.
Members have difficulty to monitor the use of means to achieve the goals set, and to define the Union strategic orientation despite the training. In order to effectively develop the cooperative activities, members need to develop technical, management and social skills. They should perform their knowledge on fisheries legislation, their capacity in setting objectives and priorities - in analyzing problems and evaluating alternative solutions ...

Outcome 3:***Improved market integration of small Tilapia famers***

The indicators set for this outcome have a 100% completion rate: namely regular supplies to meet 100% of orders and an average daily sales volume of 831 Kg exceeding the target of 822 Kg.

Two results to be reached:

- **Output 3-1: Increased marketing of existing products to new/existing markets**
Customers are supplied on time and efforts have been made to increase TDE's market share in Antananarivo and Tamatave. A sale point has been set up with 2 resellers in Antananarivo. Sale in Tamatave is reinforced by about 20 resellers.
- **Output 3-2: Improved coordination of/with the needed value chain operators**
In terms of coordination, improvements have been noted from fingerlings production to products marketing: timely delivery of fingerlings and inputs, setting a delivery point, ponds monitoring, sales outlets extension, etc.

The value chain is generally well coordinated despite some irregularities reported during group discussions:

- Delays or non-conformity of supply delivery.
- Delay in the ponds validation and the fingerlings delivery not allowing 2 cycles per year, delay or non-compliance with feed delivery according to some producers.

4.3.**EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)****4.3.2. PROJECT DIRECT AND INDIRECT IMPACTS: SOCIAL, ECONOMICS****4.3.2.1. Project economy impact**

Agriculture and livestock are the farmers' main activities in the project's area districts. The majority of mission respondents have never been fish farmers, but since the project began, with the improved techniques introduced and adopted by the beneficiaries, the number of people interested in speculation has increased. In fact, they are interested in the quantity and quality of products released and even those who were initially sceptical have joined the cooperatives.

These facts reflect the dissemination of project activities that are spreading within the community for a given fokontany and in a municipality taking into account new requests for support formulated by other farmers. The transformation of rice fields into ponds is mentioned by several respondents because the income generated by fish farming is more interesting than that resulting from rice growing.

In terms of fish availability, it could be said that the effects of the project intervention are reflected in the existence of products from cooperatives on the local market. It was noted that in comparison with the assessment mission of 2015, the number of sellers in the market has increased significantly (1 to 2 sellers in 2015, which rose to 20 in 2018). Thus, the availability of farmed fish has been significantly improved and the project economic benefits in the region are being felt more and more through the circulating cash flows (Toamasina and Antananarivo TDE sales outlets, salesmen at Toamasina's markets).

4.3.2.2. Project social impact

The adopted approach has brought changes in the community way of life which is very quickly attracted by group life. Indeed, a social cohesion of the population and particularly fish farmers has been established and is manifested by the mutual aid in the ponds construction and in the harvest. The population adopts life in association by carrying out collective activities.

Compared with the lack of income before (often not available even for vital needs such as drugs and food), the living conditions improvement was noted by all respondents. Currently, with income from fish farming activities, families can cover the costs of children education, medical care in case of illness, household equipment acquisition; house building (changing the roofing sheet). The income improvement is thus felt by the majority of the interviewees.

In terms of nutrition (better use of foods), it could be said that the availability and growing accessibility of the farmed fish market allows local households to vary their protein-rich foods and improve their food fashion. Similarly, producing households and their neighbors improve their diet because fish farmers are entitled to 5 kg of products and more at harvest time. Compared to the final beneficiaries, therefore, it could be said that the project effects are obvious and local households can consume freshwater fish even during the closure period of the inland fishery.

4.3.

EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)

4.3.3. RESULT SUMMARY UNDER SWOT

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Improvement of population living conditions - Improvement of protein intakes of local population - Hatchery can operate without external funding or grant - Broodstock production that can be made on the spot (from imported broodstock) - Production in quantity of hatchery meeting the fish farmers' needs - Rate of sex reversal (currently 98%) - Rapid fertility of pond by using NPK and urea - Quantity of products provided on market in continuous increase with fish farmers' increase - Spill-over effect of actions - Products becoming appreciated on local market: increase of the number of resellers in market compared to the situation in 2015 - Improved techniques mastered and adopted (breeding, growth monitoring, fertilisation, ...); capacity of technicians considered as satisfactory by respondents - Improved FCR - Extension of sale points: in Tanà with two official resellers - Appropriate input cost refund principle (fingerlings, feed, fertilizer ...) by fish farmers (refund at harvest) 	<ul style="list-style-type: none"> - Late arrival of fingerlings orders sometimes do not allow the fish farmers to perform two production cycles in the year - Delivery does not arrive to production sites resulting in additional costs to fish farmers for transport : certain sites are far from delivery point - Presence of small fishes at harvest - Non conforming delivery to fish farmers' needs: this is the case recently for feed delivery for finishing instead of feed for growing ; as mentioned by the interviewed people at the level of all cooperatives and confirmed by the TDE technical team (cause: error in quantities shipped by the supplier) - Adjustment of feed quantity not mastered by fish farmers : they have to always call on technicians - Diminution of water source debit in certain sites - The TDE technicians become insufficient to coach the fish farmers whose number increased. So the monitoring frequency is very much spaced, the training of new fish farmers are delayed, as mentioned by the interviewed people - Sale points is not well known (new in Tamatave – the one in Tanà) - Premises of receipt/sorting out/handling of products do not meet the standards to ensure their health - Non utilisation of adequate equipment for packaging the products (packaging of products in insulated cans, without lid) - Use of insufficient ice quantity
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> - Arrival of 10 new agents within DRRHP (MER agents): staff in all circonscriptions is going to be filled out (Brickaville, Vatomandry, Mahanoro ...) and they can monitor the cooperatives activities, support locally the cooperatives in administrative formalities... 	<ul style="list-style-type: none"> - Exclusive use of chemical fertilizers that can destroy the soil quality: some fish farmers addressed the problem to have pond fertility (water becoming clearer as compared to the previous years). A collaboration with universities can be done for studies to be made by students (engineer diploma, master...) to see the effects/impacts of the sole use of chemical fertilizer on soil analysis... - Risk of market saturation - Destruction of watersheds by the "tavy"¹⁷ practice and deforestation by charcoal making

¹⁷ The « tavy » consists in clearing forests to make cultivation lands with.

4.3.**EVALUATION OF THE PROJECT EFFECTS AND IMPACTS (continued)****4.3.4. RECOMMENDATIONS**

The elements of value chain are well structured and functional: fingerlings production, input and material supply, pond management, production techniques (intinerary and technical standards developed), harvest organisation, collection/treatment and packaging/sales.

The actors directly or indirectly involved in the development of the project are committed themselves and motivated, but improvements still need to be made:

- Market study to be performed to properly assess the markets capacity to absorb products (both in Toamasina and Antananarivo) and to properly assess consumer products appreciation;
- Technique: compliance with the layout and product treatment unit hygiene standards (compliance with forward movement) and the products packaging/transport using isothermal boxes with ice of appropriate presentation (preferably in flakes to avoid crushing the fish) and of sufficient quantity (at least 1 Kg of ice for 1 to 2 Kg of fish to ensure better preservation¹⁸). During the visit of the product processing unit of TDE, it was found that some insulated boxes don't have a lid thus facilitating the loss of cold;
- Water sources preservation and restoration through reforestation even though TDE has not cut down trees, rainwater infiltration improvement and spring cleaning activities;
- Test on organic manure use for pond fertilization especially for breeders (use of compost);
- Activities resgistration by fish farmers: to be repeated for data matching at the time of counts (number of fingerlings/quantity of feed and fertilizer received) and also for monitoring fish growth and adjusting feed. This process could facilitate the technicians tasks because they can only take the notebooks for office recordings;
- Design and make available to fish farmers manual/guide training materials based on images. This method has concrete advantages because it takes a playful form and thus facilitates the understanding and memorization by target fish farmers of the training courses;
- In order to remedy the insufficient number of technicians against the number of fish farmers (3 technicians for 329 fish farmers in 2018), putting in place technical responsible coming from the cooperative members could be maintained, even reinforced against the number of ponds. They should receive capacity building and coaching from the technicians who will be their supervisors. This supervision/coaching could reinforce the members's confidence in them. Payment of their per diem allowances by the cooperatives might be envisaged.

¹⁸ Standard provided for in CODEX alimentarius, taken in the guidelines for the conservation of halieutic products published by FAO

4.4.**PROJECT EFFICIENCY AND EFFECTIVENESS EVALUATION****4.4.1. FINANCIAL EVALUATION****4.4.1.1. Project financial resources use from 2016 to 2018**

In accordance with the cooperation agreements established with NorgesVel and TDE, the action financing and the financial absorption are as follows:

In MGA

Year	Budget	Funds received		Ratio Exp/Budg
		Norges Vel	Expenditures	
2016	1,657,199,099.70	662,643,851.00	1,530,467,214.41	92%
2017	703,407,436.81	703,407,436.81	1,831,066,343.78	260%
2018	1,097,323,450.80	869,008,918.00	1,034,938,560.51	94%
Total	3,457,929,987.31	2,235,060,205.81	4,396,472,118.70	127%

Source: Auditor's report, Norges Vel

From 2016 to 2018, the funding provided by Norges Vel to the project is estimated at MGA 2,235,060,205.81. The project financial absorption exceeding 90% over the 3 years studied is very satisfactory.

The project self-financing capacity is detailed as follows:

Year	Funding		Ratio Income/Exp
	by Norges Vel	Expenditures	
2016	662,643,851	1,530,467,214.41	43%
2017	703,407,436.81	1,831,066,343.78	38%
2018	869,008,918	1,034,938,560.51	84%

TDE's revenue portion in the budget increased significantly from 2016 to 2018, reflecting an improvement in its self-financing capacity. This revenue consists of inputs sale, the members' production sale and the cooperatives contribution and their members.

For 2018, it was noted that Norges Vel financed 84% of TDE expenditures. This increase is due to an increase of 107% for the Feed Unit as well as an increase of 106% for the Sales and marketing Unit. Those increases are due to the acquisition of a refrigerating truck, the acquisition of a land for building a new storage location, and the acquisition of a new point of sale.

4.4. PROJECT EFFICIENCY AND EFFECTIVENESS EVALUATION (continued)

4.4.1.2. Analysis per Unit from 2016 to 2018

From 2016 to 2018, the Project financial absorption per Unit is detailed as follows:

Year 2016

	Project Budget	Project Expenditures	Project Balance	Ratio Exp/budg
Extension Service Unit	152,170,965.04	151,449,191.39	721,773.65	99,52%
Hatchery Unit	154,750,455.08	155,609,057.27	(858,602.19)	100%
Feed Unit	47,884,606.03	47,312,611.58	571,994.53	98,80%
Sales and marketing Unit	120,346,293.93	120,274,799.60	71,494.33	99,94%
Administration Unit	126,251,521.83	126,714,325.08	(462,803.25)	100%
Sub total	601,403,841.91	601,359,984.92	43,856.99	99,99%
Other costs covered by TDE	1,055,795,257.79	929,107,229.49	126,688,028	88%
Total expenses by Project & TDE	1,657,199,099.70	1,530,467,214.41	126,731,885	92,35%

Year 2017

	Project Budget	Project Expenditures	Project Balance	Ratio Exp/budg
Extension Service Unit	161,352,277	158,151,185	3,201,092	98%
Hatchery Unit	108,682,161	108,290,389	391,772	99%
Feed Unit	114,518,554	113,253,089	1,265,465	98%
Sales and marketing Unit	190,758,471	190,343,344	415,127	99%
Administration Unit	128,095,971	127,700,573	395,397	99%
Sub total	703,407,436	697,738,581	5,668,855	99%
Other costs covered by TDE	-	1,133,327,762	(1,133,327,762)	
Total costs by Project & TDE	703,407,436	1,831,066,343	(1,127,658,906)	

Year 2018 (as at 30/09/18)

	Project Budget	Project Expenditures	Project Balance	Ratio Exp/budg
Extension Service Unit	177,913,899.55	161,153,333.81	16,760,565.74	91%
Sales and marketing Unit	269,703,908.48	258,283,624.26	11,420,284.22	96%
Administration	145,360,786.68	133,665,726.72	11,695,059.96	92%
Breeding scheme	24,172,378.31	20,100,911.57	4,071,466.74	83%
Technical Hub with HACCP standard	251,793,000.00	249,692,920.00	2,100,080.00	99%
Sub total received by TDE	868,943,973.02²⁰	822,896,516.36	46,047,456.66	95%
Other costs by TDE				
Hatchery Unit	100,408,599.67	93,338,575.18	7,070,024.49	93%
Feed Unit	38,370,878.11	34,182,051.70	4,188,826.41	89%
Additional expenses 2018	89,600,000.00	84,521,417.27	5,078,582.73	94%
Sub total 2	228,379,477.78	212,042,044.15	16,337,433.63	93%
Total costs	1,097,323,450.80	1,034,938,560.51	62,384,890.29	94%

²⁰ MGA 745,913,710.51 received by transfer and MGA 123,029,735.76 by nature

4.4. PROJECT EFFICIENCY AND EFFECTIVENESS EVALUATION (continued)

Overall financial performance per project unit: 2016 to 2018

	Budget	Expenditures	Balance	Ratio Exp/budg
Extension Service Unit	491,437,141.59	470,753,710.20	20,683,431.39	96%
Hatchery Unit	533,136,524.56	522,183,070.53	10,953,454.03	98%
Feed Unit	307,763,946.71	294,231,427.30	13,532,519.41	96%
Sales and marketing Unit	335,277,143.24	330,719,055.17	4,558,088.07	99%
Administration Unit	506,140,492.83	504,107,818.08	2,032,674.75	100%
Sub total	2,173,755,248.93	2,121,995,081.28	51,760,167.65	98%
Other costs covered by TDE	1,284,174,735.57	2,274,477,035.64	(990,302,300.07)	177%
Coûts totaux	3,457,929,984.50	4,396,472,116.92	(938,542,132.42)	127%

Source: TDE data for 2018, auditor's report for 2016 and 2017

Generally speaking, the budget performance analysis per unit leads to some remarks:

Extension service unit: occupies between 22 and 25% of the Union's budget. A challenge for this unit is to decrease the support to producers for the construction of the first 2 ponds. The input delivery organization to collection points should be maintained.

Hatchery unit: 25% in 2016, 15% in 2017, this cost has been reduced to 8% of the budget. Infrastructure, transport and maintenance costs are the main items of expenditure for this unit.

Feed unit: This unit uses on average 8 to 10% of the budget. It should be noted, however, that this proportion does not include the purchase of feed. For this unit, an increase of 107% was noted in 2018 compared to 2017 corresponding to a land acquisition for building a new storage location.

Sales and marketing unit: occupies around 20% of the Union's budget in 2016 and 2017, and 37% in 2018. For 2017 to 2018, an increase of 106% was noted. This increase is explained by the acquisition of a refrigerated truck to transport production in the best conditions, the acquisition of a new point of sale and other additional costs.

Administration: Since 2017, this unit has used 18% of the budget. This budget rate charged to project administration below 20% is in line with the rates applied by development projects in Madagascar.

4.4. PROJECT EFFICIENCY AND EFFECTIVENESS EVALUATION (continued)

4.4.1.3. Analysis of operating expense development as compared to production development

Development of production quantity as compared to development of operating expenses (part: sustainability)

	2016	2017	Nov 2018
<i>Production in kg</i>	90,326.60	151,994.70	231,654.50
<i>Turnover in MGA</i>	653,345,693.16	1,208,116,778.60	2,102,329,309
<i>Expenditures in MGA</i>	1,530,467,214.41	1,831,066,343.78	1,034,938,560.51

Source: Auditor's report for 2016 and 2017, TDE for 2018

From 2016 to 2017, an increase of 14.36% in expenditures results in an increase of 68% in production, and an improvement of 84% in turnover.

From 2017 to 2018, a decrease of (-43.47%) in expenditures results in an increase of 52.41% in production, and an improvement of 74% in turnover.

4.4.2. RESOURCES APPROPRIATENESS EVALUATION IN RELATION TO PROJECT NEEDS: HR, MATERIAL RESOURCES

Regarding to resources appropriateness made available in relation to local physical conditions, most respondents found that technicians have the required technical capacity, but they find that their visits are becoming less frequent because the number of fish farmers increases.

4.4. PROJECT EFFICIENCY AND EFFECTIVENESS EVALUATION (continued)

4.4.3. RESULT SUMMARY ACCORDING TO SWOT

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> – Information system capable to define the project needs – Reliable budget monitoring system – Improvement of TDE self-funding capacity – Organization improvement by putting in place gathering points – Administrative team competent to coordinate and to implement the project 	<ul style="list-style-type: none"> – The implementation of other activities has an impact on producers' productivity, on their income and, therefore, on the Union income – The budget for supporting the producers reflects a financial dependence towards the partner – Non-application of training by some producers has consequences on their productivity, thus on their income as well as on the Union income. – Any feed supply shortage would result in decrease in production and thus a decrease in income for producers and for the Union as well.
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> – Partners' confidence in the TDE – Strong potential market extension in Antananarivo enabling to absorb the Union production objectives 	<ul style="list-style-type: none"> – Cyclones undermine the producers' efforts and have impacts on the Union financial viability – Investments made requiring significant efforts for the maintenance and replacement – Regulations about commissions to pay at the regions and communes level are not very clear for the Union and its members. It is the role of technical service to inform TDE and fish farmers about the legislation in force and / or any new administrative procedures – Foreign currency rate fluctuations have a consequence on imported input costs.

4.4.4. RECOMMENDATIONS (WEAKNESS, STRENGTH IMPROVEMENT)

- Strengthening feed storage capacity: which enables to reduce the fluctuations induced by foreign currency rate variations and to avoid stock shortage that affects the producer's income and therefore the Union's income,
- Strengthening partnership between the TDE and supplier for feed credit purchase : in 2018 the purchase was directly made by the donor,
- Performing a study for quality feed production in Madagascar in order to improve availability stability as well as the feed cost for the producers,
- Strengthening the producer monitoring system in the application of production techniques, through the improvement of availability of technical officers regarding monitoring for conducting tilapia production.

4.5.**PROJECT SUSTAINABILITY EVALUATION****4.5.1. TECHNICAL SUSTAINABILITY**

From technical perspective, all the requirements to develop this activity are met, specifically: availability of land that can be used for pond construction, availability of water throughout the year. Therefore, despite the difficulties to face with for the development and transformation of a land/rice field into fish farming ponds, all those who responded opted for the development of the male mono sex tilapia farming.

One locality (Toamasina II) expressed its will to cooperate with the fish farmers to the extent that it can and for the actions/activities for which it is responsible. These are among others:

- Providing involved fish farmers with available (national) land so that they can proceed with extensions;
- Making available officers who control techniques to accompany the fish farmers. Those officers will receive training by TDE.

Multiplication of technical officers per area will relieve so much the technicians in their monitoring activities. The cascade training method thus enables to reach many targets in a short time.

As compared to institutional viability, the support beneficiaries were structured into cooperatives grouped in the TDE union which are entities deemed to be relevant and sufficient to ensure continuity.

Moreover, arrangements were made by TDE to strengthen technical sustainability of the model:

- The reduction in farmer and pond coaching and monitoring cost by putting in place lead farmer. Even though the achievement rate is 40% against the target value that is 6 tilapia technical responsables put in place against 15 expected. The site visits enabled to confirm their efficiency but their number is not sufficient as compared to the number of ponds to be monitored. Among others, they ensure pre-visit of sites for construction of new ponds, monitoring of fish growth... However, those responsables deplore that the farmers do not have sufficient confidence in their opinion.
- Improvement of organization in farmer supply with inputs as well as production harvests, by putting in place collection points. However, according to some farmers' remarks living away from the collection points, this organization would result in additional costs to them for feed conveyance to their production site. As the objective is to improve farmers' income as well as TDE financing capacity, this matter could be deepened during the meetings of the Union Board of Directors.
- Control of good performance fingerling production by putting in place a hatchery that is currently 100% operational. The producers have access to quality fingerlings.

4.5.

PROJECT SUSTAINABILITY EVALUATION (continued)

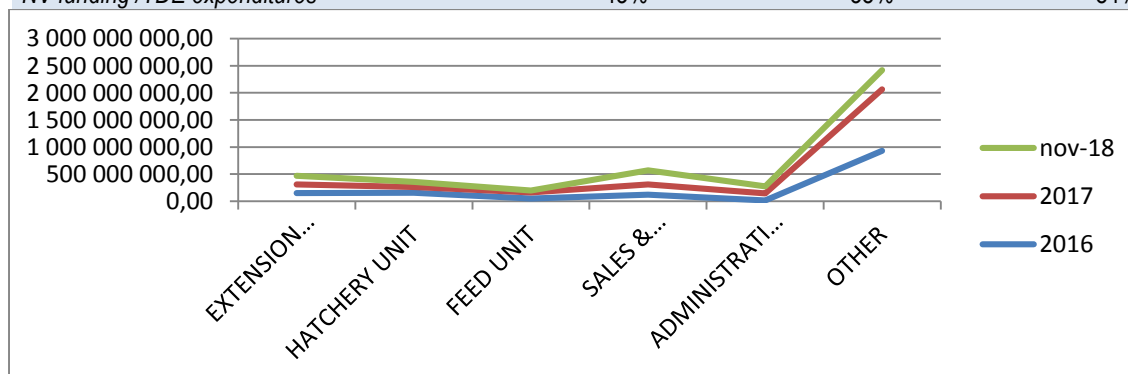
- Implementation of technical measures that enable to limit losses during cyclones however remains to be strengthened. According to the technicians and farmers met, the producers often learn by their errors and not by training. The origin of production losses during cyclones (including losses in 2018) should be further developed taking into account all the technical measures already planned and put in place: such as the installation of "security grids", the use of signaling colors....
- Control of marketing by the improvement of Tamatave selling point visibility (change to a street that is clearly busier and near local markets), keeping of the selling point in Antananarivo as well as increase in number of resellers not only in Antananarivo but in Tamatave, too.

4.5.2. FINANCIAL SUSTAINABILITY

	2016	2017	Nov 2018
EXTENSION SERVICE	151,449,191.39	158,151,185.13	161,153,333.81
HATCHERY UNIT	155,609,057.27	108,290,389.27	93,338,575.18
FEED UNIT	47,312,611.58	113,253,089.22,	34,182,051.70
SALES & MARKETING	120,274,799.60	190,343,344.20	258,283,624.26
ADMINISTRATION	126,714,325.08	127,700,573.91	133,665,726.72
OTHER	929,107,229.49	1,133,327,762.05	354,315,248.84
Total of Expenditures	1,530,467,214.41	1,831,066,343.78	1,034,938,560.51
Funding by Norges Vel	662,643,851	703,407,436.81	869,008,918

Ratio :

NV funding /TDE expenditures 43% 38% 84%



Source: Auditors report, TDE data

According to this table, an improvement of expenditure financing capacity by TDE through a diminution of the expenditure part funded by Norges Vel from 43% in 2016 to 38% in 2017 is noted. For 2018, it was noted that Norges Vel financed 84% of TDE expenditures. This increase is due to an increase of 107% for the Feed Unit as well as an increase of 106% for the Sales and marketing Unit. Those increases are due to the acquisition of a refrigerating truck, the acquisition of a land for building a new storage location, and the acquisition of a new point of sale.

4.5.**PROJECT SUSTAINABILITY EVALUATION (continued)**

As compared to the financial sustainability, the production activities have enabled the cooperative members to put aside a percentage of 5% of their sale as savings for the purpose to set up a fund enabling them to generate income needed for their functioning as well as acquisition of goods and services.

It needs to be noted that all these findings are still at their commencement. The arrangements made by the project are likely to generate significant effects including sustainability that was also scheduled. However, the major matter is time.

The major concern after withdrawal of Norges Vel funding is the operation of TDE team:

- Payment of the technical team salaries (management),
- Renewal of heavy equipment (cars, ice making...).

The objective is that, both income and turnover for TDE is sufficient to cover both for all salaries and other operational costs. Currently, production covers 77% of operating/ administrative costs in relation to the goal to reach 60% in 2018.

For farmers, the purchase of inputs and the cost of pond construction remain quite high. In relation to the risks represented by the activity (theft, flooding, etc.) and the lending conditions of the microfinance institutions, producers are less favorable with addressing to microfinance institutions despite the fact that the activity is profitable. Savings and mutual aid remain the options for which the producers are favorable.

However, the credit that TDE obtained from LFL for purchasing feed is a very good point and enables to continue the "revolving input credit" allowing farmers to get quality feeds.

The "revolving input credit" in place remains more accessible for producers. Actually, this system is:

- Less expensive for farmers (8% of the gross turnover on sale of production),
- More adapted to the producers' situation, since the credit repayment after the production sale contributes to finance TDE operating costs (such as the production of fingerlings, the delivery of inputs, the harvest and the sale of production ...).

At the level of microfinance institutions, the credit:

- Is more expensive, (2% per month, without commission costs and other possible costs, the cost will increase in case of breeding and/or selling time extension),
- Requires a guarantee from 133% to 150% of the amount requested,
- Is difficult to access given the vulnerability of the farmers, since the repayment must be made from the first month after the fund release. (For a credit for an average input cost of MGA 2,649,614, the producer will have to repay USD 141 or MGA 494,596 per month for 6 months, excluding fees),
- Doesn't contribute in maintaining TDE's various services that would still be an additional cost.

4.5. PROJECT SUSTAINABILITY EVALUATION (continued)

However, to allow the « revolving input credit » to be sustainable, it would be necessary to ensure that outputs make it possible to repay pre-financing of inputs and to participate in the financing of TDE operation. The risk related to this « revolving input credit » is however that TDE will have difficulty in recovering the funds invested in case of production problems. In order to reduce this risk, the monitoring and support system should be strengthened to ensure that all technical measures to secure and maximize production are applied.

It should be noted that Access Bank Madagascar has developed a product for farmers and livestock farmers called « FAFY credit », which allows the loan to be repaid once production is sold. Repayment is done in one or two installments, after the production sale, with a dedicated team to support the producer. Although this credit also requires a guarantee, the repayment method remains more accessible in relation to the farmers' vulnerability. This product is not yet available in Tamatave. We can consider using it in the future to support the extension of the TDE members' activities.

4.5.3. OTHER ASPECTS IN RELATION TO THE PROJECT

“Gender” aspect

As compared to the basic problem about women's situation, the project approach that consists in supporting also women who meet the requirements, has enabled to each member of cooperatives the opportunity to face with shared responsibilities and to express themselves (during cooperatives' meetings and during group focus discussion held in connection with the present term of office). Hence, women and men could actively take part in the activities and could benefit in the same way from the benefits of the activities conducted with the project.

However, it needs to point out that the number of women involved in the project implementation is still lower than the men number, not only for accountability within the Board of Directors but in farms management, too (Cf. table about results achieved).

“Environment” aspect

Under law No. 2015-053 related to fisheries and aquaculture Code, in its book II on aquaculture, chapter 2 (production system and types of aquaculture), article 102 states that aquaculture development must ensure human well-being and sustainable ecological well-being. Therefore, environment preservation must be under the rule. Fish farmers are already convinced of it and some of them already proceed with restoring watersheds/protecting sources through reforestation activities. In fact, as mentioned above, some fish farmers face with a diminution of water source debit in certain sites.

Moreover, as TDE uses imported feeds, one must be careful and put in place a light water quality control system in order to avoid or to minimize the negative impacts of the use of those feeds as well as use of fertilizers on environment.

Moreover, fish farming activities development has resulted in decrease in activities that are detrimental to environment (charcoal making).

4.5.	PROJECT SUSTAINABILITY EVALUATION (continued)
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4.5.4. RESULT SUMMARY ACCORDING TO SWOT

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Succession structure after the project departure already put in place and having the management capacity required 	<ul style="list-style-type: none"> - System self-funding capacity still low - Low involvement of women in responsible positions
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> - Availability of lands that can be used 	<ul style="list-style-type: none"> - Environment degradation - Vagueness of regulation governing taxation to be applied to the Union.

4.5.5. RECOMMENDATIONS

Arrangements to make for competence transfer for the project sustainability purpose:

- Capacities of the Board of Directors members in terms of the Union management is to be built so that they can completely fulfill their roles;
- Reforestation actions are recommended for protecting sources due to insufficient water issues already found in some production sites. Reforestations targeting fast-growing species (e.g. *Acacia mangium* as it seems that eucalyptus is a big water consumer) can be extended as, on the one hand, restoration of watersheds is ensured and, on the other hand, population's needs for firewood and charcoal will be met without prejudice to water sources;
- Women's participation mainly in playing a strategic role within the Boards of Directors is still to be reinforced.

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5

**Conclusion and
General Recommendations**

5. Conclusion and General Recommendations

5.1. GLOBAL APPRECIATION

Aquaculture plays an important socio-economic role in Madagascar in general and in the Atsinanana Region in particular. Indeed, if marine aquaculture, specifically shrimp and sea cucumber farming as well as seaweed farming, provides well-remunerated job opportunities and generates foreign currencies, contributing then to improvement of the country's trade balance, freshwater fish farming provides a large part of the population with consumption fish. Moreover, an increase in production results in job opportunities in farms and in service industries such as input marketing and supply.

It needs to point out that from the outset up to now freshwater fish production mainly comes from fishing activities performed in natural water bodies. But, during the past years, exploitation of most of those water bodies, including those in the Atsinanana and Alaotra Mangoro Region, which supply local markets, is near the tolerable maximum level (overexploitation resulting in a decrease in production and in size of catches).

Therefore, taking into account:

- a potential in favorable environments for pond fish farming;
- the availability of better quality species the zoo-technical performance of which (monosex Tilapia is already evidenced by the project and which finds in the Region parameters favorable to its optimal growth including temperature among others);
- markets that are still wide and product that is appreciated by consumers.

The promotion by TDE of male monosex Tilapia farming in the Region is primordial to improve the farmers' income and animal protein intake for the population. Feed, fingerlings and good management must be in place to ensure best results.

5.2. LESSONS LEARNED AND GENERAL RECOMMENDATIONS

The following topics reflect the highlights of positive aspects and to be consolidated.

- Production of fingerlings ensured in quantity and in quality by controlling hatchery management: management of male and female spawners, control of technique of sex reversal - egg incubation with a high hatching rate (80%) - more and more improved sex reconversion rate (98%) - controlled rearing technique (fingerlings survival rate reaching 87 to 92%) - production of broodstock practiced in the hatchery site;
- Farmers following prescribed protocols (protocols adapted to feed, fingerlings and environment) enjoy a highly improved FCR;
- Outlets of fish farmers' products ensured;
- Input supply ensured;
- Mutual aid and good will of people intervening in the project implementation;
- All three elements in the triangle, feed, fingerlings and management must be in place to ensure best possible results.

Globally, producers could express that the project objectives are achieved; many witnessed that the knowledge they acquired in connection with this project have enabled them to improve their living condition and, generally, no major issue did not prevent the project to progress in compliance with the partner and beneficiaries' requirements.

To consolidate the acquired knowledge and to adjust dysfunctions noted, our recommendations are the following:

Synergy with Other Actors and Communication

- Improving the complementarity of actions to strengthen certain links, and more particularly developing partnerships with various institutions and projects directly or indirectly involved in fish farming:
 - Fish feeds (in Madagascar) because of the considerable needs for feed to justify the local feed production, thus sparing them from being imported.

Indeed, several projects are generally involved in fish farming development and particularly in monosex Tilapia and there would be fish feed needs justifying the relevance of local production. Indeed, it should be pointed out that there are companies that produce fish feed (AGRIVAL, SABMA, AMI) and other ones that have produced the same (TIKO FEED MILL), which shows the speculation feasibility but which performance should still be improved. Collaboration with research institutions such as FOFIFA, which makes monosex Tilapia breeding, will allow the experimentation of different provende formulas. This is not necessarily by TDE but in the context of projects under MRHP supervision, requested by the fish farmers' platform.

5.2. LESSONS LEARNED AND GENERAL RECOMMENDATIONS (continued)

The problem of insufficient raw materials can be solved by the PPP system between Communes - Food Manufacturing Companies - Farmer Cooperatives to ensure the need for raw materials, private public partnerships can always be established with communes that have land to be exploited by producer cooperatives (this is a type of PPP developed by the "Local Economic Development" component of the Communal Inclusive Development and Decentralization (ProDéCID), Project financed by the German Cooperation and implemented in three Regions of Madagascar.

- Upgrading of infrastructure and equipment for products treatment and packaging / transport.
- Collaboration with universities can be carried out for studies to be done by students who prepare graduation memoirs (engineering, DEA ...) to see the effects / impacts of the exclusive use of chemical fertilizers and other inputs used by the farm on the soil (soil analysis, ...) as well as on water resources, and also study of erosion and erosion control strategy development.

Encourage the communes to set up a local support system that is accessible and viable for TDE. Actually, in the communal development plan implementation, the commune has technicians who will help for the communes' priorities achievement. Through the rebate paid to the commune thanks to TDE activity, the commune is winning when the TDE activity is doing well. In order to strengthen the activity viability and thus develop the commune, the technicians from the commune could sensitize the producers to respect the recommended production techniques. TDE's technicians could for this purpose, provide them with technical training so that the commune's technicians can adequately accompany and follow up TDE members' activities. TDE activity would be good and the commune as well.

- Strengthening the collaboration with deconcentrated technical services, namely:
 - The Regional Department of Fisheries Resources and fishing with its divisions which issue the compliance visas
 - And the Regional Department of Livestock which issues the certificates of origin and health certificates of products shipped outside the Region.

The technical services can coordinate the actions involving several actors concerned by the sector: estimation of the feed needs of all the fish farming projects / entrepreneurs - implementation of economic intelligence informing on the prices used, the fish productions with the quantities marketed by region / national ... These data are interesting and would help in decision making on the outlets extension for example.

The DRRHP and the Official Veterinarian / Fisheries Authority could support TDE in designing the new treatment infrastructure plan to comply with the standards.

5.2. LESSONS LEARNED AND GENERAL RECOMMENDATIONS (continued)

It is also their role to:

- inform TDE and fish farmers about the legislation in force and / or any new administrative procedures,
 - support the establishment and formalization of a platform for the promotion of monosex tilapia breeding. Promoting synergies and complementarities of actions with other projects working for the development of monosex tilapia breeding: exchange of experiences on technical itineraries, on broodstock management, on approaches to improve the producers' investment capacities (ponds extension...).
- Promoting synergies and complementarities of actions with other projects working for the development of monosex tilapia breeding: exchange of experiences on technical itineraries, on broodstock management, on approaches to improve the producers' investment capacities (ponds extension...). The sharing of experiences with the other projects can also be done through service contracts in which TDE provides training. These would be sources of revenue for TDE.
 - Improving communication between the administrative team and producers so that they can better manage situations.
 - By putting in place an interlocutor for each site in relation with the co-op presidents and the socio-organizer to help him/ her transmit the information or to announce any changes without waiting for the official meeting.
 - By postering at the defined locations identified at local cooperatives level.
 - By introducing a proper database and software instead of the use of the monitoring excel based system which is labour intensive.

Capacity Building

- Building the capacity of Board members and if necessary using external resources in case of problems of understanding and analysis of files.
- Strengthen the staffing and leadership capacity of local responsables at the site level to meet the producer's needs for support. These technical officers are chosen from the members of cooperatives to assist the farmers.

5.2. LESSONS LEARNED AND GENERAL RECOMMENDATIONS (continued)

Technique

- Maintain hygienic standards for farmvisits and hatchery in particular is also recommended
- Observance of the hygiene and sanitary conditions of the products reception and processing unit currently used and taking the opinion of the Regional Department of fisheries Resources as well as the veterinary service (Regional Department of Agriculture and Livestock) for designing the plan of the new processing unit to be installed
- Training of the handling, transportation and product processing team on hygiene in general (vehicles and means of packaging / transportation of products, personnel, fish handling equipment and tools) and on hygiene products, not only to reduce post-harvest losses but also to provide consumers with safe, hygienic and quality products
- The project should advance the financing of the new technical site for reception of fish as well as purchase proper robust cooling boxes and apply proper cleaning and disinfection systems.
- Training of the processing and marketing unit team on the use of cold in products conservation
- Increased ice-making capacity, preferably in flakes: purchase of a new ice-making machine and repair of the existing machine. Ice machine should be solid enough to last even under the highly variable voltage the national grid supplies.
- Conducting diversification tests, the products presentation to be offered on the market for their valorisation: live fish, fish fillet, ... It should be noted that the tilapia skin can be tanned and used in leather goods. Actually, fish fillets and smoked fish can be sold at a high price by targeting other types of customers (refer to products sold in supermarkets). Similarly, live fish are highly valued and the only point of sale of live fish of Toamasina under this assignment fails to meet the demands. These technical and financial feasibility tests may be conducted by TDE through a contractual agreement with specialists in product processing.
- Ensuring the preservation and restoration of water sources through reforestation activities even if TDE has not cut down trees, faced with the environmental deterioration caused by abusive exploitation of forests for the production of coals and firewood. It will improve the infiltration of rainwater and cleaning of sources: reforestation targeting fast-growing species (e.g. Accaciamangium) is recommended given that eucalyptus appears to be big consumer of water).
- Considering the use of organic fertilizers simultaneously with chemical fertilizers for ponds fertilization (use of composter) to minimize the negative effects of chemical fertilizers on soil quality. In fact, some fish farmers interviewed mentioned that the fertilizer response to pond fertilization no longer lasts as long as it did in the beginning.

The ideal would be to respect the doses usually recommended (10 to 20 Kg / are as dose of funds and 2,5 to 5 Kg / are / week as maintenance dose) but these doses are to be corrected according to the answers of the ponds and according to the doses of mineral fertilizers to be applied on the one hand and also according to the possibilities of fish farmers on the other hand. In our opinion, fish farmers who practice poultry or beef farming will have no problems and there are some who have been interviewed by the evaluation team.

Given all this uncertainty, we would recommend conducting a study on the impact of the exclusive use of mineral fertilizer and on the use of mineral fertilizer combined with organic manures by students preparing dissertations (University ofToliara or Mahajanga).

5.2. LESSONS LEARNED AND GENERAL RECOMMENDATIONS (continued)

Organisation and Management

- Encouraging the taking of responsibilities by fish farmers:
 - Recording of activity data (number of fingerlings / quantity of feed and fertilizer received) to allow cross-checking of information at time of counting and also for monitoring fish growth and feed adjustment;
 - Giving a strategic role to women
- Extending the inputs storage capacity and providing a stock to limit the risk of stock out
- Planning a replacement plan for heavy equipment
- Strengthening the availability and leadership capacity of local Technical Officers to fill the lack of technicians' staff and especially preparing them technically to be independent.
- Clarify with the Ministry of Fisheries Resources and Aquaculture TDE situation regarding its obligation to pay or not taxes. Normally, having a collection permit assumes that taxes on product collection have to be paid. Technical services have the role to inform TDE and fish farmers about the legislation in force and / or any new administrative procedures

Commercial Aspects

- Conducting a market study to properly assess the market's ability to absorb products (both in Toamasina and Antananarivo) and assessing consumer's appreciation of the products...
- Strengthening market expansion in Antananarivo to support increased production.
- Improving the points of sale visibility by increasing billboards in town of Tamatave to raise awareness of TDE products and especially to make known the point of sale which moved in September 2018. Actually, the team of evaluators had difficulties to find the point of sale because had asked several people before finding one who knows the new location.
- Improving the packaging of products for transportation (production sites to Toamasina):
 Preferably, ice flakes should be made as ice bars should be crushed (ice bars crush the fish).
 Use insulated boxes for the products transportation from production sites to Tamatave, especially in hot season: we have seen fish delivered in large plastic cans with insufficient ice.

5.2. LESSONS LEARNED AND GENERAL RECOMMENDATIONS (continued)

- Complying with arrangement and hygiene standards of the product processing unit (maintaining forward movement) and product packaging/transport by using isothermal boxes with ice of appropriate presentation (preferably ice flakes in order not to crush fish) and of sufficient quantity (at least 1 Kg of ice for 1 to 2 Kg of fish to ensure a better conservation).²¹ As a reference, the law 2015-053 related to aquaculture product marketing which states under its article 115 that: without prejudice to statutes in force, marketing and transport of aquaculture products at the national level are subject to obtaining a selling and transport authorization issued by the Ministry of Fisheries and Aquaculture and a health certificate issued by the relevant authority in this respect. Rules of implementation are set through regulation.
- Ensuring preservation and restoration of water sources through reforestation activities, rainwater infiltration improvement, and cleaning of sources: reforestation targeting fast-growing species (e.g. *Acacia mangium*) is recommended due to the fact that eucalyptus seems to be big water consumer). This rehabilitation of water resources ensures a sustainable sufficient water supply for tilapia pond farming.
- Envisaging the use of organic manures for pond fertilization (use of compost bin) to put with chemical fertilizers.²²

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²¹ Standard provided for in CODEX alimentarius, taken in the guidelines for conserving halieutic products published by FAO

²² The ideal would be to respect the doses usually recommended (10 to 20 Kg / are as dose of funds and 2,5 to 5 Kg / are / week as maintenance dose) but these doses are to be corrected according to the answers of the ponds and according to the doses of mineral fertilizers to be applied on the one hand and also according to the possibilities of fish farmers on the other hand

Appendices

- APPENDIX 1.** List of People Met during our intervention
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Appendix 1.

List of People Met during our intervention

Appendix 1

List of People Met during our intervention

Full name	Functions
Mr RAKOTONDRINA Christian	Responsible for TDE salespoint in Antananarivo
Mrs AHITANTSOA Zaliah Jeanne Félicité	Managing Director
Mr RAFALIMISY Karim Chadno	Operational Manager
Mr RASOLONIRINA Jean Olivier	TDE Finance and Administration Officer
Mrs ANDRIANAMBININA Sandra	Technico Commercial TDE
Mr BEMARINA Lucien	RSE Prosperer Atsinanana
Mr SANGO	1st Deputy Mayor , Tamatave II
Mr Henri Fidèle Benoît	Assistant of the Chief of District in Brickaville
Mr JIMMY	Mayor at Vohitranivona
Mr VONY Roger	Anjara Environnement
Mr ANDRIANARINIRINA Zo	Regional Director (in charge of Fénériver Est) APDRA
Mme RAKOTONAIVO Hary Lala	National Coordinator of FORMAPROD
Mr RAZAFINDRAZAKA Tony	Chief of Aquaculture in fresh water Service– MRHP Ampandrianomby
Mr RAKOTONIRINA. Etienne	Regional Director of Fisheries Resources and Fisheries– Toamasina
Mrs RAHELIMALALA Faranirina	Chief of Regional Aquaculture Service- Toamasina

Appendix 2.

List of persons representing the TDE Union Board and Cooperatives at group discussions

Appendix 2.**List of persons representing the TDE Union Board and Cooperatives at group discussions****BOARD MEMBERS**

No	NAME	ANDRAIKITRA ANATY CA (Responsibility in Board of Directors)
01	RAMBININTSOAMALAZA Christophère	Chairman
02	RAFALIMISY Karim C.	Member
03	MANANJARA Célestin	Counsellor
04	LAHADY Henri	Chairman Tsaradia
05	RABEDESY	SG/ CA
06	TSIMANDRESY Dauphin	Chairman of Cooperative Tsarafara
07	RAYMOND	Treasurer
08	TATA Richard	Vice Chairman

COOPERATIVE TSARAFARA

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	RAKOTONDRAJAO Joseph	Counsellor
02	RAHARIMALALA Lydie Lucienne	Member
03	ANDRIANTSIFERANA T.M Angelio	Member
04	SAMPILAHY Rostin	Farmer
05	TSIMANDRESY Dauphin	Filoha Kaoperativa Tsarafara (Chairman of Cooperative Tsarafara)
06	PAPOLY Solange	Farmer
07	JHAMES	Farmer
08	ANDRIAMAHOELISON DomyValériste	Member
09	JEAN Victor Arsène	Farmer
10	RAZAFINDRAFIDY Hasina Fabiola	Farmer
11	RANDRIA Gervaro	Farmer

COOPERATIVE KOFIAMIT

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	SOA Jean Richard	Vice-Chairman
02	RABEDESY	Chairman
03	JAMESA Doude	Farmer
04	RAKOTOMALALA Jacquelin	Farmer
05	LARO Martin	Farmer
06	MENA Jeans Louis	Farmer
07	JILE Andre	Farmer
08	RASOANANTOANDRO Claudine	Farmer
09	RICHARD Norbert	Farmer
10	FANOMEZANJANAHARY Jeannot	Farmer
11	MARIE Rose	Farmer

COOP IVOLOINA

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	RAMBININTSOAMALAZA Christophère	Chairman (Chairman)
02	LAPOMPE Delinaresse	Member (member)
03	TODY Ernest	Vice-Chairman
04	LANDRY Augustin	Member (member)
05	CLEMENT Maurice	Member (member)
06	TOVONIRINA Jacobson	Member (member)
07	RANIVOSON Jacques	Counsellor
08	RAVALOMANDA Jean Chris	Treasurer
09	DIMANCHE	Member (member)
10	TALATA Salomon	Member (member)
11	RATIARISON Jean	Member (member)
12	MAURICE MARCELIN	Member (member)
13	NATACHA Obienne	Member (member)
14	IBE Auguste	Member (member)
15	LALANIRINA Georgette	Member (member)
16	ALBERT	Member (member)

COOPERATIVE VONONA

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	LAHADY Nono François	Farmer (simple farmer)
02	RANDRIAMANANA Andrisoa	Mpitan- tsoratra (secretary)
03	LAHADY Honoré	Member (simple member)
04	RALAY Martin	Member (simple member)
05	JEAN Jacques	Member (simple member)
06	HARIMALALA	Member (simple member)
07	SAMPILAHY Julien	Member (simple member)
08	RAZANASETA Rabe	Member (simple member)
09	RANDRIANASOLO	Member (simple member)
10	SAMPILAHY Maurice	Member (simple member)
11	LESABOTSY Ravelo Edmond	Member (simple member)
12	TOMBOLAHY Zeze	Member (simple member)
13	LEBANA Jean Michel	Member (simple member)
14	NONO Hervé	Member (simple member)
15	RANDRIANARIVELO Amourah	Member (simple member)
16	THOMIC Norbert	Member (simple member)
17	RESAHA Stevertinne	Member (simple member)
18	VICTOR Norbert	Member (simple member)
19	GERARD Norbert	Member (simple member)
20	JEAN de Dieu	Member (simple member)
21	LEMIARAKA André Julien	Member
22	NORBERT	Member
23	ZO Marie Louise	Member
24	VAVY Roa Célestine	Member
25	RAYMOND	Chairman
26	ROGER Norbert	Member

COOPERATIVE VITASOA

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	MANANJARA Célestin	Chairman
02	MAROVARY Jacqueline	Member
03	TSIMARIAKA Harison	Member
04	MICKA Vanessa	Member
05	JOSE	Member
06	RAVAOSOLO Marceline	Member
07	SOLANGE	Member
08	RANDRIANAVONY Avotriniaina Aurélien	Member
09	JEAN Pierre	Member

COOPERATIVE TSARADIA

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	JEAN Pierre	Member
02	SOLO André	Member
03	SAMPIVONY Alphonsine	Member
04	BAOKELY Charle	Member
05	CHARLES André Tsaradia	Member
06	RAZANAJAFY Jean José	Member
07	FRANCOIS Marolahy	Member
08	RAKOTONIRINA Georges	Member
09	LAHADY Henri	Chairman
10	EFADAHY Bruno	Member

COOPERATIVE TSIMIVAHA

No	NAME	ANDRAIKITRA ANATY KAOPERATIVA (Responsibility in the Cooperative)
01	Sonapeta	Treasurer
02	Ranabavy Miora	Member
03	Emelienne	Counsellor
04	Amélie	Member
05	Joséphine Nety	Member
06	Ra Louis	Technical officer
07	Armel Louis	Member
08	Jean Claude	Member
09	Talata	Member
10	Zafy Harison Georges	Member
11	Emilienne	Counsellor
12	Frédéric marius	Member
13	Issaia Jean Claude	Member
14	Talata Paul René	Member
15	Georges Harison	Member

Appendix 3.

Result Monitoring Framework for period 2016 - 2019

Appendix 3.

Result Monitoring Framework for period 2016 - 2019

Producer Steered Tilapia Farming, Organisation and Sales in MADAGASCAR, with Tilapia de l'Est (TDE): Result Monitoring Framework for period 2016 - 2019

Results	Activities	Indicators	Baseline	Targets 2018	Realization	% Result achieved	Observation
IMPACT LEVEL							
IMPACT Sustainable Tilapia farmers' Livelihoods in the East coast of Madagascar, contributing to increased availability of fish on the markets of Tamatave and Antananarivo.		New jobs for women/ men (total) (target 60% women and 40% men)		24/16 (40)	99/230 (329) (30% women)		Total number of producers
		Improved existing jobs for women/ men (total) (target 41% women and 59% men)	154 / 224 (372)	70/100 (170)			
		Increased income from 2016 for targeted tilapia producers	60 USD/ month average (targets given as percentage increase over baseline)	75% (that is USD 105 or 367,500 Ar)	378,116	103%	118 producers have at least 2 ponds and an average monthly income of 556,786 Ar. 211 producers have one pond with an average monthly income of 278,393 Ar
		Increased business development for tilapia producers with own capital/ external loans	Model is shown profitable per producer, but further growth after upstart of max. 2 ponds supported by project is not yet financed by producers themselves/ with external loans	15% of members have additional production based on external/ own capital	36.3%	239%	33% have 2 ponds, about 3% have 3 ponds and 0.3% has 4 ponds
OUTCOME AND OUTPUT LEVEL							
OUTCOME 1 Improved tilapia farming business operations		Increased production	40 tons fresh tilapia	300 tons fresh tilapia	231,645 tons	77%	Information about productions as at November 21, 2018
		Improved FCR (feed conversion ratio) for tilapia producers	1: 1.4	1:1	1:1.5 (1:1.44 of people strongly affected by the cyclone are removed)	-50%	High FCR though the project had a FCR of 1:1.3 in 2017 after a FCR of 1:1.46 in 2016
		Production parameters are registered, monitored and analyzed by the producers	Partly registered/ monitored, basic analysis	75% registration + M&E + Good Analysis	100% registration	133%	Biomass harvested, ABW, DOC, mortality, FCR. Registrations are performed mainly by TDE technicians.
Output 1.1. Integrated training + coaching in sustainable production- and management techniques implemented for women and men producers		No. of tilapia technicians trained/ re-trained/ coached	5 tilapia technicians	5 technicians	5 technicians	100%	3 technicians of extension services and 2 of hatchery. The operational Manager also performs monitoring of producers.
		No. of tilapia producers trained and coached	100 of 142 members	Min. 210 members	329 producers	156%	All producers have received integrated training and coaching
		No. of producers trained/ coached as technical supports/ responsables, women % incl.	4 tilapia- (no women) responsables	15 tilapia-technical responsables	06 tilapia-technical responsables	10% (1 woman)	A woman was included as trained but left at the moment, she did not fulfill the task due to pregnancy/birth/small child
		% women trained at all levels	32%	60%			

Evaluation Report

Results	Activities	Indicators	Baseline	Targets	Realization	% Result achieved	Observation
Output 1.2. Sustainable and climate resilient tilapia sites and ponds established/-stocked by the producers	No. of tilapia ponds constructed + stocked	112 ponds	400 ponds	459 ponds	115%	459 ponds the 84 of which are under construction and 1 new	
	New sustainable tilapia hatchery established/operational	Water reservoir + 3 ponds partly in place	Full functioning	Full functioning	100%		
OUTCOME 2 Well-functioning producer steered cooperative businesses	Increased coverage of operating/ administrative costs from sales/ production	15% by Coop Union Approx. 40% by 5 tilapia coops	60%	77%	128%		
	Professional Quarterly Board meetings and Annual Assemblies (with Agendas, plans/ results reporting, Analysis and Minutes produced)	Meetings held, lack of Agendas, Plan/ Result reporting, some Minutes - especially lack Analysis	Discussions and Analysis more complete	Due to lack of sufficient qualification, the members are not yet able to make an in-depth reflection on TDE's orientation.		Meetings held, result reported, some minutes, discussions and analysis limited by the low education of members	
	Democratic and professional internal sharing of plans, results/ reports and minutes by Boards/ GAs with feedback given	No system for internal reporting from Union to coops	Mutual sharing from coops to Coop Union.	Mutual sharing from coops to Coop Union.	100%		
	Increased lobbying for improved tilapia aquaculture policies/ laws/ regulations for small producers	Meeting with Ministries as relevant on tilapia ASC standards/ other as relevant	Min. 3 meetings achieved w. Min. on relevant issues	3 meetings: Min. Fisheries, CSP, NCBA CLUSA	100%	Authorization for transportation of fish collected, payment of commission, putting in place a favorable environment for development of cooperatives in Madagascar, importation of feed and broodstock fry.	
	Women's increased Board participation in aquaculture businesses	32%	48%	0% at the level of Union 20% at local cooperatives level	0% UnionTDE 41% coop. locales	The function of treasurer for the local 7 coops is occupied by a woman, by counting 35 members of office in total for the 7 coops.	
Output 2.1. Business Plans established and updated	Business Plan for Coop Union w/ strategy, operational plans, budget, gender mainstreaming etc. established and updated	Draft Business Plan for 2015 in place	Action Plan 2018 in line with overall Business Plan	Action Plan 2018 in line with overall Business Plan	100%		
	Business/ Organizational/ Action Plans for local cooperatives established, updated	No Annual Action Plans in 5 cooperatives	Org. Plan revision, Annual Action Plan in place + used	Org. Plan revision, Annual Action Plan in place + used	100%		
Output 2.2. Training + coaching implemented in sustainable cooperative/ business steering and management for women and men producers	No. of tilapia Boards trained + coached	1 Coop Union Board + 5 cooperative Boards trained	1 Coop Union + 10 coop Boards	7 members of the coop. Union + 35 members of 7 coop boards	-	All active members in 2016 benefitted from training, in cooperative principle	
	No. of tilapia members trained + coached	100	210	129/352 members in simplified management and in cooperative principle 45/352 members in literacy 33 members trained on communication and leadership and 16 on note taking and reporting	167%	113/352 or 32% are women (2016) Training needs for new members The number of trained members is 352, and the number of producers is currently 329: some producers (fish cage culture) left TDE	

Evaluation Report

Results	Activities	Indicators	Baseline	Targets	Realization	% Result achieved	Observation
OUTCOME 3 Improved market integration of small Tilapia farmers		More regular tilapia sales to existing/ new market segments	50% on time in terms of regular supply: there is always fish to sell - but variations due to supply irregularities not adapted to market demands	95% on time (regular)	100% on time		Regular supply enabling to honor 100% of orders : Tamatave selling point, Antananarivo selling point, resellers
		Increased tilapia sales to existing/ new market segments (individuals & restaurants buying from Coop Union sales point; direct sales to wholesalers + new segments defined)	110 kg/ day sold on average. But irregularity of sales due to market still under development + delayed stocking + harvest	822 kg/ day sold on average	831 kg/day sold average	101%	
Output 3.1. Increased marketing to existing/ new markets		Tilapia is more and better marketed to existing/ new market segments	Some general marketing carried out based on Local Market Survey Oct. 2015 + previous Market Study July 2012	Continued targeted quality marketing for increased purchases	Continued targeted quality marketing for increased purchases		Efforts to increase market portion in Antananarivo as compared to Tamatave market saturation
Output 3.2. Improved coordination of the value chain operators		Tilapia Coop Union has timely pond construction checks/ feed + fingerling sales to members	50% on time	95%	Correct data not available given that the team could not interview but 99 beneficiaries, that is 30% of producers		Delayed checking of the union regarding pond construction, feeding and fingerling sale according to some producers
		Local cooperatives harvest and transport tilapia to Coop Union collection points	Done by Coop Union with coops/ collection at each producers site	Local coops harvest + transport to agreed collection points	Local coops harvest + transport to agreed collection points		Feed and fingerlings delivery points were established and are operational despite non-satisfaction of producers being away from fixed points.
		On-time delivery of input, fingerlings, materials, technical support and purchase of production by the cooperative union/ cooperatives to/ from the tilapia producers	60% on time	95%	TDE self assessment: 80% in 2018) Correct data not available given that the team could not interview but 99 beneficiaries, that is 30% of producers	80%	Delay for the validation of ponds and the delivery of fingerlings that unable to do 2 cycles per year. Delay or non-compliance of the feed delivery... according to some producers

Appendix 4.

Bibliography

Appendix 4.

Bibliography

LIST OF DOCUMENTS CONSULTED

Documents provided by the project:

- Technical Documents
 - o Logical framework 2016-2019
 - o External evaluation of the Project "Producer Steered Fish Farming, Organisation and Commercialisation in Tamatave, Madagascar"
 - o Madagascar - Result framework 2016-2019: Tilapia farming component
 - o Project document: Project Producer Steered Tilapia Farming, Organisation and Sales in Tamatave, Madagascar , Final Version, November 2017
 - o Business plan 2016-2017
 - o Business plan 2018-2019
 - o Evolution journalière des ventes (daily evolution of sales)
 - o Agreed Minutes from TDE Follow-up April 2018
 - o Agreed Minutes from TDE Follow-up March 2017
 - o Agreed Minutes_TDE Follow-up Aug 2017
 - o Agreed Minutes_TDE Follow-up Aug 2017_signTDE LAST PG
 - o Summing up from Meeting between NorgesVel and Tilapia de l'Est in Tana, Madagascar (Hotel Relais des Plateaux), June 2017
 - o Summing up from Meeting between NorgesVel and Tilapia de l'Est in Tana, Madagascar (IC Hotel), November 2016
 - o Areas for improvement at the Brickaville hatchery - FIAS 11.03.17
 - o Bottlenecks + possibilities TDE value chain 07.03.17
 - o FIAS_Brief report on LFL visit and follow up_FINAL_29.10.18
 - o Agenda of the meeting between NorgesVel, FIAS and Tilapia de l'Est, September 2018
 - o Consultancy report : Capacity building of the fish farmers' members of the Cooperative Union Tilapia de l'Est, Tamatave, Madagascar, Senior Advisor, José Ramos, Hellerud, Norway, April 2016
 - o TDE follow up mission, 2016
 - o Global Result TDE 2016 and activity plan 2017
 - o Project cooperation agreement 2017-2019
 - o Project cooperation agreement 2016
 - o Project agreement 2014-2015, addendum January-April 2016
 - o Letter of guarantee for the payments of Union Cooperative TDE to Aller Aqua
 - o Contract NV, TDE, FIAS
 - o Training Reports : on cooperative principle, literacy, note taking and reporting

Evaluation Report**- Financial Documents:**

- Business plan_Finance_UCO TDE _2017
- Balance of budget and achievement 31 December 2017
- Business plan_Finance_UCO TDE _2018
- Business plan_Finance_UCO TDE _2019
- Balance of budget and achievement 10 September 2018
- Follow up Grow out 15_09_2018
- Real_profitability_sensitivity_analysis_UCO_2016, 2017 and 2018
- Harvest and Stocking summary_30_11_2018
- Pond statut 15_09_2018
- Dashboard _15_09_2018
- Audit Report 2016 MIDEM
- Audit report 2016 UCO TDE
- Audit report 2017 UCO TDE
- UCO TDE's Articles of Association
- UCO TDE Rules of procedure
- TDE administration Rules of procedure

Documents provided by partners:

- Interministerial Decree related to Monosex tilapia
- Producers' specification of male monosex tilapia's fingerlings
- Decree related to the creation of fingerlings and fish production and sale establishment

Documents available on website:

- Law No. 99-004 of 21 April 1999 related cooperatives
- Periodic survey to households in 2010, January 2011, INSTAT, Madagascar
- Information Sharing and Dissemination Workshop on Tilapia farming in Toamasina, August 2014

Appendix 5.

Photos

Appendix 5.

Photos

	
<p>Tamatave salespoint</p>	<p>Consumers in Tamatave</p>
	
<p>Tananarive salespoint</p>	<p>Sale of production</p>
	
<p>Some part of the production for the farmer</p>	<p>A delivery and collection vehicle</p>



Delivery of feeds by the refrigerated truck



Meeting with the members of TDE's Board of Directors



Infrastructure in the hatchery



Infrastructure in the hatchery



Hatchery



Farmer's ponds

Evaluation Report



Current unsafe treatment location



Packaging and transportation to be improved



Packaging to be improved



Fish delivered



Fish delivered in plastic bags with insufficient ice quantities



Type of cooler proposed: between the boards and galvanized flat steel, there is polystyrene. If the cover is kept closed, the ice with the product can go a week. It is experimented and used as part of a project implemented in Toliara by a UNDP/FAO project of artisanal fishing development.

Appendix 6.

Materials for making an insulated box

Appendix 6

Materials for making an insulated box

Capacity (liter)	Length (m)	Width (m)	Height (m)	Polystirene (number)	Sheet metal plate (number)	Board 4m (nb)
120	0.60	0.40	0.50	4	2	6
240	0.80	0.60	0.50	5	3	7
360	0.80	0.60	0.75	6	4	8
400	1	0.80	0.50	6	4	8
600	1	0.80	0.75	8	4	13