ETHIOPIAN MEAT & DAIRY INDUSTRY DEVELOPMENT INSTITUTE

PRE-FEASIBILITY STUDY FOR THE STABLISHMENT OF FISH PROCESSING EXPORT INDUSTRY

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Bishoftu-Ethiopia

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1. EXECUTIVE SUMMARY

The proposed fish processing plant for export will be established in Ethiopia with a capacity to process 12,000 tons of raw fish. The country annual fish potential is 94,541tons, which is distributed to lakes, reservoirs, and rivers. Therefore, the fish processing plant would collect from different parts of the country and produces processed fishes. The present fish supply is almost half of the demand 50034.1tons. The market is expected to reach to 111971 tons by the year 2020.

The total investment capital of the project estimated to be Birr 45,654,024. The project will be financed Birr 34,240,518 through a bank loan for five years period and use 11,413,506 from his Own equity. The government provide lease financing for Processing machinery and equipments. At full operation and annual net profit after tax estimated to be reached Birr 45,596,110. Also the fish processing plant will create employment opportunity for about 35 persons.

Based on the net present value (NPV) and BCR shows that, this project is economically viable and the project owner can return his investment.

2. BACKGROUD

Ethiopia's endowment with natural resources places her as one of the fortune countries in Africa. Her possession of natural resources of inland lakes and other water body's fisheries is no exception. The numerous rivers and lakes provide the country a tremendous development opportunity. The main Ethiopia Rivers, the total distance these rivers cover and the species of fishes observed in each of them are shown below.

Table 1 Fishery potentials and utilization

No	Water bodies	Main potential yield Estimates (ton/yr)*	Current utilization tons (2014/15)
1	Major Lakes	39,262	36796
2	Major Reservoirs	7879	5889
3	Small Water Bodies	25,996	2243.1
4	Rivers	21,405	5106
5	Total	94541	50034.1

*Source: *G. Tesfaye, M.Wolff,)**MoLF(2014/15)***

In addition to these, newly under construction reservoirs including the huge renascences are a good opportunity to. Aquaculture can become untapped fish sources. There is a suitable geo-climatic condition develop fishery including landscapes, altitude, soil, rainfall, atmospheric temperature and physical resources such as land and water are readily available to establish aquaculture facilities. Therefore, there are highly suitable and moderately suitable are 15,158 Km2 and 871,731Km2, respectively for fish farming, especially for Tilapia and Catfish, but also Carp and temperate water species such as trout.

Export of fishery products to the international market is not yet developed. Some exports were carried out to North Africa & in the Middle East and to some other countries a few years ago. By now only a few companies are exporting 82 tons dried, and 707 tons wet salted fish product to Sudan from Lake Tana. A large amount of fresh and dried fish is exported to Kenya from Omo River illegally. Different fish products are imported from different countries amounted 200tons.

3. PROJECT DISCRIPTION

The plant will produce Tilapia Gutted (chilled or frozen), Tilapia filleted (chilled or frozen), Nile Perch filleted special (chilled or frozen), Catfish filleted (chilled or frozen, Barbs/beso filleted (chilled or frozen).

Fish are collected from fishery cooperatives and fish farmers to the plant. However, some additional quantity fishes are collected by motorized collection boats from remote fishery cooperatives at far landing sites.

On board, the fish are sorted and received in insulated boxes covered with ices and transport to fish processing plant. The product will pack based on various consumer demands, bulk and retail form package, bags, carton package when necessary.

The plant will have the essential modern equipment and machine for handling, processing, preservation, storage and distribution. The project will have excellent opportunities for future diversifying product assortments like smoked fish and dried fish.

4. OPPORTUNITY RATIONALE

Ethiopia has favorable socioeconomic conditions and physical resources such as water, land and natural resources that support the development of aquaculture.

Ethiopia, one of the most populous nations standing 2nd in Africa and 17th in the world, has increasing unmet demand for fishery products. The growing demand for fish, especially during the fasting season cannot be met by production from capture fisheries alone.

Aquaculture is increasingly recognized as an alternative means of achieving food security and poverty reduction in the rural area and is now considered an integral part of rural and agricultural development policies and strategies of the Government of Ethiopia. The aquaculture policies and strategies of the country and the legal framework for fishery development are also very supportive. The Growth and Development Plan encourages the private sector to invest in aquaculture sub-sector.

5. SUPPLY AND DEMAND

Global per fish consumption increased from an average of 9.9 Kg in the 1960s, 17.6 Kg in 2007 to 19.2Kg in 2012. The growth was however highly skewed in developed countries. Annual per fish consumption in developing regions was also significantly increased from 5.2Kg in 1961 to 17.8Kg in 2012. While nationally, it grows from 0.19Kg to 0.52Kg now. A sizeable and growing portion of fish consumed in developed countries consists of imports, owing to steady demand and declining domestic fishery production.

The local and export fish market is influenced among others by the prevailing food culture of the society, income of the population and urbanization. Also, it depends on consumer preference, consumer's income, population size, the piece of the product, price substitutes and other factors. Increasing population and change of diet among the population and rising real income are expected to expand the demand for fish and fish products.

Therefore, there is high demand of national and international. In spite of huge available potential, the current export of fish is still very small. The existing hot international market is mainly Middle East countries. There are a significant amount of fishery products exported from Kenya, Sudan, and Somalia to these countries.

Table2 Demand **and** supply gap

Year	Total demand (in tons)	Total supply (in tones)	Market gap (in tones)
2010	87,562	16,770	70,792
2011	91,600	12,047	74,553
2012	93,689	18,058	75,631
2013	95,703	24,257	71,446
2014	97,694	28,952	68,742
2015	99,391	38,370	61,021
2016	101,627	51,748	49,879
2017	103,914	55,888	48,026
2018	106,252	60,359	45,893
2019	108,642	63,377	45,265
2020	111,971	66,546	45,425

Source: G. Tesfaye, M.Wolff,),MoLF(2014/15)

Concerning local market, in recent years, the price of fish incised drastically. For instance, the tilapia fillet costs 10-13 Br/Kg: - catfish fillet 7-9Br/Kg before 2003 and now-a-days 80-90Br/Kg and 35-40Br/Kg respectively in Addis Ababa market.

In particular, export of fishery products from Ethiopia to the international market is not as such developed. For instance, some export were carried out to North Africa and the Middle East into some other countries a few years ago. By now only a few companies are exporting dried processed fish product to Sudan from Lake Tana only.

The main reason for this little amount of export is that Ethiopian fish processors and traders could not manage to penetrate the international market immensely due to lack of capacity to meet quality standards and fish trade requirements.

As a result, fish export to a foreign market is still very small, even though the potential is enormous. The Federal Ministry of Agriculture estimated fish exports to have incised from 5243tones in 2015 to 32,474 tons in 2020.

Table 3 Export demand projection

Year	Export demand (in tones)
2015	5243
2016	7553
2017	10,876
2018	15,661
2019	22,552
2020	32,474

Source: DBE (2014)

6. PRODUCTION PROCESS

Fish collection/receiving and processing

Fish are supplied by fishers to the plant. Fish sorted and received in insulated boxes covered with ices and transport to fish processing plant.

Freezing, packing and storage

Gutted and filled trolleys are held in freezing until the center of the product temperature reached below -18°C that takes 8 hrs. Before packing, the frozen product are glazed though cold water tank. Then after, it will transfer to packaging room. The product is packed for various consumer demands, bulk and retail form package, bags, carton package if necessary. The packaging is designed to attract the customer's attention and encouraging sales by using thermoses plastic. After packaging, sealing, weighing and labeling, the final product transferred to cold storage below -18°C until dispatch.

7. ENVIRONMENTAL IMPACT

The fish and other forms of aquatic life are highly dependent upon the environment in which they evolved; changes in an atmosphere can devastate the marine life living there. Weather in small and large lakes, the fish is at the receiving end of all kinds of human activity. Therefore, the promoter should stand at the side of the receiving end-fish. The project has positive environment impact resulted from implementing lake management plan actually due to the private ownership of resources which commonly lacks in pool resources. The project has to plan to establish filtering mechanism to clean the water that is out of the processing plant. In addition to this, the project will be scheduled the follow-up the input water environment to avoid the primary cause of marine pollution.

8. PROJECT COST SUMMARY

8.1. Project economics

Total land area required is 1hactare out of which 2000 square meters are built – up area. The construction cost of buildings and civil works at a rate of Birr 6000 per m2 is estimated. The production capacity of the facility is assumed to be over 12,000 tons per year. The total investment requirement is determined at approximately Birr 45,654,024,which is 25% own capital and the rest 75% is covered by bank loan. The plant will create employment opportunities for 35 individuals.

8.2. Project financing

Investment			
Description	Total Investment	Own	Bank loan
Total Equipment cost	12,800,000	3,200,000	9,600,000
Buildings and construction	12,000,000	3,000,000	9,000,000
Working Capital	20,754,024	5,113,506	15,640,518
Pre-operational Expenses	100,000	100,000	-
Total	45,654,024	11,413,506	34,240,518

8.3. Project cost/capital Investment

Working Capital Requirement	Annual	Requirement in number of days	Requirement in Birr
Purchase of raw fish	141,811,500	30	11,655,740
Packaging material	29,950,589	60	4,923,384
Salaries	2,772,000	90	683,507
Benefits	277,200	90	68,351
Promotion and Advertisement	50,000	365	50,000
Rent	240,000	90	59,178
Car Running Expense	3,690,000	90	909,863
Interest Expense	3,375,699	90	832,364
Other Expenses (Utilities)	6,373,860	90	1,571,637
Total			**20,754,024**

8.4. Machinery and equipment, Land; Buildings, and civil works

Investment			
Description	**Total Investment**	**Own**	**Bank loan**
Testing Equipment	100,000	25,000	75,000
Sterilizer	2,000,000	500,000	1,500,000
Cooling Tank	600,000	150,000	450,000
Cold chain truck	6,000,000	1,500,000	4,500,000
Office furniture and equipment	100,000	25,000	75,000
Pickup	2,000,000	500,000	1,500,000
Deep Freezer	1,000,000	250,000	750,000
Packing machine	1,000,000	250,000	750,000
Total Equipment cost	**12,800,000**	**3,200,000**	**9,600,000**
Buildings and construction	12,000,000	3,000,000	9,000,000
Total	**24,800,000**	**6,200,000**	**18,600,000**

Depreciation					
	Year 1	Year 2	Year 3	Year4	Year 5
Beginning Book Value equipment	12,800,000	10,240,000	8,192,000	6,553,600	5,242,880
Depreciation for equipment	2,560,000	2,048,000	1,638,400	1,310,720	1,048,576
Beginning Book Value for building	12,000,000	11,400,000	10,830,000	10,288,500	10,261,425
Depreciation for equipment	600,000	570,000	541,500	27,075	513,071
Total Depreciation	**3,160,000**	**2,618,000**	**2,179,900**	**1,337,795**	**1,561,647**

8.5. Manpower required and labour cost

Position	Quantity	Salary	Total Monthly Salary	Annual Salary
Manager	1	20,000	20,000	240,000
Deputy managers	2	12,000	24,000	288,000
Supervisor/Technologist	6	10,000	60,000	720,000
Collector and Accountants	6	8,000	48,000	576,000
Processing Operators	9	5,000	45,000	540,000
Assistant	4	4,000	16,000	192,000
Driver	4	3,000	12,000	144,000
Security Guard	3	2,000	6,000	72,000
Total	**35**		**231,000**	**2,772,000**

Projected Promotional Expenses					
	Year 1	Year 2	Year 3	year4	year5
Banner	10,000	10,000	10,000	10,000	10,000
Sign Post	10,000	10,000	10,000	10,000	10,000
Launching Event	10,000	10,000	10,000	10,000	10,000
Personal Selling	15,000	15,000	15,000	15,000	15,000
Brochure	5,000	5,000	5,000	5,000	5,000
Total	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**

8.6. Financial assumptions

Fish production potential	
Annual production (ton)	94,541
Purchasing share of the business	5%
Total Purchase (ton)	4,727
Daily Purchase collection capacity(ton)	14
Projected annual Fish production Growth	15%
Average Market Share growth	1%
Fish Wastage - lose	1%
Output (Product) Mix	
Processed fish	60%
Offal	40%
Fish meal	10% of offal

Selling Price	
Processed fish	75000 Birr per ton
Fish meal	10000 Birr per ton
Raw fish Purchase Price	30000 Birr per ton
Price of packaging material	10000 Birr per ton

Financial resource	
Own Finance	25%
Bank Finance	75%
Bank Interest Rate	12%
Employee Salary & Benefit	
Annual increment	10%
Employee Benefit	10%
Rent - storage and processing	10000 Birr per month
Rent - Collection center	10000 Birr per month
Vehicle Running Expenses	
Fuel and Lubricant per day	10000 Birr
Annual Vehicle Maintenance per year	40000 Birr
Vehicle operation days	330
Depreciation	
Depreciation Rate equipment	20%
Depreciation Rate buildings	5%
Miscellaneous Expenses	3% of sales

8.7. Financial analysis

Production and Sales volume					
	Year 1	**Year 2**	**Year 3**	**Year4**	**Year5**
Raw fish Purchase	4,727	5,483	6,361	7,378	8559
Raw fish loss	47	55	64	74	86
Net raw fish available	**4,680**	**5,429**	**6,297**	**7,305**	**8,473**
Sales Volume					
Processed fish	2,808	3,257	3,778	4,383	5,084
Fish meat	187	217	252	292	339
Sales in Birr					
Processed fish	210,590,078	244,284,490	283,370,008	328,709,210	381,302,683
Fish meat	1,871,912	2,171,418	2,518,845	2,921,860	3,389,357
Total Sales	**212,461,989**	**246,455,908**	**285,888,853**	**331,631,069**	**384,692,040**
Purchase Cost	**141,811,500**	**164,501,340**	**190,821,554**	**221,353,003**	**256,769,484**

Projection of Income Statement

Particulars	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Sales (revenue)	212,461,98	246,455,90	285,888,853	331,631,069	384,692,040
Costs and Expenses					
Purchase of Raw Fish	141,811,50	164,501,34	190,821,554	221,353,003	
Gross Profit	70,650,489	81,954,568	95,067,299	110,278,066	91,922,556
Operation expense					
Packaging material	9,950,589	4,742,683	40,301,512	40,301,512	40,301,512
Salaries	2,772,000	3,049,200	3,354,120	3,689,532	4,058,485
Benefits(Incentives)	277,200	304,920	335,412	368,953	405,849
Depreciation	3,160,000	2,618,000	2,179,900	1,337,795	1,561,647
Promotion and Advertisement	50,000	50,000	50,000	50,000	50,000
Rent	240,000	240,000	240,000	240,000	240,000
Car running Expense	3,690,000	3,690,000	3,690,000	3,690,000	3,690,000
Interest Expense	4,108,862	3,287,089.	2,465,317.2	1,643,544.	821,772.43
Other Expenses	6,373,860	7,393,677	8,576,666	9,948,932	11,540,761
Subtotal operation expense	50,622,51	55,375,570	61,192,927	61,270,269	62,670,026
Net Profit/Income		**26,578,998**	**33,874,372**	**49,007,797**	**65,252,530**
Provision for Tax	6,228,342	8,127,132	10,268,887	14,783,864	19,656,420
Net Income After Tax	**3,799,636**	**8,451,866**	**23,605,485**	**34,223,933**	**45,596,110**

Cash Flow Statement

Particulars	Pre-operating period	Year				
		1	2	3	4	5
Cash in flow						
Own equity	11,413,506					
Loan received	34,240,518					
Cash sales		212,461,989	246,455,908	285,888,853	331,631,069	384,692,040
Total Cash inflow	**45,654,024**	**212,461,989**	**246,455,908**	**285,888,853**	**331,631,069**	**384,692,040**
Cash outflow						
Investment expense	37,340,518					
Purchase of raw Fish		141,811,500	164,501,340	190,821,554	221,353,003	256,769,484
Packaging material		29,950,589	34,742,683	40,301,512	40,301,512	40,301,512
Salary		2,772,000	3,049,200	3,354,120	3,689,532	4,058,485
Depreciation		3,160,000	2,618,000	2,179,900	1,337,795	1,561,647
Overhead cost		10,631,060	11,678,597	12,892,078	14,297,885	15,926,610
Interest expense		4,108,862.	3,287,089.	2,465,317.	1,643,544.	821,772.43
Loan repayment		6,848,103.60	6,848,103.60	6,848,103.60	6,848,103.60	6,848,103.60
Total Cash outflow	**37,340,518**	**199,282,115**	**226,725,013**	**258,862,585**	**289,471,375**	**326,287,614**
Net cash flow	8,313,506	13,179,874	19,730,895	27,026,268	42,159,694	58,404,426
Beginning cash balance		8,313,506	21,493,380	41,224,275	68,250,543	110,410,237
Ending Cash Balance	**8,313,506**	**21,493,380**	**41,224,275**	**68,250,543**	**110,410,237**	**168,814,663**

Measure of project worthiness

Net Present Value (NPV) and Benefit ratio (BCR) computation at 12% discount rate

Year	Investment	Gross Cost (oper+prod.cost)	Discount factor	Present Value(birr)	Gross Benefit(birr)	Discount factor	Present Value(birr)
0	3,100,000	3,100,000	1.000	3,100,000			
1	34,240,518	84,863029	0.893	75782685	70,650,489	0.893	63,090,887
2		55,375,550	0.797	44134313	81,954,568	0.797	65,317,791
3		61,192,927	0.712	43569364	95,067,299	0.712	67,687,917
4		61,270,269	0.636	38967891	110,278,066	0.636	70,136,850
5		62,700,026	0.567	35550915	91,922,556	0.567	52,120,089
Total	**37,340,518**	**328,501,801**	**0.734**	**241,105,168**	**449,872,978**	**0.734**	**318,353,53**

Net Present Value (NPV)

NPV = Present value of gross benefit - Present value of gross cost

= 318,353,534 - 241,105,168

= 77,248,366

The net present value is greater than zero. There for this fish processing project is accepted.

Benefit- Cost Ratio (BCR)

BCR = Present Value of gross benefit

Present Value of gross cost

= 318,353,534

241,105,168

= 1.32

The ratio is greater than one. This means that the project owner will recover the investment.

Loan Repayment Schedule

Year	Principal Outstanding	Installment due payable	Interest at 12%	Total Payment
1	34,240,518.00	6,848,103.60	4,108,862.16	10,443,357.99
2	27,392,414.40	6,848,103.60	3,287,089.73	9,724,307.11
3	20,544,310.80	6,848,103.60	2,465,317.296	9,005,256.23
4	13,696,207.20	6,848,103.60	1,643,544.864	8,286,205.36
5	6,848,103.60	6,848,103.60	821,772.432	7,567,154.48
Total	**0**	**34,240,518**	**12,326,586.48**	**46,567,104.48**

9. CONCLUSION

The Ethiopian Government considers fishery as one of the areas of intervention, which needs to be fully developed to meet its priority objectives, which are poverty alleviation, food self-sufficiency, generate foreign currency.

The global fish market is increasing due to strengthening regional economy groupings such as COMESA and IGAD. Changes in the tradition of developing countries are exporting to developed country markets to export to their regions to meet the demands of consumers, especially in emerging economies of Middle East, Africa Asia, and Latin America. The proposed project has numerous opportunity exporting fish and fish products to regional and international market.

The project is not the capital-intensive affair, but rather a further labor-intensive activity that could employ the significant labor strength available along the area.

The advantage of this enterprise is evident:

- The project belongs to agro-industry which has given prior attention by the government.
- It wills first participated intensively environmental and social reconstruction of the fishery.
- It will create new employment opportunities and integrate the real fish to the regional and international economy.

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