

**FEASIBILITY STUDY ON THE PROMOTION OR SCALING UP OF THE "SABOU MANIAN" SMOKEHOUSE**

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**ABSTRACT**

This study analyzes the technical, organizational, and financial feasibility of the improved smokehouse (Sabou Manian) developed by the STDF/PG/611 project (MTF/MLI/063/STF). It focused on three regions: Koulikoro, Ségou, and Mopti, as well as the Bamako district. Four sites were identified where the owners of Sabou Manian smokehouses, developed by the Food Technology Laboratory (LTA), reside. These sites are located in the regions of Koulikoro, Ségou, Mopti, and Bamako. The activity involved all nine beneficiaries of the Sabou Manian smokehouse. Qualitative and quantitative approaches were used to collect data through semi-structured interviews (SSI) conducted via telephone calls and in person with the Sabou Manian smokehouse users. Excel software was used to enter the collected data, which was subsequently analyzed using the same software as well as SPSS 21.

The average purchase price of fresh fish is 1,400 CFA francs/kg for freshwater fish and 1,875 CFA francs/kg for farmed fish. Smoked fish from the improved smokehouse cost an average of 7,250 CFA francs/kg, approximately double the price of smoked fish from traditional smokehouses (3,437 CFA francs/kg).

In conclusion, we find that the financial results obtained are profitable and very satisfactory. The internal rate of return (IRR) of 81.6% over 5 years and 151.50% over 10 years indicate that the project's profitability is highly attractive.

Furthermore, the funds invested in the use of this "Sabou Mania" oven will be recouped in the first year, a very favorable payback period.

**Keywords:** Sabou Manian smokehouse, Scaling Up, Fish production.

**1. INTRODUCTION**

Fishing is a significant sub-sector of the Malian economy and is practiced in all of the country's waterways. Fish production fluctuates between 100,000 and 120,000 tons per year, ensuring an average annual consumption of 10.5 kg per capita. It contributes 90 billion CFA francs (FCFA) to the national economy, representing 4.2% of the Gross Domestic Product (GDP). The number of jobs generated upstream and downstream in the fishing industry is estimated at 500,000 for young people and women in the areas of fish production, processing, and marketing [1].

However, the sub-sector suffers from the remoteness and isolation of production areas, as well as from insufficient modern infrastructure for landing, processing, preserving, and storing fish. The reality of this analysis of the working situation highlights numerous post-harvest losses, negatively impacting the income of those involved and leading to a deterioration in product quality. Indeed, a study conducted in collaboration with the Food and Agriculture Organization of the United Nations (FAO) revealed that physical losses reach 4% and quality losses 17% for fresh fish [2].

Processing, which offers an alternative, absorbs approximately three-quarters of the national marketed production [3]. This processing represents about 60%, compared to 40% for fresh fish [4].

This processing is fundamentally characterized by the use of chemical products to slow down degradation processes caused by molds and fish-eating insects. The authorized products to be used are primarily K'Othrine and Gardona, the distribution and sale of which fall exclusively under the jurisdiction of the Mopti Fisheries Operation (OPM). A parallel trade in insecticides used for treating and preserving smoked fish exists. This growing parallel trade remains the source of the high levels of insecticide residues in Malian smoked fish, which, based on scientific health standards, become unfit for human consumption, leading to significant public health and trade problems.

Post-harvest losses are considerable due to the precarious processing and storage conditions. If we disregard breakages, which are not strictly considered losses, the actual post-harvest loss rate averages between 5 and 10%. The breakage rate of processed products is estimated at approximately 10% at the port of Mopti. Some of this breakage is destined for animal feed, often through fishmeal mills located around Bamako. Breakage results in an average reduction of half the product's value [5].

In addition to the use of chemicals, traditional ovens and direct smokehouses with two glued and stacked compartments (concrete blocks, Chorkor) are used for processing in Mali.

Given the challenges in processing fish products, any technologically, ecologically, socio-economically acceptable, and accessible innovation is welcome. Therefore, the use of the "Sabou Manian" smokehouse could be a means of producing high-quality, healthy, and nutritious smoked fish for both Malian consumers and the regional market.

## **2. MATERIALS AND METHODS**

### **2.1. Equipment**

The equipment is based on the general characteristics of the "Sabou Manian" smokehouse.

#### **2.1.1. Presentation of the "Sabou Manian" Smokehouse**

The "Sabou Manian" smokehouse (Image 1) is a double-walled, indirect oven with thermal insulation between the walls. It is made of galvanized iron (exterior) and stainless steel (interior), measuring 1.25 m in length (height) and 0.80 m in depth. The oven consists of:

- 10 racks;
- 1 grease collection tray during smoking;
- 2 burners for the heat source;
- 1 smoking chamber;
- 1 chimney for smoke.

The total capacity of the oven is 70-80 kg of fresh fish, depending on the size of the fish.

### **2.1.2. Operating Principle**

The oven's operating principle is based on two phases:

- A heating phase for the fish using a mixture of good quality wood and charcoal (Detarium microcarpum, Vitellaria paradoxa, Sclerocarya birrea, Pterocarpus lucens, Pterocarpus erinaceus, Combretum glutinosum, etc.).
- A smoking phase for the fish, lasting 1 to 2 hours, using the smoking device located at the rear of the oven and the harvesting residue.

#### **Hygiene and Safety Measures**

- Wash hands with soap and rinse with potable water before beginning the smoking process to prevent contamination of the fresh fish.
- Clean the oven before and after each use.
- Wear white coats and hairnets during fish smoking operations.
- Keep children away from the smoking area and do not allow them to work there.
- Do not put your hands in the heat source during smoking.



**Image 1.** "Sabou Manian" Smokehouse

## **2.2. Methods**

The methodological approach is based on the documentary review, the conduct of surveys and the processing and analysis of the data collected.

### **2.2.1. Document review**

A literature search related to smoking rooms and fishing was conducted. This literature search was based on reference documents, articles, journals and websites.

### **2.2.2. Conduct of investigations**

#### **2.2.2.1. Sampling**

The sampling concerned three regions, namely Koulikoro, Ségou, Mopti and the district of Bamako where the "Sabou Manian" smokehouses developed by the Food Technology Laboratory (LTA) are used. The activity concerned all the beneficiaries of the "Sabou Manian" smoking room, which are nine (9) in number.

**2.2.2.2. Questionnaire administration**

Qualitative and quantitative approaches were used to collect data through semi-structured interviews (SSIs) "via phone calls and face-to-face" with women processors.

**2.2.3. Processing and analysis of the collected data**

The Excel software was used as a support for the entry of the collected data, which was then analyzed with the same software in addition to SPSS 21. Descriptive statistics were performed to identify trends (mean, percentage, etc.) of the variables. Formulas were used for the financial analysis.

**Net value added (NPV):**

NPV is the criterion that measures the profitability of an investment. Value is considered to be created when the NPV is positive. Among several projects, the one with the largest NPV is preferred. It is a financial indicator that measures the profitability of an investment project [6].

**CF<sub>t</sub>** = Cash Flow for each period t;

**I<sub>0</sub>** = Initial investment in t = 0

**r** = The discount rate

$$VAN = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - I_0 \quad VAN = -I_0 + CF_1 / (1+i) + CF_2 (1+i)^2 + ..... + CF_n / (1+i)^n$$

**Internal Rate of Return (IRR):**

The internal rate of return or internal rate of return (IRR) is a financial indicator. It is the discount rate at which the net present value (NPV) of a set of financial flows is zero. It is a financial indicator that makes it possible to assess the relevance and profitability of an investment project [7].

**C<sub>ft</sub>** : Cash-Flow for each period t;

**I<sub>0</sub>** : Initial investment in t=0

**A** : The discount rate

The IRR is also the rate for which the NPV is zero.

$$-I + CF_1 / (1+i) + CF_2 (1+i)^2 + ..... + CF_n / (1+i)^n = 0$$

**• Payback Period (PP):**

The payback period indicates the number of periods required to recover an investment, in months or years. The investment with the shortest payback period is the one to prioritize [8].

**• Profitability Index (PI)**

The profitability index compares the present value of the cash flows generated by an investment project to the amount invested. A profitability index greater than 1 is equivalent to a positive net present value.

The profitability index is a profitability indicator that measures the value created by each CFA franc spent on the investment [9].

CF<sub>t</sub>: Cash flow for each period t;

I<sub>0</sub>: Initial investment at t = 0;

r: Discount rate

### 3. RESULTS

The results are structured around certain characteristics of the areas where the “Sabou Manian” smokehouse is used, different links in the value chain, and the financial and economic analysis.

#### 3.1. Structural and Socioeconomic Characteristics

The fish processing activity is predominantly female (100%), with an average age of 51. They have been working as processors for an average of 23 years (Table 1).

**Table 1. Socioeconomic Characteristics**

Désignations	Maximum	Moyenne	Minimum
Age (ans)	66	51	40
Depuis quand pratiquez-vous le métier (fumage) (ans)	40	23	5

#### 3.2. Demographic Characteristics

The data collected on demographic characteristics are presented in Table 2.

The results indicate that 80% and 20% of women are Bozo and Fulani, respectively, who are processors. They have varying levels of education: 33% have not received formal education, 33% have received higher education, 17% are literate, and 17% have received vocational training. They all belong to socio-professional organizations (60% cooperatives and 40% associations) and are all in contact with support structures (IER; National Fisheries Directorate). Only 20% of the producers received a subsidy for the purchase of a smokehouse (National Coordination of Farmers' Organizations "CNOPE").

**Table 2. Demographic Characteristics**

Designations	%
<b>Ethnicity</b>	
Bozo	80
Peuhl	20
<b>Marital status</b>	

Married	100
<b>Educational level</b>	
None	33
Literate	17
Superior	33
Vocational training	17
<b>Membership of a socio-professional organization</b>	
Cooperative	60
Association	40
Contact with management structures	100
Do you have access to the subsidy	20

### 3.4. Quantities

Fresh fish are either freshwater or farmed. On average, processors purchase 4130 kg of fish (Table 3).

**Table 3. Quantities of fresh fish purchased**

Type of fish	Amount of fresh fish purchased (kg)		
	Maximum	Medium	Minimum
Freshwater fish	3000	1480	40
Fish farming	3500	2650	1800
<b>Total</b>	6500	4130	1840

### 3.5. Prices

The average price for purchasing fresh fish is 1400 FCFA/kg for freshwater fish and 1875 FCFA/kg for farmed fish (Table 4).

**Table 4. Unit price of fresh fish**

Type of fish	Unit price of fresh fish during the period (FCFA)		
	Maximum	Medium	Minimum
Freshwater fish	2250	1400	700
Fish farming	2000	1875	1750

### 3.6. Frequency

The peak season for fish farming, pond fishing, takes place between October and February, when the fish's physiological activity slows down due to the drop in temperatures.

### **3.7. Markets**

#### **3.7.1. Competition**

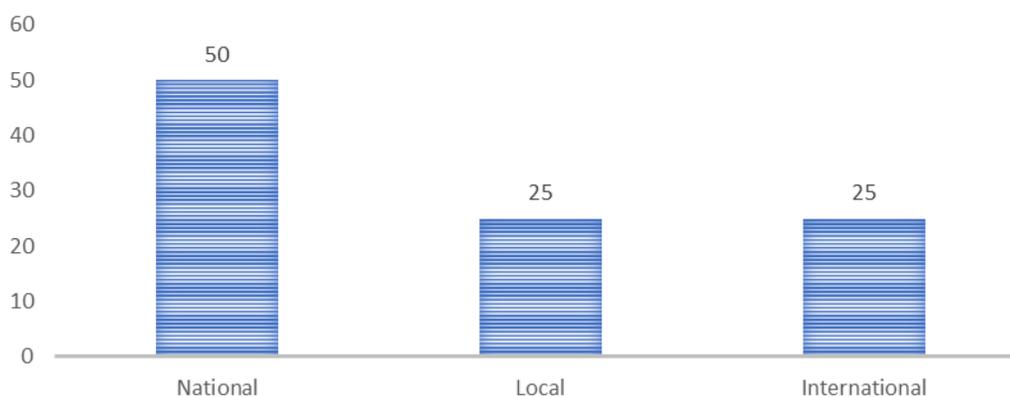
The main competitors of the "Sabou Manian" smokehouse are all direct (traditional) smokehouses. The "Sabou Manian" indirect smokehouse is a new, high-impact technology with added value that addresses some of the technical, social, economic, and environmental problems faced by processors.

It allows:

- Processors to increase their production capacity and income; to improve the quality and taste of their products; to extend the shelf life of their products; and to protect consumer health.
- Consumers should have access to quality products (hygienic, organoleptic – flavor, texture, color – healthy, etc.); and proper product preservation to protect their health.

#### **3.7.2. Target Markets**

Smoked fish is an important source of income for many Malian women and young people. The main target markets are the national market (50%), the local market (region of residence) (25%), and the international market (25%) (Figure 1).



**Figure 1.** Target Markets

#### **3.8. Selling Price**

Smoked fish from the improved smokehouse cost an average of 7,250 FCFA/kg, approximately double the price of smoked fish from traditional smokehouses (3,437 FCFA/kg). This price is explained by the organoleptic (taste, texture, color, and aroma), hygienic, and preservation qualities that the smokehouse imparts to the smoked fish (Table 5).

**Table 5. Selling Price**

Type of smoker	Selling price of smoked fish (FCFA)		
	Maximum	Medium	Minimum
<b>Sabou Manian</b>	10 000	7 250	5000
<b>Traditional</b>	4000	3437	2750

**3.8.1. Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis**

The results of the SWOT analysis are presented in Table 6.

**Internally**

- The strengths of the "Sabou Manian" smokehouse are its design, construction, and development, which stem from local expertise advocating not only the use of sustainable and recyclable materials and the reduction of the impact of distribution and transportation, but also its numerous added values, opening the door to the international market for the finished products produced from it, and its ease of use.

- The weaknesses in the use of the "Sabou Manian" smokehouse are that handling the doors after opening the smokehouse during use can cause minor burns, the weight of the smokehouse limits its mobility, and its capacity is limited to 100 kg.

**Externally**

- The opportunities available to the "Sabou Manian" smokehouse include the quality of its products, which supports their sale on the international market; fuel savings; the quality of the finished products, which are thus more profitable; the quality of the finished products, which meet the characteristics (hygienic, organoleptic "taste, smell, texture, color," sanitary, etc.) sought by consumers; and the possibility of supplying restaurants, hotels, and supermarkets.

- The threats are the risk of counterfeit production ("piracy") of the technology by informal artisans and the cost of the smokehouse, which some processors find somewhat high.

**Table 6. SWOT Analysis**

Positive	Internal		Negatives
	Strengths	Weaknesses	
	1. Design, manufacturing and development are local expertise. 2. It offers added values such as: <ul style="list-style-type: none"> <li>• Saving in smoking time.</li> </ul>	<ul style="list-style-type: none"> <li>• The oil touches the tray being hot triggering the flame</li> <li>• Handling the doors after opening the smoker while in use can lead to burns</li> <li>• Smoker Weight</li> </ul>	

<ul style="list-style-type: none"> <li>• An increase in the shelf life of the products.</li> <li>• An improvement in the quality (hygienic, organoleptic) of products.</li> <li>• Saving fuel use.</li> <li>• Improved taste of products.</li> <li>• An increase in the actors' incomes.</li> <li>• Preservation of the consumer's health.</li> <li>• Improved hygiene.</li> </ul> <p>3. It is less labor-intensive</p> <p>4. Easy to use</p>	<ul style="list-style-type: none"> <li>• The capacity of the smoker limited to 100 kg (which can be limiting for large production areas)</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• The quality of the products militates in favour of their being placed on the international market.</li> <li>• The fuel economy and the quality of the finished products allow for higher profitability.</li> <li>• Possibility of supplying restaurants with finished products.</li> <li>• The quality of the finished products meets expectations (hygienic, organoleptic "taste, smell, texture and colour", sanitary, etc.).</li> <li>• Possibility of supplying hotels and supermarkets with finished products.</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of technology hacking</li> <li>• The cost of the smoker</li> </ul>
<b>External</b>	

### 3.9. Financial and Economic Analysis

#### 3.9.1. Costs

The average costs for smoked fish production are: purchase of fresh fish (6,432,880 FCFA), purchase of fuel (59,224 FCFA), and purchase of equipment/materials (143,117 FCFA).

#### • Fresh Fish

The costs related to fresh fish are shown in Table 7.

**Table 7. Costs Related to Fresh Fish**

Designations	Sabou Manian Smoker			
	Amount used/year	Unit	Price/unit (FCFA)	Average costs (FCFA)
Freshwater fish	1246,7	Kg	1 400	1 745 380
Fish farming	2 500,00	Kg	1 875	4 687 500
	<b>Total</b>			<b>6 432 880</b>

• Fuels

Fuel-related costs are shown in Table 8.

**Table 8. Fuel-related costs**

Designations	Sabou Manian Smoker			
	Amount used/year	Unit	Price/unit (FCFA)	Average costs (FCFA)
Wood	184,3	Kg	100	18 430
Coal	313,8	Kg	130	40 794
	<b>Total</b>			<b>59 224</b>

• Equipment/Materials

Equipment-related expenses are listed in Table 9.

**Table 9. Equipment/Materials-related expenses**

Materials and equipment	Costs (FCFA)		
	Maximum	Medium	Minimum
Racks	5 000	4 500	4 000
Strainers	20 000	12 667	6 000

<b>Basins</b>	300 000	108 750	15 000
<b>Knives</b>	15 000	7 000	2 000
<b>Scissors</b>	7 200	7 200	7 200
<b>Buckets</b>	3 000	3 000	3 000
<b>Total</b>	350 200	143 117	37 200

### 3.9.2. Quantity of Smoked Fish

The processors produce an average of 1250 kg of smoked fish, of which 415 kg is freshwater and 835 kg is farmed (Table 10).

**Table 10. Quantity of Smoked Fish (kg) Obtained**

Type of smoker	Type of fish	Amount of smoked fish obtained		
		Maximum	Medium	Minimum
<b>Sabou Manian</b>	Freshwater fish	1 000	415	13
	Fish from fish farms	835	835	835

### 3.9.3. Financial Analysis

#### 3.9.3.1. Over 5 Years

The difference between the present value of future cash flows generated by the investment and the initial cost of this investment is positive (NPV = 7,339,748.14). This indicates that the investment is profitable, as it generates more value than it costs.

The Internal Rate of Return (IRR = 81.6%), which makes the net present value (NPV) of future cash flows equal to the initial investment, is also positive. This means that the investment should generate more value than it costs. The project can be profitable up to 81.6%.

The payback period (PP) is one (1) year. The project will generate profit from the first year. With this short payback period, the investment is less risky. The profitability index (PI) shows that for every FCFA injected; the company can generate 7.47 times this investment (5-year financial analysis table below).

Table 11. 5-Year Financial Analysis

Designations	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
<b>Investments</b>						
Purchase of the "sabou Manian" smoking room	1 200 000					
Equipment and materials	143 117					
<b>Total Investment</b>	<b>1 343 117</b>					
<b>Amort. Capital assets</b>		<b>240 000</b>				
<b>Operating expenses (EC)</b>						
Fresh fish		6 432 880	6 432 880	6 432 880	6 432 880	6 432 880
Fuels (Wood & Coal)		59 224	59 224	59 224	59 224	59 224
<b>Total EC</b>	<b>0</b>	<b>6 492 104</b>				
<b>Recipes</b>						
Sale of smoked fish		8 287 875	8 287 875	8 287 875	8 287 875	8 287 875
<b>Turnover</b>	<b>0</b>	<b>8 287 875</b>				
Cash Flow	- 1 343 117	1 555 771	1 555 771	1 555 771	1 555 771	1 555 771
Discounted cash flow (12%)	- 1 343 117	1 389 081	1 240 251	1 107 367	988 721	882 786
Discounted cumulative cash flow	- 1 343 117	45 964	1 286 215	2 393 582	3 382 303	4 265 089

**VAN** 7 339 748.14

**TRI** 81.6%

**IP** 7.47

**DRC** 1 ans

• Over 10 years

The difference between the present value of future cash flows generated by the investment and the initial cost of this investment is positive (NPV = 30,656,694.79). This indicates that the investment is profitable, as it generates more value than it costs.

The rate (IRR = 151.50%) that makes the net present value (NPV) of future cash flows equal to the initial investment is also positive.

This means that the investment should generate more value than it costs. The project can be profitable up to 151.50%.

The payback period (PPP) is one (1) year. The project will generate profit from the first year. With this short payback period, the investment is less risky. The profitability index (PI) shows that for every FCFA injected, the company can generate 54.88 times this investment (financial analysis table over 10 years below).

Table 12. Financial analysis over 10 years (include units!)

Designations	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
<b>Investments</b>											
Purchase of the "Sabou Manian" smoking room	1 200 000										
Equipment and materials	143 117										
<b>Total Investment</b>	<b>1 343 117</b>										
<b>Amort. Capital assets</b>		<b>134 312</b>									
<b>Operating expenses (EC)</b>											
Fresh fish		6 432 880	6 432 880	6 432 880	6 432 880	6 432 880	6 432 880	6 432 880	6 432 880	6 432 880	6 432 880
Fuels (Wood & Coal)		59 224	59 224	59 224	59 224	59 224	59 224	59 224	59 224	59 224	59 224
<b>Total EC</b>	<b>0</b>	<b>6 492 104</b>									
<b>Recipes</b>											
Sale of smoked fish		9 067 575	9 067 575	9 067 575	9 067 575	9 067 575	9 067 575	9 067 575	9 067 575	9 067 575	9 067 575
<b>Turnover</b>	<b>0</b>	<b>9 067 575</b>									
Cash Flow	- 1 343 117	2 441 159	2 441 159	2 441 159	2 441 159	2 441 159	2 441 159	2 441 159	2 441 159	2 441 159	2 441 159
Discounted cash flow (12%)	- 1 343 117	2 179 607	1 946 077	1 737 569	1 551 401	1 385 179	1 236 767	1 104 256	985 943	880 307	785 988
Discounted cumulative cash flow	- 1 343 117	<b>836 490</b>	2 782 567	4 520 136	6 071 537	7 456 716	8 693 483	9 797 740	10 783 683	11 663 990	12 449 977

VAN 30 656 694.79

TRI 151.50%

IP 54.88

DRC 1 ans

#### 4. DISCUSSION

The fish processing activity is predominantly female (100% of the activity is carried out by women). This percentage was found by Abochi (2010) in his study on the microbiological quality assessment of artisanally smoked fish in Togo.

##### Improved production capacity.

The introduction of the Sabou Manian smokehouse into the Malian fish sector has boosted the production of smoked products. Studies show that the improved Sabou Manian smokehouse, measuring 1.25 m in length (height) and 0.80 m in depth (equivalent to a hearth), can process between 80 and 100 kg of fish for 45 minutes to 1 hour. This result is confirmed by Ndiaye et al. (2009), who found that a 10-meter-long, 1-meter-wide smokehouse can smoke 30 baskets of fish, or 1,500 kg per batch, representing an increase of over 40% compared to the traditional method.

However, there is a considerable discrepancy between these results and those of the organization Aide Développement Gembloux ADG (2012), which found that a standard smokehouse (23.5 m<sup>2</sup> average surface area) yields 1,396 kg of dried fish from 4,504 kg of fresh fish in a single smoking session, equivalent to over 190 kg of fish per square meter. These figures seem exorbitant, as even improved, compartmentalized smokehouses with accessories that effectively contain the heat treatment media cannot achieve such a high yield.

##### Improving Product Quality

Products from the Sabou Manian smokehouses are distributed in several countries in the region. According to Ndiaye and Diei-Ouadi (2009), these products have a long shelf life, can be transported over long distances, and can be stored for several months, thus allowing for regular deliveries based on demand. Their findings indicate that this is due to the texture of these products, which are well-dehydrated and firmer. This texture gives the products the resistance to handling and transport that traders in the sub-region and distant markets seek. They also confirm Djessouho's (2015) observation that the fish processing method used by women on the ground exposes the product to contamination by dust, insects, rodents, and bird droppings. This dried fish, which contains many bacteria and impurities, cannot be stored for extended periods.

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### **Fuel Consumption Reduction**

A decrease in fuel consumption was observed for products smoked using the Sabou Manian smoker compared to traditional smokers. According to Ndiaye (2010), this improvement is due to the accessories (door, lid) that are absent in traditional smokers. Furthermore, the physical fireboxes for the fuel allowed for the regulation of smoking parameters (temperature, smoke density and speed, humidity, etc.).

Adopting the Sabou Manian smoker increases product quality. This result corroborates the findings of Camara Ndiaye (2016), who stated that improved smokers have increased and enhanced product quality and the income generated by the activity.

### **5. CONCLUSIONS**

This study has shed light on certain inherent realities of fish smoking. It is an activity primarily practiced by women and organized within a socio-professional group. The study highlighted the qualitative and quantitative performance of the "Sabou Manian" smokehouse, which promotes better fish preservation and income generation.

The average purchase price of fresh fish is 1,400 FCFA/kg for freshwater fish and 1,875 FCFA/kg for farmed fish. Smoked fish from the improved smokehouse cost an average of 7,250 FCFA/kg, approximately double the price of fish smoked in traditional smokehouses (3,437 FCFA/kg). This price difference is explained by the organoleptic (taste, smell, texture, and color), hygienic, and preservation qualities that the smokehouse imparts to the smoked fish. The "Sabou Manian" smokehouse allows women processors to increase their production capacity and income, improve the sanitary quality and taste of their products, extend their shelf life, and protect consumer health. It provides consumers with high-quality products in terms of hygiene, organoleptic qualities, and overall health, ensuring good product preservation while safeguarding their well-being.

Internally, the "Sabou Manian" smokehouse boasts strengths such as its construction and development based on local expertise using appropriate materials, its numerous added benefits, and its ease of use. However, it also has weaknesses, including the fact that hot oil can ignite when it touches the tray, the risk of burns from handling the doors after opening the smokehouse during use, and the smokehouse's weight and limited capacity of 100 kg, which may be unsuitable for large fishing areas. Externally, there are opportunities such as the quality of the products, which supports their entry into the international market; fuel savings; the quality of the finished products, which allows for greater profitability; the quality of the finished products, which meets consumer expectations (hygienic, organoleptic, and sanitary, etc.); and the possibility of supplying restaurants, hotels, and supermarkets. However, there are also threats, such as the risk of technology piracy by informal sector artisans and the cost of the smoking room, which the processors find somewhat high.

In concluding this project, we realize that the financial results obtained are profitable and very satisfactory. The internal rate of return of 81.6% over 5 years and 151.50% over 10 years indicate that the project's profitability is very attractive. Furthermore, the funds invested in the use of this "Sabou Ma-nia" smoker will be recovered within the first year, a very attractive recovery period.

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