

Smoked Fish Intervention Justification

Background

The fisheries sector—comprised of both cultured and wild capture fish—is one of the most important sectors in Nigeria, both from an economic and social standpoint. In 2009, the Federal Department of Fisheries contributed approximately US\$ 1 billion to the country’s GDP. Further, in the Niger Delta, the sector is an important contributor to employment, livelihoods, and food security. Particularly for the sector’s participants including pond fish farmers and fishermen, as well as distributors, marketers, transporters, credit service providers, boat owners, and net repairers.

In the fisheries sector, fish reaches the end consumer—households, informal eateries, formal institutions—in either a smoked or fresh state. In the domestic smoked fish channel, supply is dominated by smoked wild capture fish representing about 95% of total supply, with the remainder from pond cultured fish. The importance of the wild capture sector is reflected in its size, value, and the number of economically active participants. The wild capture value chain is valued at about N393 billion per annum. The sector has shown strong growth trends linked to increased consumer demand for smoked fish and supports an estimated 16,400 smokers (99% of which are women) in urban and rural smoking clusters, and more than 241,000 fisher-folk who supply fresh fish.

MADE selected the wild capture sector for intervention¹ because it fulfilled key selection criteria—growth potential, impact on the poor and women, and feasibility. The sector’s good growth potential is driven by growing domestic demand for smoked fish products. The sector’s poverty reduction potential reflects the number of wild capture fishermen and smokers who depend upon it. The sector’s feasibility stems from the existence of technology partners that produce mechanised smoking kilns which can improve smoking efficiency, as well as the willingness of partners to train local Niger Delta Region fabricators to fabricate the kilns under royalties agreements.

However, to realise the opportunities presented by the sector for fisher-folk and fish smokers (both large-scale “*fish smoking mummies*” and small-scale smokers), the following underlying strategic constraints must be addressed:

- High post-harvest losses affect fisher-folk and smokers (available fish cannot be processed)
- Inefficient traditional smoking methods are at present the dominant form of smoking.
- This is linked to the current lack of commercially available improved smoking technology.
- Wide lack of awareness on the potential financial benefits of improved smoking technology.

Strategic Constraints

For fisher-folk and smokers (both smoking mummies and small-scale smokers) these constraints result in less than optimum incomes as a result of post-harvest losses which occur because of limited smoking capacity on shore and inefficient smoking practices. For small-scale smokers who are “self-employed” limited smoking capacity also manifests as a low return on labour.

At the sector level, these constraints manifest as an imbalance between the supply of smoked fish and the demand of smoked fish, the increased importation of smoked fish into the region, and the high price of wild captured smoked fish for the end consumer, alongside lack of capacity to process gluts of available fish. The impacts of addressing these constraints would be to improve supply of smoked fish and incomes of fisher-folk and smokers via reduced post-harvest losses and improved smoking efficiency.

¹The primary focus of the intervention will be the wild captured sector; however the aquaculture sector will see ancillary benefits, and could be grown later as a result of stronger pull from an expanding market.

Analysis of Options

The key intervention to develop the smoked fish market is to promote the roll-out of improved smoking technology. There are several models that MADE could adopt in rolling out the smoking technology during the pilot phase. The extent to which the models deployed during the pilot phase gain traction and are publicized as being successful at reasonable prices will help decide which model(s) become more widely utilised during the implementation phase.

Model 1: MADE facilitates smoking kiln manufacturers to deploy smoking kilns in a number of community smoking clusters, with MADE organising the demonstrations of the smoking kiln, and associated publicity and awareness, in collaboration with smoking mammies. This can be started in the Pilot Stage. They will normally manage smoking kilns as a separate business, selling smoking services to smaller smokers. This would help demonstrate the increased efficiency, quality, and profitability of smoking kilns to mammies and smaller smokers.

Model 2: MADE facilitates smoking mammies to purchase improved smoking kilns to operate as a separate business, designed to sell smoking services to small-scale smokers, to produce demonstration effects, accompanied by publicity and awareness.

Model 3: MADE facilitates an independent Business Development Service Provider (BDSP) to deploy the smoking kilns in community smoking cluster, to achieve demonstration effects which can be discussed and publicized.

MADE is still negotiating with the different market actors to determine in which of these models there is the greatest interest and which is most applicable in a given market. MADE believes that **Model 2** is most appropriate for the pilot phase in Akwa Ibom. However, moving forward both Model 1 and Model 3 remain applicable, with their adoption depending on geographic locations and local cultural and socio-economic frameworks at community level. In Bonny, Rivers State, for example, Model 3 would be more appropriate given the location and economic circumstances of the community. Final decisions on methodology, or combinations of methodologies, will reflect community level concerns and opportunities.

Description of Intervention

The intervention will be the deployment of improved, mechanised smoking kilns in urban and/or rural smoking clusters. To do this, MADE must undertake the following major activities:

Phase 1: Set-up

- Identify, select, and conduct an assessment of the capacities and incentives of pilot partners, namely one or more fabricators of the improved, mechanised smoking kilns, smoking mammies, and/or local Business Development Service Providers (BDSPs).
- Negotiate with pilot partners to prepare agreements, activity plans, and activity budgets.
- MADE to facilitate purchase of one or more smoking kilns by smoking mammies or BDSPs.

Phase 2: Roll-out

- Facilitate the smoking mammies and/or service providers to deploy the new machines.
- MADE to facilitate fabricator to provide training to smoking mammies.
- MADE to facilitate fabricator to provide training to local Niger Delta Region fabricators.
- MADE to facilitate publicity and awareness.
- MADE facilitates an implementation partner to conduct monitoring and evaluation, including a baseline assessment, mid-project assessment, and final assessment.

Phase 3: Knowledge dissemination

- MADE facilitates fabricators and smoking mammies to organise results sharing workshops aimed at producer and processor associations (Business Membership Organizations- BMOs), government Ministries, Departments and Agencies (MDAs) and other interested parties.

Potential Partners

In order to deploy the smoking kiln, MADE must select from the following categories of partners:

Partner Category	Potential Partner(s)
Fabricator	NIOMR, Azemor
Smoking Mammy	TBA
local service provider	TBA

Table 1: Category of Partners

Partners are selected on the basis of their capacities and incentives.

Capacities

Fabricator(s) : With the capacity to construct an improved smoking kiln and the organisational structure in place to commercialise the new smoking kilns.

Smoking Mammy (ies): With capacity to influence many small-scale and large-scale smokers.

Local Service Provider: With the capacity to deploy the smoking kiln as a business opportunity.

Incentives

Fabricator: Fabricators have the incentive to use the demonstration as a marketing opportunity of a product which is yet to gain traction in the local market.

Smoking Mammies: Have the incentive to participate in the demonstration because it exposes them and their business clients to a more efficient and profitable manner to smoke their fish.

Local Service Provider: Has the incentive to participate to gain additional streams of income.

Theory of Change

The desired outcome of the deployment of improved smoking technology is to increase the incomes of smokers and fisher-folk.

For fish smokers, access to a new kiln will increase their smoking efficiency (the time it takes to smoke fish) and reduce fuel costs and increase their smoking capacity (the amount of fish that can be smoked in a given time); leading to increased incomes and higher profitability.

Improvements in smoking incomes and profitability will incentivise fish smokers to buy more fresh fish from fisher-folk, thereby increasing fisher-folk incomes. Improved fish smoking capacity will also increase fisher-folk incomes, or decrease normal losses, by reducing on-shore post harvest losses.

Potential Impact

The potential impact of using improved smoking kilns introduces new smoking efficiencies, and increased profitability for fish smoking mammies. The profitability analysis in table 2 (below) demonstrates that a woman smoking three loads of 250kg per day with the new kiln, earns significantly more over three days, with a lower outlay of cash per day, compared to a smoker smoking 500kg in the same period with existing smoking technology . But to get to this position she has to invest in a new kiln. That investment can lead to higher income has to be learned.

Although the initial cost of an improved smoking kiln is higher than a traditional drum or smoking alter, an improved smoking kiln can pay for it's investment cost in as little as 25 days, when managed by one individual and charged out to small smokers on a daily basis. Considering that there are about 100 smoking days in a year, this means that it can pay for itself within about a quarter of available annual smoking time and produce a good profit on the investment for the rest of the year, and for its functioning lifetime. This is therefore an excellent programme intervention target.

		CAPTURED SMOKED FISH BIG FISH MAMMIE SMOKER MODEL				
CAPITAL COSTS		UNIT PRICE	TRADITIONAL METHOD		NIOMR KILN METHOD RENTED	NIOMR KILN METHOD - OWNED
THATCH SHED			2,000		2,000	2,000
SMOKING PLATFORM			2,000			-
New kiln					510,000	510,000
SUB-TOTAL			4,000		512,000	512,000
OPERATING COSTS						-
cost of 160Kg fresh fish (10 basins of 16 kg)	10	20,000	625,000		937,500	937,500
Smoking capacity(Kg)/load			500		250	250
3-day smoking capacity (Kg)			500		750	750
firewood/coal for 3 days	3	10,000	30,000	2,200	6,600	6,600
Labour cost		3,000	9,375		14,063	14,063
Tolling fee					75,000	
Depreciation						510
Sub-total			664,375		1,033,163	958,163
SALES						
Gross sales(3 days production)	10	30,000	937,500		1,406,250	1,406,250
Profit over 3 days			273,125		373,088	448,088
Return to labour/day			NGN 91,042		NGN 124,363	NGN 149,363
Fuel cost (N/Kg)			62.5		8.8	8.8

Table 2: Comparative cost analysis of the smoking platform technology versus the improved kiln technology

When viewing profitability from the perspective of a small scale smoker, who has limited financial capacity to purchase fish for smoking (can only afford to buy 1-2 basins at a time), it is important to conduct a return on labour analysis. This entails calculating how much money the smoker can make from a day of her labour. Given that a major constraint for the smoking women is their financial capacity and cash flow to buy fish for smoking, access to improved smoking technology smokes the fish three times faster (one day instead of three), which allows the women to turn over their limited inventory more quickly. This can increase their return to a day of labour threefold, so long as access to improved smoking technology is not charged at a significantly higher price. [The programme will need to pay some attention to the balance of benefits between mummies and small scale smokers]. The following table compares the return to labour for a small scale smoker working on a higher volume with existing or similar prices.

OPERATING COSTS	units	cost	traditional	unit	modern kiln
cost of 160Kg fresh fish (10 basins of 16 kg)	1	20,000	20,000		20,000
firewood/coal for 3 days	3	1,000	3,000		-
Labour cost (own labour)					
Tolling fee (smoking charge)					3,200
Sub-total			23,000		23,200
SALES					
Gross sales(3 days production)	1	30,000	30,000		30,000
Gross Profit per basin			7,000		6,800
Return to labour/day	3		NGN 2,333	1	NGN 6,800

Table 3: Comparative analysis of operational costs of the drum technology versus the kiln smoking technology

A similar comparative analysis using another traditional smoking technology (drum smoking technology) versus using the more modern smoking kiln technology is shown in table 4. The issues relating to the traditional smoking altar vis-à-vis the modern smoking kiln are the same for the drum versus modern kiln smoking technologies. However, in urban areas where drum technology is most prevalent the project will deploy the 25kg kiln or 50kg kiln.

Table 4 shows a comparison between a modern kiln with a 25kg capacity and a drum smoker with a 20kg capacity. The table shows that the return on labour per day is higher with the modern kiln technology at N6,080 as against N2,920 realised using the drum smoking technology. The fuel usage is lesser in the case of the modern kiln at N22/kg as against N50/kg for the drum technology at full equipment capacity. Finally, smoking the same quantity of fish, the kiln technology at less than half capacity loading has a N55/kg fuel cost compared against the drum technology's N50/kg fuel cost.

Investment Costs	Assumptions	Traditional drum smoking technology				Comments	New kiln smoking technology			
		vol.	unit	Unit cost	Total cost		vol.	unit	unit cost	Total cost
Cost of Drum		1	no	3,000	3,000					
Cost of welding				500	500					
Cost of grille				2,500	2,500					
Cost of kiln						25kg kiln	1	no	100,000	100,000
TOTAL INVESTMENT					6,000					100,000
Operational Costs										
2-day smoking capacity	20kg	20	kg			50 kg	50	kg		
Cost of fish	20kg of small fish per load	20	kg	350	7,000		50	kg	350	17,500
Firewood/coal					1,000.00	1/2 bag of coal	0.5	bag	2,200.00	1,100.00
Rent	Per day rental	2	days	80.00	160.00	N28000 per month	2	days		2,240.00
Tolling fee	own labour	20	kg			N100/kg (equipment payback charge)	20	kg	100.00	2,000.00
TOTAL OPERATIONAL COST					8,160.00					21,840.00
Fuel costs(N/Kg) at same loading capacity	25kg	20	kg		50.00	¼ bag of coal	20	kg	1,100.00	55.00
SALES	Assumption : all production is sold off daily					Assumption : all production is sold off daily				
Sales cost	(N700-N1000)/kg	20	kg	700.00	14,000.00		50	kg	700.00	35,000.00
Gross profit					5,840.00					13,160.00
Return on labour/day					2,920.00					6,080.00
Fuel cost/ Kg of fish					50.00					22.00

Table 4: Comparative Analysis of the drum smoking technology versus the modern kiln smoking technology (smokers' ownership of equipment model), showing that daily labour income doubles.

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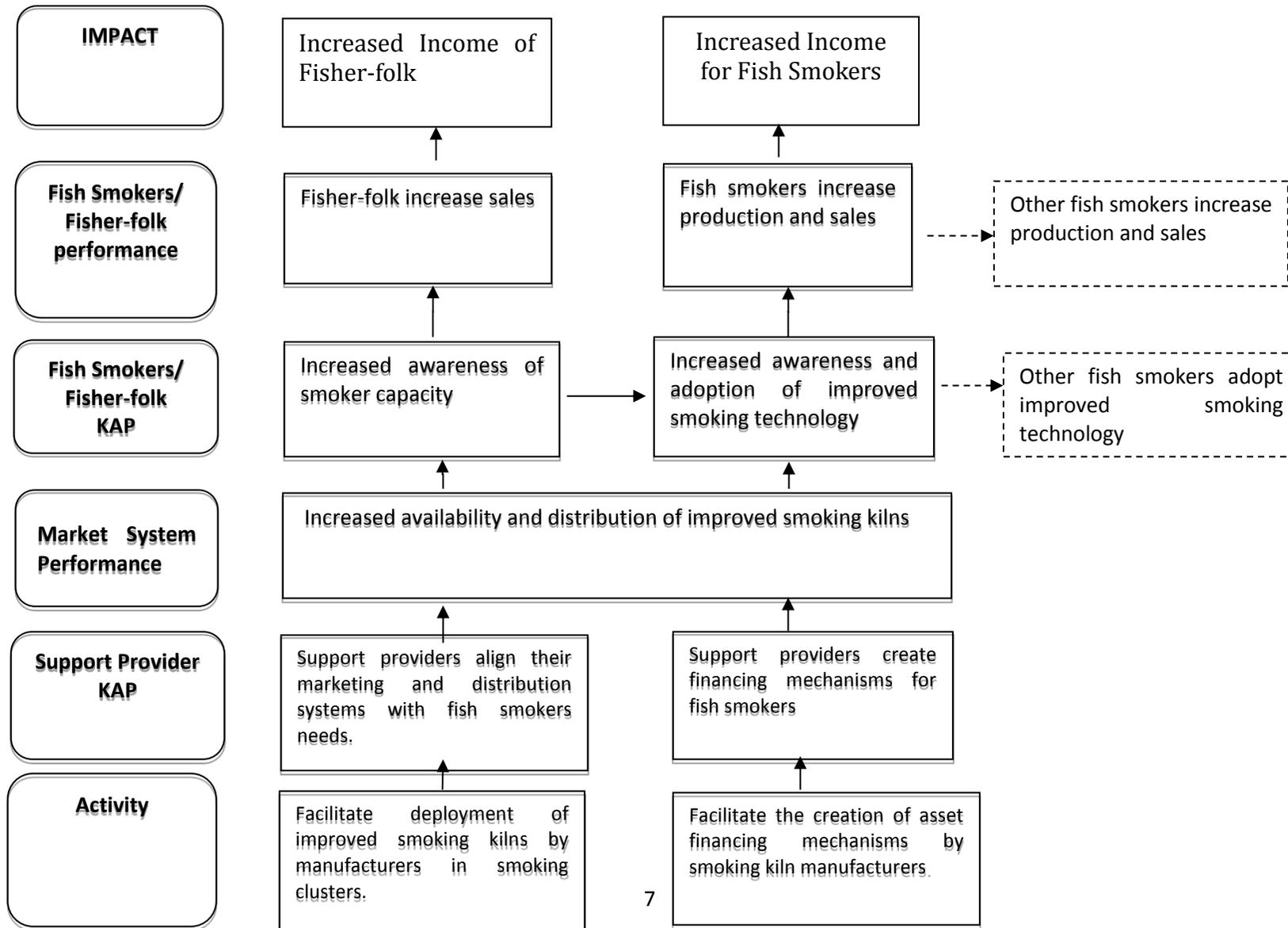
Given the conservative estimated number of improved smoking kilns for which MADE will facilitate sales and deployment, the minimum targets for potential impact in terms of numbers of beneficiaries is outlined in table 5, below.

Greater and/or more impactful deployment of resources earlier in the programme, including possible association with any other emerging innovators in the sector, could result in higher earlier outputs, but the programme design assumes a more considered and careful start-up, which may be possibly be improved upon once practical implementation lessons are being learned.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	year 7	
	2014 (six mo)	2015	2016	2017	2018	2019	2020	2021
Fish Smoking Beneficiaries	120	240	840	1320	1080	1200	240	5040
Sales of Smoking Kilns	1	4	12	40	84	120	160	168
women smoking/klin/day	30	120	360	1200	2520	3600	4800	5040
current income per day/small smoker	2 333	2 333	2 333	2 333	2 333	2 333	2 333	2 333
new income per day/small smoker	2 720	2 720	2 720	2 720	2 720	2 720	2 720	2 720
NAIC/day	387	387	387	387	387	387	387	387
NAIC/year	38 667	38 667	38 667	38 667	38 667	38 667	38 667	38 667
NAIC/year in GBP	147.58	147.58	147.58	147.58	147.58	147.58	147.58	147.58
Cumulative NAIC per year		4 640 000	13 920 000	46 400 000	97 440 000	139 200 000	185 600 000	194 880 000

Table 5: Potential Impact of Deployment of Improved Smoking Kiln

Draft results change



Exit Strategy

The exit strategy is that after the successful demonstration of the technology, the market for smoking kilns will be catalysed with smoking mummies purchasing smoking kilns to either smoke their own supply or rent it out to small-scale fish smokers, in addition, some associations of small-scale fish smokers may form and facilitate joint purchase of smoking kilns, which MADE may also promote, for use within their respective clusters.

For the mummies who decide to acquire kilns and for new kinds of commercial service providers acquiring kilns, increased competition in an expanding sector would be no bad thing. Their businesses would grow with time as they experienced increased income and profits.

MADE would therefore promote a more stronger and more diversified smoking sector in which mummies, new kinds of commercial service providers and associations of smaller smokers owning kilns could all participate. This would help address equity, inclusion and anti-poverty strategies within the sector, although this would require a sense of balance and some diplomacy.

Roles and Responsibilities

S#	Actors	MADE's offer	Roles & Responsibilities
1	Fabricators	An opportunity to raise awareness of improved, mechanized smoking kilns and increase market share. Also an opportunity to increase income base through royalties payable by local regional fabricators, when possible and appropriate.	Agree to sell the smoking kiln to smoking mammy on a 70% pre-delivery and 30% post delivery payment basis; or to help devise alternative financing packages and methods. To train smoking mummies on use of smoking kilns. Help train local fabricators on the fabrication of improved kilns.
2	Smoking Mummies	An opportunity to improve smoking efficiency and establish a stronger or even new streams of income through renting out of smoking kilns or charging out to supply smoking services.	Market the use of smoking kiln to community smokers; agree to participate in any M&E activities; agree to participate in any project demonstration activities.
3	Service providers	An opportunity to establish a new stream of income through renting out of smoking kilns and/or charging for smoking services.	Market the use of smoking kilns to community smokers at pre-agreed or reasonable prices; agree to participate in any M&E activities; agree to participate in any project demonstration activities
4	MADE		Facilitate implementation of planned activities/events, and monitoring of results.

Risk Analysis

The potential risks include:

- The smoking kiln manufacturers are not interested in commercialising the product in the Niger Delta. MADE will mitigate this risk by helping to develop a strong value proposition.
- A potential risk is that the manufacturers will not agree to be paid in instalments. MADE can consider to mitigate that risk by acting as a guarantor for the smoking mammy. MADE will also have to help devise other ways to mobilize investment costs by working with Micro Finance Banks (MFBs), Commercial Banks or other funding sources.
- Ideas like charging royalties to copy a new kiln may not work in the Nigerian/Niger Delta business culture context. Innovators in the oil palm sector simply produced more advanced machines cheaper than state research institution prototypes. MADE will help devise

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methods to incentivise and promote replicated fabrication of kilns and this may require some innovation and dexterity to adapt to the vibrant nature of the Nigerian private sector.

- The smoking mammy is not an effective marketer of the kiln product. MADE will mitigate this risk by assisting the smoking mammies to develop marketing materials and running awareness programmes alongside her.
- The fabricators are also geared to production rather than to sales. MADE will see how fabricators can be motivated and supported to increase sales of new kilns. This may apply to artisanal or evolving larger scale commercial fabricators.