

# Market Development in the Niger Delta (MADE)

Business Case

Economic Appraisal



**Department for International Development  
Contract no. PO 6072**



April 2014

## Abbreviations

ATA	Agricultural Transformation Agenda
CPP	Crop Protection Product
CSC	Critical Success Criteria
DFID	Department of International Development
GBP	Great Britain Pound
IRR	Internal Rate of Return
MADE	Market Development Program in the Niger-Delta
M4P	Making Market work for the poor
NAIC	Net Additional Income Change
NIFOR	Nigerian Institute for Oil Palm Research
NPV	Net Present Value
PIND	Foundations for Partnerships in the Niger-Delta
VFM	Value for Money

## Table of Contents

1.0 Executive Summary .....	1
2.0 Options Considered .....	3
2.1 Opportunities.....	3
2.2 Options Considered .....	3
2.2.1 Choosing the opening portfolio .....	3
2.2.2 Addressing systemic constraints .....	6
2.3 Intervention Logic and Evidence.....	13
2.4 Incremental Costs .....	13
2.5 Incremental benefits.....	14
2.6 Balance of Costs and Benefits.....	15
2.6.1 Period of analysis.....	15
2.6.2 Methodology .....	16
2.6.3 Key results.....	16
2.7 Risks and Uncertainty .....	17
2.8 Competition Assessment.....	18
2.9 Macroeconomic Impact.....	19
2.10 Fiscal Impact .....	19
2.11 Financial Sustainability .....	19
2.12 Attribution to DFID .....	19
2.13 Summary and Recommendations.....	19
2.14 Technical note: summary and justification of key analytical parameters.....	19

## LISTS OF TABLES

Table 1	Potential value chains considered.....	4
Table 2:	Value for Money from different MADE investments from September 2014 – March 2020.....	5
Table 3:	Value for money – 4 markets + 2 additional.....	6
Table 4:	Incremental costs (nominal GBP) .....	14
Table 5:	Incremental Benefits(Nominal GBP):NAIC.....	12
Table 6:	Cost-benefit analysis (all financial data in GB£).....	13
Table 7:	Results of sensitivity analyses.....	15

## LISTS OF FIGURES

Figure 1:	Generic MADE Theory of Change.....	10
-----------	------------------------------------	----

NB: The data used in this economic appraisal are drawn from a separate excel spreadsheet

## 1.0 Executive Summary

The Niger Delta has recently come out of more than a decade of insurrection, characterized by conflict with the government as well as conflict among the local ethnic groups trying to access greater benefits from the oil resources in the region. This conflict restricted the investment by outside businesses in the region and limited most donor assistance to focus on social issues and conflict alleviation, not economic growth. With the Amnesty, signed in June 2009, there was greater opportunity and interest to invest in the region.

The economy in the Niger Delta has been heavily distorted by the presence of oil in the region, which has created negative incentives to investing in agricultural production and smaller economic activities. Despite the oil wealth in the region, few industrial operations leveraging the significant agricultural resources in the region have successfully taken off.

Agriculture in the Niger Delta is typified by traditional modes of production, with associated low productivity; significant investments are yet to flow into the sector and technology and infrastructure services remain limited.

The target groups for MADE are small scale farmers and rural and urban entrepreneurs. Those involved in agriculture farm small areas, are unable to significantly diversify their production activities, and face high levels of risk, particularly from drought; they are, necessarily, risk averse.

MADE has selected a portfolio of investments which are based on strong economic growth potential from the growing demand for agricultural products and the availability of new technologies that can break the low input-low output cycles of production in the Niger Delta. The portfolio of investments are based on growing demand for agricultural commodities, availability of productivity-increasing technologies, access to cheap disease control technology, and potential to capitalise on successful pilot projects undertaken by the PIND Foundation and Propcom Mai-karfi, which can be expanded and replicated in the Niger Delta.

MADE's portfolio of interventions addresses key constraints in a number of value chains which will unblock the growth potential of those sectors with a particular focus on poorer households. Initial target sectors include palm oil, aquaculture and fish smoking, improving access to fertilizers and crop protection products and seeds, and Newcastle Disease control in village chickens, fertiliser/crop protection products and seeds, and two additional interventions that will be identified during inception. Total outreach is **249,000 households across five and a half years.**

The efficiency ratio – measured as the ratio of total NAIC (Net Additional Income Change) across the portfolio of interventions over **five and a half** years, to the total costs contributed by DFID to the programme (including **funding for the** design and pilot) – is estimated to **2.53.**

The results of the cost-benefit analysis are significantly above break-even levels **over the five and a half year period:**

Net present value (NPV) of £ **12,988,733**

Internal rate of return (IRR) of **73%.**

The programme's interventions will provide positive benefits to the targeted beneficiaries. But the main success of the programme will be driven by the benefits that larger firms will make by engaging with the target beneficiaries, thereby creating a mutually beneficial financial and social incentives to work together, drive outreach, and the long term sustainability of the project. Various intangible benefits will also flow from the programme.

Various risks are associated with the implementation of MADE, with security and severe market dysfunctions the most important. The failure of partners to deliver on their commitments, government interventions crowding out of commercially viable investments, technical failures and a series of adverse weather events are also potentially significant risks.

Sensitivity analyses indicate that the programme outlined will achieve economic outcomes even if not all interventions succeed.

There are no macroeconomic implications, fiscal pressures or competition issues arising from the proposed interventions.

DFID will be able to claim a significant level of attribution in relation to the interventions facilitated by MADE.

## 2.0 Options Considered

### 2.1 Opportunities

The Business Case lays out the detailed rationale for the MADE programme, applying an M4P approach to addressing market failures and stimulating pro-poor economic growth through a series of interventions in different market systems.

Interventions in the opening portfolio are based on various opportunities that are available to poor farmers and other entrepreneurs rural dwellers in the Niger Delta including:

- Growing demand for agricultural commodities for local consumption or processing;

- The availability of affordable technology to increase productivity and the profitability of farm enterprises;

- Potential access to cheap, proven and easily used technologies such as vaccines for the control of Newcastle Disease in poultry;

- Establishment of links to, and support for the private sector, resulting in the mitigation of systemic constraints in market systems and sustainable outcomes;

- The opportunity to capitalise on successful interventions in the fertiliser markets introduced by PrOpCom, and the aquaculture and palm oil initiatives introduced by PIND Foundation.

## 2.2 Options Considered

### 2.2.1 Choosing the opening portfolio

A short list of 13 market systems/sectors have been appraised against three different sets of critical success criteria factors:

- The potential to have broad outreach to large numbers of poor people;

- The growth potential of the sectors within with the programme would focus, and

- The feasibility of the programme to find good points of traction to be able to address the critical constraints in the sector, taking into consideration the political economy and the nature of the structure of the sectors.

The selected sectors were also subjected to a climate and environmental risk assessment, to ensure that they would do no harm.

**Table 1** Potential value chains considered

Productive Sector	Service Sector
Palm Oil	Agricultural Inputs
Poultry	Konkri Women
Aquaculture	Informal Financial Services
Smoked fish	Media
Cassava	Farm Machinery Services
Recycling	Fabrication Services
	Bio-remediation

These factors were used to identify an opening portfolio of four markets for the programme. The Critical Success Criteria (CSC) and climate and environment assessment are summarised in the Appraisal Case. The value for money assessment is detailed below.

In carrying out the market research for each of the sectors, the programme team searched for clear areas for intervention with the likelihood of succeeding. Of the six detailed sector studies (fisheries/aquaculture, palm oil, agricultural inputs, poultry, cassava, and recycling), two had limited potential for impact as no market driven, sustainable intervention was readily apparent which would result in a significant impact on our target markets. Therefore, rather than trying to make up numbers for an analysis, we have not included them. The VFM analysis provides the ratio between the estimated benefits to beneficiaries to the investment to be made by DFID<sup>1</sup>.

The benefits to beneficiaries are expressed as Net Additional Income Change, or NAIC. The net income change is based on stable market prices and the increased productivity, production or cost savings related to the market changes achieved. It is assumed that any increased supply of these goods is at a level that will have no impact on prices received because of existing unmet demand in each market.

The estimated values for NAIC and intervention costs draw on a variety of sources:

- Government and international bodies for different markets and regions;
- Experience in Nigeria from PIND, Propcom and other programmes;
- International experience for similar types of interventions; and

---

<sup>1</sup> VFM is calculated in relation only to DFID's investment – so as to assess the potential benefits accrued as a result of DFID support (including from private and public investment which has been leveraged by the programme). Conversely, the cost benefit analysis uses all of the costs of programme to Nigeria.

Qualitative and quantitative research conducted by programme staff during the design phase.

The calculations for the estimated value of the NAIC are based on beneficiary level activity and are averaged across the sectors, regrouping farmers and small enterprises. The total NAIC for each intervention is calculated as follows:

**(Expected number of beneficiaries for the intervention) x (Net average income change per beneficiary for that intervention) = NAIC.**

The results of this analysis are reported in the Economic appraisal and summarised in Table 2 below. A ratio above 1.0 indicates positive VFM; the four markets evaluated return positive value for DFID's funding. The agricultural inputs market, which includes fertilisers as well as Crop Protection Products, indicates that for every £1 spent by DFID the poor farmers' incomes increase by £ 4.99, reflecting strongest VFM for this market (reflecting the scale of outreach with potential for individual NAIC growth). Overall, when all costs are taken into consideration (including the pilot phase), the programme's overall VFM is 2.61.

**Table 2: Value for Money from different MADE investments from September 2014 – March 2020**

Sectors	NAIC and Costs	Totals	Ratio	Rank
Agricultural inputs	Total NAIC	£14,596,077	5.85	1
	Intervention Costs	£2,494,585		
Palm oil	Total NAIC	£9,122,840	3.66	2
	Intervention Costs	£2,494,585		
Poultry	Total NAIC	£5,574,503	2.23	3
	Intervention Costs	£2,494,585		
Aquaculture/Fisheries	Total NAIC	£3,978,875	1.60	4
	Intervention Costs	£2,494,585		
Additional interventions (2)*	Total NAIC	£2,947,068	1.34	5
	Intervention Costs	£2,207,022		

**Table 3: Value for money – 4 markets + 2 additional**

VFM - 4 markets +								
Year	2015 (7 mo)	2016	2017	2018	2019	2020	Total	VFM
<b>Palm oil</b>								
Aggregate NAIC (GBP)	£80,331	£356,291	£981,349	£1,861,998	£2,547,626	£3,295,244	£9,122,840	3.66
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585	
<b>Poultry</b>								
Aggregate NAIC (GBP)	£36,403	£210,228	£622,084	£1,243,166	£1,559,101	£1,903,521	£5,574,503	2.23
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585	
<b>Aquaculture/Fisheries</b>								
Aggregate NAIC (GBP)	£31,413	£200,466	£526,933	£867,411	£1,089,151	£1,263,501	£3,978,875	1.60
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585	
<b>Agricultural inputs</b>								
Aggregate NAIC (GBP)	£43,760	£282,135	£1,260,088	£2,941,754	£4,296,532	£5,771,809	£14,596,077	5.85
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585	
<b>Additional interventions (2)*</b>								
Aggregate NAIC (GBP)	£0	£38,409	£163,887	£503,202	£883,253	£1,358,316	£2,947,068	1.34
Project costs	£0	£756,693	£756,693	£693,635	£0	£0	£2,207,022	

<b>Gross NAIC</b>	<b>£36,219,363</b>
<b>Costs</b>	<b>£14,299,032</b>
<b>VFM ratio</b>	<b>2.53</b>

## 2.2.2 Addressing systemic constraints

*Palm oil:* Over 900,000 poor men and women are involved in all aspects of the palm oil sector from growing palm plantations, caring for and harvesting from wild groves, trading in fruit, processing oil, and trading and retailing oil. As a traditional cash and food crop, palm oil production is a low input low output commodity. The yields of FFB from the plantations are low due to poor farming practices, but more importantly the levels of oil extracted from the fruit are typically 40% or less of the available oil content due to poor processing technology and skills. This very low extraction rate makes the processing of palm oil barely more than a break even proposition, disincentivising investment in the value chain by small farmers. While improved, processing equipment, appropriately scaled for smaller processors, is available, it is not well known and no one is actively marketing it. While not too expensive and with a quick pay back period, it is poised to replace the tens of thousands of small, inefficient processing machines in use.

MADE will act as the lead coordinator for the activity, assisting in the demonstration of the technology and its benefits. Once it has been established that "Change Works," this will generate the

buy-in from the various market actors. This is fully coherent with M4P approaches in weak market environments. MADE will use private sector actors as the owners of the process. Fabricators and processors will "own and host" the demonstrations, but MADE will facilitate the development of the content to be disseminated, the collection of the data on demonstrating the value proposition, etc.

MADE will work with the Nigerian Institute for Palm Oil Research (NIFOR), developers of the improved processing technology, and a range of fabricators of the palm oil processing mills desiring to actively market them. Together, NIFOR, MADE, and the fabricators will demonstrate the value proposition of the new mills and actively promote sales by the fabricators. By engaging the relevant stakeholders in the value chain, such as the secondary processors, who have significant demand for additional oil, and financial institutions MADE will speed the promotion and the uptake of the new technology. At the demonstration sites, MADE will support the organization of field days to promote good agricultural practices and proper milling techniques. MADE will link to the ATA, to orient their distribution and funding for new mills and links to institutional finance to more market driven approaches. Activities will begin in Akwa Ibom and Rivers States.

Together, they will demonstrate the value proposition of the new mills and actively promote sales by the fabricators. By engaging the relevant stakeholders in the value chain, such as the secondary processors, who have the demand for additional oil, and financial institutions MADE will speed the promotion and the uptake of the new technology. At the demonstration sites, MADE will also use the field days to promote good agricultural practices and proper milling techniques. MADE will link to the ATA, to leverage their distribution and funding for new mills. Activities will begin in Akwa Ibom and Rivers States.

Income increases will start with the 50% increase in yield of oil from the existing fruit, which will incentivise farmers to harvest more of the existing fruit (using more labour) and to improve their care of the plantations to increase their yields, creating a virtuous cycle of improvements.

*Poultry:* Poultry consumption is increasing at 20% per annum in Nigeria. Opportunities exist in both the commercial bird market system as well as the traditional birds, but MADE will focus first on the traditional bird system. In the Niger Delta approximately 3 million households – 44% of the households in the region – keep local chickens, with an average flock size of 11 per household. The four core oil producing states (Akwa Ibom, Bayelsa, Delta and Rivers) are estimated to account for 44% of households with chickens, and 50% of the chicken population, in the Niger Delta. Women are an integral part of traditional poultry across Nigeria. They can be found at all levels of the value chain, primarily as producers who dominate the household production, but also as collectors, retailers in weekly markets, and retailers in daily markets, as well as in the provision of supporting services.

Key constraints in the market system include that there is currently only one manufacturer of vaccine in Nigeria, the National Veterinary Research Institute (NVRI) which, while interested in increasing output has limited capacity to do so. Distribution systems in rural areas are also limited, a situation exacerbated by the lack of a cold chain in most areas, which is important because the vaccine is live. Skills in handling and transporting vaccine are important but lacking. There is also no

network of vaccinators, while rural residents have little or no knowledge that it is possible to vaccinate against Newcastle Disease.

Vaccination against Newcastle Disease will bring economic benefits to poor farmers, with particular benefits for women and children; vaccination is cheap and effective, and field research shows that farmers will invest in control measures; and a substantial number of jobs will be created, particularly for women vaccinators. The activity will start initially in Delta and Rivers States.

*Aquaculture and Fisheries:*

Aquaculture and fisheries provide significant opportunities for growth in the Niger Delta. Fish farming is on the increase with more pond farmers starting every year, though imports from Southwest Nigeria provide competition for the Niger Delta production. Fish smoking provides steady livelihoods for many women in the fishing villages along the rivers and near the coast, as well as in the markets in the towns for local consumption as well as export.

The major constraints on the pond production side have come from the:

- Poor production knowledge and practices by farmers leading to large wastage of feed and poor water quality —resulting in a high production cost for catfish farming;

- Poor business management knowledge to understand profitability and be able to present a loan application to financial institutions;

- Low quality and reliability of fingerlings from hatcheries, whose supply is not very well matched to the timing of the demand for fingerlings; and

- Low awareness of the market opportunity for potential feed sales by some feed companies, leading to low market penetration.

The intervention will work with the major fish feed companies to organise demonstration ponds to increase the competitiveness of the farmers, leading to more sales of fish and more sales of feed. The intervention will include the hatcheries, with a component on improving their technical and business capacity to respond to the increasing demand from farmers.

On the fish smoking, which affects both pond producers and the wild capture, the key strategic constraints to profitability and growth in the sector are:

- High post-harvest losses on the part of both fisher-folk and smokers: losses can be as high as 14% on board the boats and 20% on shore;

- Traditional smoking methods, the dominant form of smoking, are inefficient (requiring up to three days and much fuelwood), do not always smoke thoroughly to meet optimum preservation standards, and can present a health hazard and a fire hazard;

- The low levels of penetration and uptake of commercially available improved smoking technology; and

- 9 Lack of awareness of the value proposition for improved smoking technology by the smokers, and of the market size by the kiln manufacturers.

The smoking intervention will focus on working with the kiln manufacturers who have expressed interest in piloting the fish smoking technology in the fishing villages and the smoking clusters in the towns. The intervention will integrate the leading fish mammals, who are not aware of the business models underlying the smoking technologies, to speed the uptake of the technologies.

*Agricultural Inputs:* Across the Niger Delta, small scale farmers' accessibility to and usage of agricultural inputs (fertilizer, seed and Crop Protection Products - CPP) remains limited. In the fertiliser market, small-holder, rural farmers are often unable to access fertiliser at the right time, in appropriately sized packaging (appropriate defined by technical and cost considerations), in close proximity to their homesteads. In addition, when fertiliser is available, the lack of understanding regarding its benefits and proper application limit its use and corresponding positive impact on yields.

The use of fertiliser in Nigeria is amongst the lowest in the world at an average rate of 13kg/ha, which is even lower in the Niger Delta at 9 kg/ha. Fertiliser distribution in the Niger Delta. The intervention is based on a successful intervention from PrOpCom and Propcom Mai-karfi in the North of Nigeria, but will include the CPP companies to expand the yields through improved use of both fertiliser and CPP, accompanied by correct application and spacing techniques.

The Nigeria government's new fertiliser/input subsidy scheme, the GESS, aims to increase the role of private companies in the distribution of subsidised inputs. However, it is encountering challenges and is not yet promoting an effective competitive distribution channel to small farmers. In addition the approach has done little to increase poor farmers' access to quality fertiliser or ability to pay for it (because it is sold in 50kg bags which most poor farmers cannot afford). Farmers also lacked information about the correct usage of fertiliser.

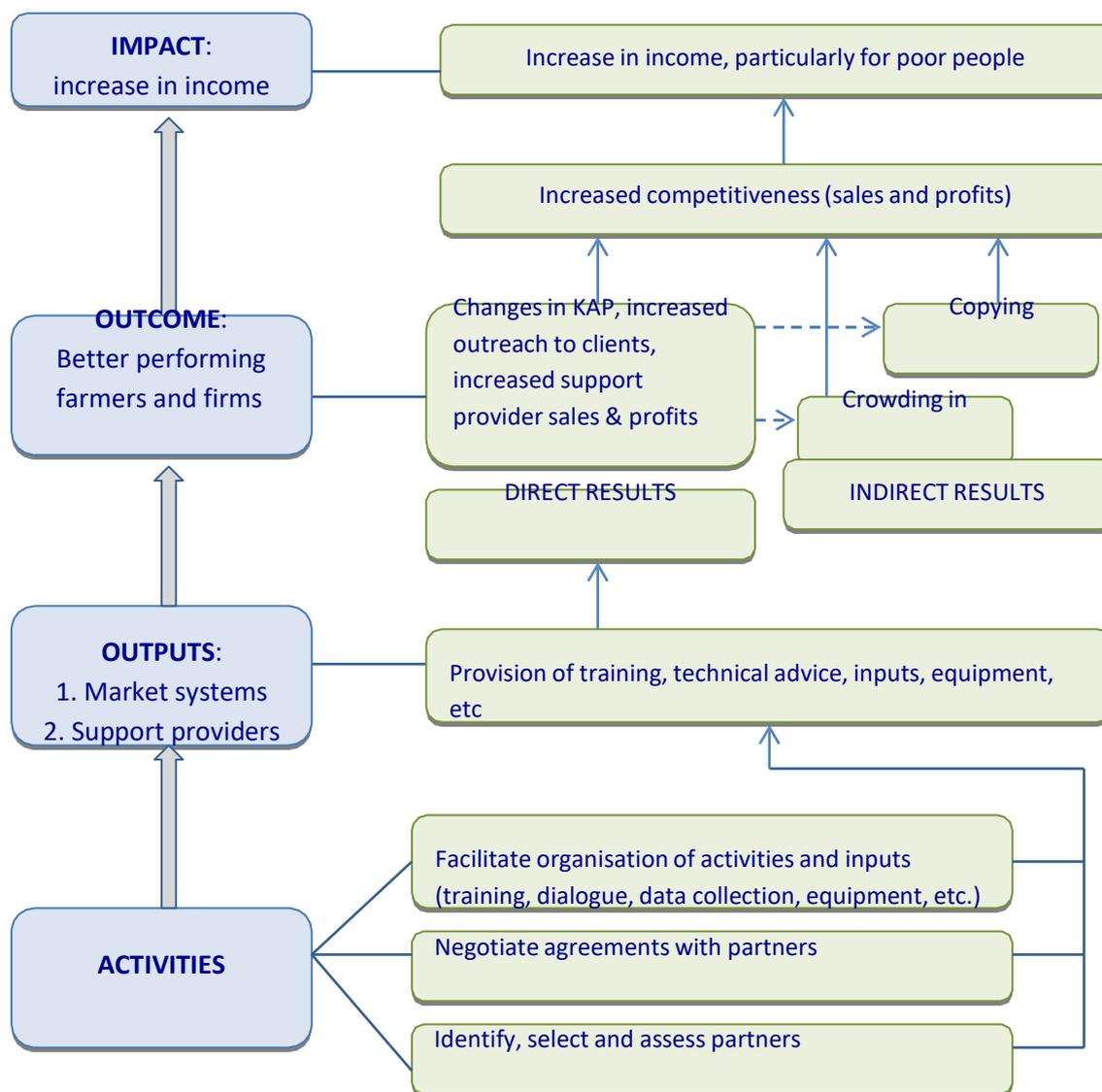
While direct procurement by the government is decreasing, various systemic constraints remain. These include poor distribution systems in rural areas, poor quality control of fertilisers and limited knowledge amongst poor farmers of the benefits of fertiliser use and of correct application techniques.

The MADE intervention will aim to facilitate the development of distribution systems that profitably supply of fertilizer in suitable package sizes at affordable price points within the Niger Delta. The programme will work with fertiliser and CPP companies to embed Good Agricultural Practice into the selling process agricultural inputs, through existing functional farming input distribution networks. The MADE team, led by the partnership with agricultural input companies, will initially target the states of Imo, Edo, Delta, Akwa-Ibom, Cross Rivers, Rivers states.

### 2.3 Intervention Logic and Evidence

MADE’s theory of change underpins the programme’s overall objectives and strategy (logical framework) and operationally it underpins the results chains for each intervention. The logic is shown in Figure 2.

**Figure 1: Generic MADE Theory of Change**



### 2.4 Incremental Costs

The estimated incremental costs of interventions in the opening portfolio are shown in Table 4. These costs are used in the economic analysis reported in section B.6 below. The incremental costs were estimated by MADE’s management and analysis teams. Certain caveats apply, however. First, it has been assumed that the project costs will be the same for each intervention.

**Table 4: Incremental costs (nominal GBP)**

<b>Year</b>	<b>2015 (7 mo)</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>Total</b>
<b>Palm oil</b>							
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585
Partner costs (GBP)	£1,920	£11,520	£22,560	£32,160	£36,000	£43,200	£147,360
<b>Poultry</b>							
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585
Partner costs (GBP)	£23,904	£35,857	£35,857	£35,857	£35,857	£35,857	£203,187
<b>Aquaculture/Fisheries</b>							
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585
Partner costs (GBP)	£6,107	£17,557	£25,191	£31,298	£34,351	£35,878	£150,382
<b>Agricultural inputs</b>							
Project costs	£287,563	£756,693	£756,693	£693,635	£0	£0	£2,494,585
Partner costs (GBP)	£6,240	£16,320	£20,160	£47,040	£52,800	£31,200	£173,760
<b>Additional interventions (2)*</b>							
Project costs	£0	£756,693	£756,693	£693,635	£0	£0	£2,207,022
Partner costs (GBP)	£0	£7,634	£13,359	£15,267	£22,901	£22,901	£82,061
<b>Total Programme Costs</b>	<b>£1,150,251</b>	<b>£3,783,466</b>	<b>£3,783,466</b>	<b>£3,468,177</b>	<b>£0</b>	<b>£0</b>	<b>£12,185,361</b>

Interventions will permit a more accurate estimation of costs, at which time the incremental costs can be updated.

Second, the contributions of partners are based on data provided by the research teams but these data are preliminary; they will need to be updated during technical design. Therefore the data in Table 4, which are used in the subsequent analysis, are indicative rather than exact.

## 2.5 Incremental benefits

The measure of incremental benefit employed is that of 'net additional income change' (NAIC), measured in GBP, as a result of the interventions. Data were estimated for each market by estimating the net income change per household and multiplying that by the number of households expected to be reached. Both the outreach and the net income gains were estimated by the design team.

The NAIC for each market in the opening portfolio is shown in Table 5.

NAIC is used as a proxy for welfare and for reduced poverty. The net income change is based on undistorted market prices and the increased productivity, production or cost savings related to the market changes promoted. It is assumed that increased supply of these goods is at a level that will have no impact on prices received because of existing unmet demand in each market.

**Table 5: Incremental benefits (nominal GBP): NAIC**

	2015	2016	2017	2018	2019	2020	Totals
Palm oil	£124,410	£518,140	£1,132,497	£2,324,061	£3,038,167	£3,567,538	£10,704,814
Poultry	£36,403	£210,228	£622,084	£1,327,448	£1,647,597	£1,996,443	£5,840,203
Aquaculture	£119,952	£428,236	£826,451	£1,182,504	£1,470,307	£1,322,118	£5,349,568
Agricultural inputs	£32,820	£211,601	£956,006	£2,320,259	£3,625,372	£5,705,290	£12,851,348
Additional 2 markets (2)	£12,329	£79,258	£279,867	£752,883	£1,306,937	£1,981,437	£4,412,712
<b>Totals</b>	<b>£325,913</b>	<b>£1,447,464</b>	<b>£3,816,906</b>	<b>£7,907,155</b>	<b>£11,088,381</b>	<b>£14,572,826</b>	<b>£39,158,645</b>

	2015 (7 mo)	2016	2017	2018	2019	2020	Totals
Palm oil	£80,331	£356,291	£981,349	£1,861,998	£2,547,626	£3,295,244	£9,122,840
Poultry	£36,403	£210,228	£622,084	£1,243,166	£1,559,101	£1,903,521	£5,574,503
Aquaculture	£31,413	£200,466	£526,933	£867,411	£1,089,151	£1,263,501	£3,978,875
Agricultural inputs	£43,760	£282,135	£1,260,088	£2,941,754	£4,296,532	£5,771,809	£14,596,077
Additional 2 markets (2)	£-	£38,409	£163,887	£503,202	£883,253	£1,358,316	£2,947,068
<b>Totals</b>	<b>£191,906</b>	<b>£1,087,530</b>	<b>£3,554,342</b>	<b>£7,417,531</b>	<b>£10,375,663</b>	<b>£13,592,392</b>	<b>£36,219,363</b>

The incremental benefits analysis takes into consideration possible optimism bias by the design team by and have discounted the originally projected numbers to take into consideration lags in start up, etc. For this reason it has been assumed that the outreach will be 15% of the estimated level in years 1-4, and 35% in years 5 and 6.

NAIC per individual is also adjusted by a factor of 25% to reflect, again, that estimates of the impact on incomes tend to be overly-optimistic.

## 2.6 Balance of Costs and Benefits

### 2.6.1 Period of analysis

The economic appraisal was undertaken using cost-benefit analysis for two time periods:

- The three and a half year DFID-funding period for MADE (calculated as 4 years to reflect the agricultural seasons); and
- A 5.5 year period, with no MADE contributions in the last two full year (Years 5 and 6), which is the recommended approach in DCED Standard for Results Measurement, which provides for a

projection of two years of benefits beyond the project end date as benefits are expected to continue for at least this length of time in the post-project phase.

## 2.6.2 Methodology

The cost-benefit analysis, using the incremental costs and incremental benefits discussed above, is shown in Table xx. A standard cost-benefit approach is taken, with a discount rate of 10% – DFID Nigeria’s discount rate for project appraisals – used in the calculation of net present value (NPV). The internal rate of return (IRR) – the break-even discount rate – is also calculated.

The cost-benefit analysis is based on all the costs incurred, not just the DFID costs. This includes public and private sector investments leveraged by the programme (i.e. the costs to be contributed by partner firms and agencies), and which are applied to the benefits realised.

## 2.6.3 Key results

The results of the cost-benefit analysis, over a three and a half year period are:

Net Present Value (NPV) of -£917,921

Internal rate of return (IRR) of -4.3%.

The results of the cost-benefit analysis, over a 5.5 year period (DCED standard to add two years past the end of the intervention), are:

Net Present Value (NPV) of £12,988,733

Internal rate of return (IRR) of 73%.

The results of the analysis indicate an IRR of -4.3% for the period of programme funding, rising to 73% when the two years after funding ceases. This highlights the slow nature of uptake in the early years in a market development project, as the early years are focused on piloting and demonstrating that “change works” leading to the more rapid growth as crowding-in occurs in the later years. The analysis demonstrates that the most important benefits accrue in the later years of the project as the market forces settle in. This implies that the initial 3.5 year time frame is not sufficient for a market development programme with targets of this scale to establish its activities and scale them up to yield the market returns within the short term. But returns to the programme are well above break-even over six years, and are enough to allow for significant risk in achieving programme outcomes.

**Table 6: Cost-benefit analysis (all financial data in GB£)**

IRR	Discount rate	10%	Period
73%	NPV	£12,988,733	5.5
-4%	NPV	-£917,921	3.5

## 2.7 Risks and Uncertainty

There are a number of risks and uncertainties associated with the above analysis. These include what can be termed 'normal project risks' as well the additional risks associated with working in the distorted economies of the Niger Delta:

- Civil disturbance following the end of the Amnesty period in 2015 or the elections in 2015, which could disrupt project activities;
- Environmental risk owing to major oil spills, or pollution from other external sources;
- Failure of partners to deliver on their commitments, either financially or in-kind activity on the ground;
- Crowding out of project activities by market distorting investments/programmes from other donors will limit uptake of MADE market development activities
- Technical failures as a result of inadequate support, such as marketing of smoking kilns, might result in its failure, resulting in beneficiaries withdrawing from the intervention;
- Net income gains not realised because important constraints, such as marketing linkages, have not been overcome;
- Assumptions relating to the delivery or uptake of various interventions prove to be overly optimistic, such as the willingness to pay for inputs and services.

These are real risks and they apply to all of the markets in varying degrees. They have been accounted for in the economic appraisal by reducing the forecast benefits and outreach figures and by applying optimism bias adjustments. However, even pragmatic targets may not be achieved if individual interventions fail completely, and as such sensitivity analysis is needed to assess the likely impact.

In order to understand how the risks could affect the targets, the figures were subject to sensitivity analysis. Cost-benefit calculations were recalculated with the variations below, and results are shown in Table 14. In each of these calculations, while results were reduced, the costs remained the same, reallocated to the other programme interventions for achieving the other targets.

- The failure of the Palm Oil intervention (the singled highest yielding investment) yielding no results over the life of the programme (but costs remain the same);
- The failure of the village chicken intervention after two years;
- The reduction of all outreach by 66 percent (reach only 34% of targeted beneficiaries) over life of programme;
- Achieving only 50% results in two markets, for example palm oil and aquaculture results, over life of programme;
- Agricultural inputs fails in year 2.

**Table 7: Results of sensitivity analyses**

Assumption	IRR*	IRR	NPV**	NPV
	Years 1-3.5	Years 1-5.5	Years 1-3.5	Years 1-5.5
Palm oil fails completely	-44%	38%	-£3,297,493	£7,167,206
Poultry fails year 2	-29%	57%	-£2,408,143	£9,455,944
Programme only reaches 34% of total client targets	<-50%	10%	-£6,208,213	-£106,983
50% of palm oil & 50% of Fisheries/Aquaculture	-33%	53%	-£2,699,586	£8,791,346
Agricultural inputs fails after year 2	<-50%	32%	-£4,107,070	£3,873,740

\* Internal Rate of Return \*\* Net Present Value

As highlighted above, the sensitivity analysis shows that the returns from the opening portfolio are sensitive to the period of analysis. This results from the short period to which cost-benefit analyses are applied and the associated heavy impact of initial costs without taking into consideration the length of time needed to get activities underway in a sound manner addressing the real underlying constraints before benefits accrue. Importantly, however, when the **five and a half** year time period is considered – still short by market development standards but more relevant to the programme – the outcomes remain significantly above break-even. This indicates that the programme is robust and able to withstand various intervention failures; only if it achieves less than **34%** of its outreach targets (after reductions for bias) will it have a negative NPV over **5.5** years.

Any M4P programme will take risks to achieve its objectives; so it needs a robust management system to track its results and manage its risk. MADE's routine portfolio review process (strategic quarterly reviews and internal technical advisory board meetings) will examine the performance of interventions in specific markets. This review of the portfolio of activities will allow programme management to take sound investment decisions and decide whether an intervention needs to be adjusted or scaled up, or whether the programme needs to exit a market completely, to refocus on more promising areas.

## 2.8 Competition Assessment

Competition in the private sector is unlikely to be impacted adversely by the interventions proposed under MADE. Each of the markets for which interventions are proposed is typified by unmet demand so existing enterprises and service providers are unlikely to be squeezed out by increased competition. In contrast, the competition created by many of the interventions, such as for the sale of palm oil mills or for the sale of agricultural inputs, is likely to increase availability, force manufacturers to improve their quality and bring down costs to the benefit of poor farmers.

## **2.9 Macroeconomic Impact**

It is very unlikely that there will be any discernible macroeconomic impacts during the life of MADE. In the longer-term, with increased productivity and the removal of systemic impediments to market development there may be effects on economic growth in agriculture in Northern Nigeria, with consequent positive outcomes for poverty alleviation and employment. There is unlikely to be any impact on key macroeconomic indicators such as inflation.

## **2.10 Fiscal Impact**

It is also unlikely that there will be any fiscal impacts during the life of the programme. The approach is predicated to a substantial degree on private sector activity.

Conversely, there may be some increases in tax paid by private sector retailers and market agents, and possibly, although less likely, by some farmers if their incomes increase sufficiently as a result of the project. In the overall context of Nigeria's budget any such outcomes are likely to be small and, at this point, cannot be estimated.

## **2.11 Financial Sustainability**

There are no implications for government capital or recurrent spending.

## **2.12 Attribution to DFID**

DFID will be able to claim substantial attribution for the achievements of MADE. While each intervention involves one or more private sector partners the programme of interventions would be unlikely without DFID support. In each market the results of DFID's programme support will be measurable as they relate to improved productivity, enhanced health outcomes and vastly improved animal health in the case of village poultry. MADE will collect baseline data for each market and, through follow-up monitoring, measure the changes achieved as a result of the programme of interventions.

## **2.13 Summary and Recommendations**

These are provided at the beginning of this document.

## **2.14 Technical note: summary and justification of key analytical parameters**

The cost and outreach data used in the analyses are based on those provided by the various research teams and management of MADE. The assumptions made in relation to the data were outlined in the foregoing sections of this report. The key point is that all the analyses undertaken are based on quite conservative assumptions, thereby ensuring that analytical results are not over-optimistic.