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LESSONS ON IMPLEMENTATION OF RESULTS MEASUREMENT STRATEGY INTEGRATING GEOGRAPHICAL INFORMATION SYSTEMS APPLICATION IN THE CONTEXT OF MARKET SYSTEM-LED AGRICULTURAL PROJECTS IN CONFLICT AREAS

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Lessons on Implementation of Results Measurement Strategy Integrating Geographical Information Systems Application in the Context of Market System-Led Agricultural Projects in Conflict Areas

1. Introduction

Background and Context

The Market Development in the Niger Delta (MADE) Programme uses a market systems development approach to generate wealth creation and employment in the Niger Delta's non-oil economy. The first phase of MADE (September 2013 – February 2018) supported the palm oil, poultry, fisheries, cassava, agricultural inputs and finished leather goods sectors as well as a cross-cutting access to finance sector. In its second phase (March 2018-February 2020), MADE had a special focus on supporting investment and growth in sectors considered 'aspirational' and attractive to potential victims of trafficking, and thus reduce drivers of harmful migration. The second phase of MADE therefore expanded its interventions in the areas of ICT, hospitality and creative industries, which were chosen as alternatives to individuals who might be attracted to human traffickers' offers.

During the two-phase implementation of the programme, MADE built a robust and adaptive monitoring and evaluation (M&E) system that integrated geographical information systems applications as a means of enhancing the functionality of the M&E system, enabling more robust performance analysis of the programme's impact by sector and by location. The M&E system, which is compliant with the Donor Committee for Enterprise Development (DCED) Standards for Results Measurement, was improved year on year.

As the adaptations were based on lessons learned in the field, this paper articulates MADE Programme's contribution to the body of knowledge about designing and implementing adaptive and replicable M&E strategies in the context of agriculture projects that seek to improve agricultural productivity and incomes of smallholder farmers in conflict-prone regions. The lessons have been articulated to enable project proponents design smarter and focused M&E strategies that support measurement of key performance indicators more effectively.

The lessons captured in this paper were shared with stakeholders during a learning event which was held in Abuja on 24th October 2019 and later replicated in Port Harcourt on 28th November. The lessons cover our experience along the entire programme results chain and relate to a wide range of M&E practices, including managing outreach records, supporting partners to improve their data collection system, integration of M&E with knowledge management and communications, the role of geographical information systems in enhancing M&E functionality, measuring farmers behaviour change, yield, incomes, etc.

2. Description of the Learning Event

To share these lessons, the programme organised a two-hour experience-sharing event targeting other M&E practitioners and donor projects working in agricultural value chains. The event gave participants a working knowledge of the M&E system and processes that MADE Programme put in place to track

programme results and generated evidence to support decision making and continuous improvement of the programme implementation.

The event had three sessions briefly outlined below:

Session 1 – This session focused on describing the M&E system the programme set up (see Section 3 below). The presentation highlighted integration of geographical information system with the M&E system that enabled mapping of programme footprints and analysis of results by location. Description of GIS integration with the M&E system focused on how the system enabled mapping of programme outreach maps (at the output level) and use of results conversion rate from surveys to generate maps showing aggregate number of smallholder farmers making changes to their farming and business practices (intermediate outcome), those experiencing increased productivity (ultimate outcome), eventual increase in income and additional incomes by intervention, gender and target location (impact). Description of GIS integrated with the M&E system included how the programme tracks programme cost by location, enabling the team create value for money ratio maps using appropriate mapping functions. The first session ended with a discussion of challenges with implementation of the M&E system, including constraints related to working in a conflict zone and how the programme responded to each of the challenges.

Session 2 – focused on key lessons learned and their implications for design of M&E strategies for future agriculture projects. The second presentation will highlight key lessons learned from implementation of the strategy.

Session 3 – provided participants the opportunity to reflect on the lessons shared. Following the two sessions, the facilitator led some group work focusing on participants' feedback on the lessons shared. This was an opportunity for participants to validate the lessons shared and what these imply for future project design and implementation.

3. Description of the M&E System and Processes

This section describes MADE II's Monitoring and Results Measurement (MRM) system and processes. Designed to be consistent with the Donor Committee on Enterprise Development (DCED) standards for measuring results in private sector development[1], and building on the strength of MADE I's MRM system, the strategy described here focuses on streamlining the existing MRM system for achieving the following objectives:

- Improving robustness and efficiency of the results measurement process;
- Providing regular and timely data and feedback from beneficiaries in support of informed decision making and continuous improvement in the programme delivery and;
- Promoting results-based reporting and documentation of the programme's successes and lessons learned.

3.1 Stages of MADE II MRM System

The stages of the MRM process as outlined below is based on the understanding that monitoring and results measurement is a shared responsibility between the intervention team and the MRM Unit.

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[1] www.enterprise-development.org/page/measuring-and-reporting-results

Step 1 – Sector Study

MADE I began with a sector study for each of the selected sectors – i.e. agricultural inputs, cassava, palm oil, fisheries and poultry. The intent was to understand the growth potential of each sector, its relevance to the poor, constraints limiting growth of the sector and opportunities for growth. As Edo State Investment Portfolio was added as a new component in MADE II, the Programme conducted assessment of the additional sectors to identify constraints that the programme need to address.

Step 2 – Intervention Design

The programme designed interventions most appropriate for addressing the constraints that will lead to the desired change. A key criterion guiding selection of interventions relate to incentives for lead firms to continue to provide goods and services to poor or disadvantaged people. The intervention design also considers specific constraints to be resolved, the approach to resolving the constraints, what will be the systemic change due to the intervention, and the incentives key actors will derive from implementation of the planned interventions.

Step 3 – Development of Intervention Guides

The Programme then develops Intervention Guides (IG) with results chains, support calculations, impact projects, measurement plan and so on. While the MADE team (implementation and MRM personnel) has updated Intervention Guides (IGs) for existing market development interventions, IGs will be developed for each new intervention in the two components of the programme. Each IG articulates a clear understanding and specification of how the planned intervention will lead to the desired output, outcomes and eventually impact on the poor. As programme realities can change during intervention, IGs will be reviewed and updated quarterly to ensure they continue to reflect the emerging realities and the results being achieved.

Intervention guides are used as the key management and record keeping tool for each intervention. It records the purpose of the intervention and how it fits within MADE's sector strategies. It also identifies activities and their intended results, holds the plan for monitoring and measuring results, and contains information on impacts and lessons learned.

Step 4: Monitoring: Monitoring begins with setting baselines. Baselines serve both the purpose of estimating impact as well as providing valuable information that informs design of specific intervention strategy. As standard practice, baseline information is also required for all actors that MADE works with (i.e. leaf firms, intermediaries and farmers). Following the baselines established, the team continues to assess the extent to which the programme interventions are addressing key constraints and opportunities identified, resulting in the desired overall changes in the sector to the benefit of the poor. Table below presents a summary of results that will be monitored throughout the programme lifetime.

Step 5: Results aggregation: Consistent with the programme wide results measurement system, MADE aggregates results at all three level of results: output, outcome and impact for programme wide reporting.

Step 6: Communications and Lessons Learning
The programme will communicate the results of the interventions every quarter and at end of each year. The programme will also occasionally generate case studies and success stories for dissemination to stakeholders. A separate communications and knowledge management strategy provides further clarifications of the programme's approach in this regard. The programme also uses evidence generated to inform decision making and adaptation. In addition, the programme disseminates experiences to stakeholders.

3.2 Challenges Encountered
The team encountered three key challenges worthy of mentioning in this paper. These are outlined below:

- **The challenge of doing surveys in conflict-prone region:** The incessant security challenge in the Niger Delta implies that the team avoids visiting some locations when violence is reported in such areas and apply initiative in collecting data in such locations. This has implications for the choice of results measurement methodology. In response to security challenges, the team ensures recruitment of enumerators from project target communities instead of sending outsiders to extract information from local people. We also promote virtual supervision of fieldwork using WhatsApp platforms for quality assurance. Furthermore, the team depended on the security advice of the programme's security manager who is in contact with the Nigeria Police Force and other networks of security and defence agencies in the region. The advice informs the team about locations the team should avoid visiting.

- **Respondents' fatigue:** Considering the time lag from participation in programme intervention to when the actual benefits will accrue (see Lesson # 8 in Section 5), sometimes the team conducted separate outcome and impact assessment instead of a single survey. This was usually the case with interventions targeting commodities with longer production cycles such as cassava, oil palm and cocoa. This created a situation of respondents' fatigue, which could have been prevented if single impact surveys were undertaken. However, splitting the survey has the advantage of shortening the interview duration.

- **Challenge with scheduling interviews with clients in some locations:** The team occasionally had challenges with making prior appointments with clients in locations that had no access to mobile telecommunication networks. In some locations with access to mobile communication, some of the farmers had no access to phones. To arrange surveys, the team collaborated with service providers (e.g. poultry village level dealers) that liaised between the survey team and farmers. This inadvertently promoted greater transparency in the data collection process.

4. M&E and GIS Integration for Performance Analysis
In the last year of MADE I (April 2017 to February 2018), MADE began exploring the use of geographical information systems[2] (GIS) in analysis of the Programme's performance.

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[2] Geographical information system (GIS) is a set of tools that enables users capture, store, manipulate, analyse, manage, and present geographic data in a manner that supports their decision-making process. Using GIS requires:
- GIS software – and there are a few open source (free) applications online (e.g. Quantum GIS), which is very effective and encompasses most of the functionality included in ArcGIS;
- Data collection using global positioning system (GPS) handsets or a wide range of open-source applications that run on mobile (e.g. Get Geo-Coordinates, Compass, Locus Map) for gathering geographical coordinates – a sort of "address system" (e.g. latitude and longitude) that GIS applications can recognise.
- Appropriate base maps that will give the right context for the GIS exercise and desired outputs. For example, a base map showing fishing clusters will justify why a programme is driving the promotion of smoking kiln technology adoption around riverine areas and creeks as these are the locations for wild catch;
- Some expertise in automated mapping is equally essential as the capability of the GIS built depends on the expertise skills in analytical thinking.

Prior to this, the Programme used PowerPoint to create and update intervention maps. As these were standalone maps and not interactive, there were several limitations – including weaknesses related to overlaying other map layers to show spatial patterns and answer complex questions about causality beyond the capability of any table of data or maps in PowerPoint format.

To address this constraint, MADE began using global positioning system (GPS) receivers and **Get Geo-Coordinates** App installed on mobile phones to capture the geographical coordinates of intervention locations across the five agricultural value chains (agricultural inputs, cassava, fisheries, palm oil and household poultry). With appropriate descriptive data (attributes) linked to data specifying exact locations of each feature of interest (e.g. pond management training demo), the programme produce GIS-enabled maps illustrating progress with improved access to productive assets (inputs, products and technologies) the programme is supporting year on year. In line with the logframe, improved access to these assets is a precondition for farmers' and entrepreneurs' adoption of practices and innovations introduced to them by private sector partners, leading to increased productivity and eventual increase in income.

By end of MADE I, the Programme was able to combine several maps of the same geography to show spatial patterns, detect trends and forecast future directions during the extension phase. For example, the programme can now combine, classify and symbolise maps of pond management training (PMT) demos established by Master Aquaculture Service Providers (MASPs) in each implementation year. A typical question the GIS application to performance analysis enables the team to answer relates to how the spread of PMT demos can be used to guide decision making about new clusters of fish farmers that should be targeted during the extension phase as means of widening the scale of the intervention.

In MADE II, the Programme began creating outreach maps (at the output level) and use the conversion rate from results monitoring to generate maps showing aggregate number of smallholder farmers making changes to their farming and business practices (intermediate outcome), those experiencing increased productivity (ultimate outcome), eventual increase in income and additional incomes by intervention, gender and target location (impact). As the M&E system set up supports tracking of programme cost by location, the team also creates value for money ratio maps using appropriate mapping functions. Query by location, proximity analysis and overlay operations are some of the spatial analyses the programme carries out that enables interpretation of results from market systems development interventions more innovatively.

5. **Summary of Lessons**

Lessons about the Overall approach

Lesson 1: The need for timely delivery of data for both accountability and decision-making purposes require innovativeness in design and delivery of cost effective and efficient results measurement surveys (e.g. use of mobile data collection platforms, participatory surveys).
As part of the accountability process, the programme provides updates on achievements against logframe targets on a quarterly basis. The timeliness of information for both accountability and decision-making purposes requires innovativeness in measuring results. Programme teams also require good systems in place for responsive feedback to partners, including progress and evidence of setbacks to achievement of results so they can improve operations as appropriate.

To ensure timely reporting on indicators on a quarterly basis, the Programme invested in the use of mobile Apps such as Kobo Toolbox, an open source App that allows real-time analysis of survey data for timely reporting. In addition, while outsourcing of results measurement has the huge advantage of optimum neutrality and objectivity, programme teams need to know when to deliver surveys inhouse to meet important deadlines.

Lesson 2: Use evidence from M&E to inform continuous adaptation of programme strategies.
It is not enough to collect data for generating evidence in support of the difference programmes make. Equally critical is the need to use the evidence to inform continuous improvement in implementation to ensure the programme stays on track and achieve the desired objectives.

Such a perspective recognises results measurement as a process of testing underlying assumptions about causal links and gaps that need to be filled. For instance, as availability of inputs, products, services and technologies an agriculture project promotes shape adoption rate significantly, it is important to provide feedback to partners about the need to ensure implementation of the entire suite of interventions designed to address identified systemic constraints. Some of the good agronomic practices (GAP) promoted by input suppliers include proper use of inputs such as fertilisers, hybrid seeds and crop protection products. Since these are precondition for adoption of GAP, a programme team may need to use evidence from results measurement to strengthen compliance monitoring of partners' activities that contribute significantly to improved access to these productive assets.

As a way of integrating client satisfaction and feedback mechanisms, the programme ensured that outcome and impact surveys included a section soliciting feedback from clients about improvements required and their recommendations. This helped to strengthen the feedback mechanism between the programme and partners. The team. provided feedback to partners through intervention managers and this ensured gaps in intervention delivery are addressed as appropriate on a continuous basis.

Lesson 3: Application of geographical information systems in project performance analysis significantly enhances the functionality of M&E systems
The programme's integration of geographical information systems (GIS) with the M&E system to support mapping of programme's footprints and overall analysis of programme impact by location challenged

the team to think in a more geographical sense when collecting data. That is, we now consider exact location of every feature (e.g. small-scale processing equipment adopted by commercial millers processing oil palm fruits) that are attributable to the programme and review associated set of descriptive statistics (e.g. name of fabricator) to enable analysis by location. Kobo Toolbox selected for mobile data collection has the capability of collecting geo-coordinates during surveys.

With the integrated system, the programme was also able to combine several map layers depending on specific needs and this enables visualisation of spatial relationships between mapped features and answer complex questions about causality answering complex questions about causality beyond the capability of any table of data or charts. For example, with map overlays, the programme can depict both the results of specific interventions (e.g. number of farmers adopting good agronomic practices) alongside the conditions that led to the desired change (e.g. network of agro-dealers selling required inputs) and how these vary by location.

Outputs Level Results

Lesson 4: Demonstrating to partners the benefit of improving their data collection system increases the chance of availability of records beyond the grant period.
Market systems development programmes sometime use cost-share to stimulate demand for inputs, products, services and technologies in target markets. Measuring the performance of smart grants require that partners provide evidence of their reach and evidence of mutual benefits to all the market actors. To avoid a situation where partners perceive the need to collect business data as additional burden that only serves the purpose of programme reporting and accountability solely, the team should sell the value to partners. To sell the value of improving data collection system to partners, the message should be about keeping appropriate business records for their internal planning, projection and performance review while they then occasionally share the data with the programme for impact estimation and accountability to stakeholders. Such a process ensures partners continue to share sales records – a proxy for outreach or actual list of participants to project proponents beyond the funding period.

Lesson 5: In case of any duplicate records in participants' list, review why this happens and what lessons can be drawn from the situation.
While programmes should ensure duplicate records in access outreach are identified and eliminated as appropriate, programme teams need to reflect on duplicate records, how they happen, what can be learned from the situation and how best to prevent these from happening in future. While detecting and resolving duplicate records was a continuous process, the programme realised that duplication in beneficiaries records often occur due to:
- Partners' duplication of attendance records as part of their internal control measure: This is common in the fisheries intervention as partner master aquaculture service providers (MASPs) are yet to fully adopt the single-entry model the programme introduced.
- Double-counting from creation of separate demo records for each demo activity
- Farmers' participation in more than one demo: As most farmers intercrop, they may attend more than one demo (e.g. separate rice and maize demos).
- Spelling errors as even the slightest typo error (e.g. Alorie instead of Alozie) is recorded as different case

The MRM team included part-time M&E officers that provided support in detecting and analysing incidence of duplicate entries eliminated occasionally before consolidating the records. The team observed that sometimes duplicates in participants records convey their interest in the suite of interventions the programme is delivering, implying the relevance of the intervention. The team also implemented a proactive approach by supporting partners with design of templates that have multiple columns for repeat participation. At onset, partners were oriented to the M&E system, which included data collection tools and templates.

Intermediate outcome

Lesson 6: Timing of both intervention delivery and outcome assessment is critical
As there are slight differences in the agro-ecology between one state and another and farming seasons also differ by location, it is important that partners and the MRM team factor these nuances in their planning and schedule of intervention activities and results measurement across the region. In planning surveys, for instance, it is important that M&E teams considers the timing of outcome and impact surveys relative to when clients took part in interventions. For instance, if demos promoting critical best practices such as planting techniques are introduced "off-season", participants will have to wait for the next planting season before applying such practices. Wrong timing of behaviour change surveys can yield low conversion rate, giving wrong impression about maturity of the intervention.

While planning outcome surveys, the team considered the timing relative to when clients took part in an intervention and the month of the year when the set of improved practices introduced to farmers can be applied. This is because wrong timing of behaviour change surveys can yield low conversion rate, giving wrong impression about maturity of the intervention. To do this, the team developed seasonal calendars of farming activities for each state and this improved scheduling of outcome surveys.

Lesson 7: Fact-check farmers' self-reporting of their farm size as over-reporting of farm size imply potentially gross under-reporting of crop yield
Given weaknesses with farmers' self-reporting of their farm size, the programme invested in use of a mobile App (Distance and Area Measure) to fact-check farm size. When the programme used a mobile app, <u>Distance and Area Measure</u>, to fact-check farmers' self-reported farm size, it was observed that 77% of the farmers surveyed over-reported the sizes of their farms. With a sample of 225 farmers (44% women representation), we observed that most farmers thought they had nearly thrice their actual farm size.

Over-reporting of farm size, which can be unintentional, implies potentially gross under-reporting of crop yields. This is because farm size and crop yield are inversely correlated – i.e. the larger the farm size, the lower the computed yield per unit area. Future projects particularly those promoting extension service delivery should consider incorporating use of mobile Apps to measure the perimeter of farms in the curriculum for good agronomic practice demos. We realised that some farmers were interested in knowing about the App we used to fact-check the size of their farms. Since it is an easy to use approach, farmers can benefit from the training and this has potential for reducing the risk of financial institutions under-estimating the size of their farmers.

Lesson 8: The time lag from smallholder farmers' participation in an intervention to the time they begin to realise the actual benefits of increased productivity and incomes should inform setting of annual targets at outcome and impact levels.

It is important to match the timing of benefits flow with results measurement schedules. This is because widespread changes in yield and income among farmers and entrepreneurs takes time to develop as this depends on both the maturity of the interventions and level of adoption by programme clients. Contrary to the logframe projection of results at all levels on annual basis, the programme observed a time lag from participation in interventions to when the actual benefits accrue to target beneficiaries. For instance, a farmer might change some practices (i.e. behaviour change) immediately after participation in a demo, but the real benefits might not occur until a year later (or the next cropping season) when the farmer has fully applied the practices for a whole season.

This implies that annual targets initially projected at the beginning of a programme may no longer be realistic when implementation commences. Therefore, there is a need for continual review of assumptions underlying each intervention to ensure that they remain valid and the projected results remain likely. The programme adapted to the dynamic nature of its interventions and revised Phase I logframe during this reporting period to provide more realistic medium and long-term targets for the projection of results. This can complement the routine testing of assumptions and risk assessments to monitor and reflect impact of changes on results.

MADE I was unable to report increased incomes in the first two years of implementation as smallholder farmers needed more time to experience actual benefits of increased productivity and incomes. It is important to bear in mind the varying production cycles of target agricultural commodities (e.g. fish, chickens, cassava, oil palm) while projecting outcome and impact level results in the programme logframe.

To adapt to the dynamic nature of its interventions, MADE I revised the logframe to provide more realistic medium and long-term targets for the projection of results. The programme also adjusted the initial schedule for measurement of physical and financial yield and began developing a detailed benefit flow to ensure the outcome projections are more accurately tied to the timing of their benefits. This enabled setting of more realistic annual targets at the outcome and impact levels.

Lesson 9: Innovative approaches are required for measuring agricultural incomes.

Poor record keeping and general weaknesses in recall of physical and financial yield as observed among farmers and entrepreneurs has potential for impacting data integrity if beneficiaries are required to recall their physical and financial yield several months later. As means of improving data integrity, the programme aligned the schedule of crop yield measurement with the harvest season for each crop the project targets.

It is important to run outcome and impact surveys on a rolling basis as this is more appropriate for agricultural programmes that target framers growing a wide range of crops. In addition, while the methodology for measuring incomes include establishment of harvest and sales patterns, more innovative approaches – including use of mobile Apps are required for estimation of cash incomes. The Nigerian Agricultural Enterprise Curriculum has great potential for resolving the challenge with measuring farmers' yield and incomes from agricultural enterprises. Future projects need to incorporate

record keeping as an integral part of the training curriculum for both the GAP demos and technology adoption demos.