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COST BENEFIT ANALYSIS OF USAID/LIBERIA'S RICE AND GOAT VALUE CHAIN INTERVENTIONS: FINAL SUMMARY FINDINGS

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COST BENEFIT ANALYSIS OF USAID/LIBERIA'S RICE AND GOAT VALUE CHAIN INTERVENTIONS

Final Summary of Findings

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COST-BENEFIT ANALYSIS OF USAID/LIBERIA'S RICE AND GOAT VALUE CHAINS UNDER THE FED PROJECT: SUMMARY FINDINGS

PROJECT DESCRIPTION

USAID/Liberia's Food and Enterprise Development (FED) project falls within a larger portfolio of U.S. Government interventions in Liberia to improve food security under the Feed the Future initiative. The project commenced in 2011 and will be completed in 2016. USAID's FED project is being implemented in support of the Government of Liberia's (GoL's) dedication to agricultural development. FED utilizes a generalized "effective post- conflict economic development" framework with the objective of enhancing food security by creating an "indigenous incentive structure" built upon improved technology for productivity and profitability; expansion in the use of improved and mechanized input supply and extension systems; increased commercial production, marketing and processing; and improvements in enterprise services and workforce development while partnering with the government of Liberia. The USAID FED project also aims to improve the value chains of staple crops including rice and cassava, develop new value chains (vegetables and goat), and improve the enabling environment for private sector investment in agriculture.

The cost benefit analysis (CBA) was conducted on a number of selected FED interventions. Interventions in rice value chains included productivity improvement interventions, such as trainings on improved agronomic practices, and establishment of rice business hubs which include community mills, warehouses and power tillers. On goat value chains, the CBA analyzed the value of interventions establishing goat management sites consisting of three shelters (general, maternity and quarantine).

Table 1: Incremental Economic Analysis of FED Project (USAID Perspective)

Value Chain	ENPV[1] (US$ millions)	ERR[2]
Rice Value Chain	(6.58)	8.6%
Goat Value Chain	(3.60)	1.5%
Total	**(10.19)**	**7.6%**

[1] In finance, the net present value (NPV) is defined as the sum of the present values (PVs) of incoming and outgoing cash flows over a period of time. Economic Net Present Value (ENPV) then looks at incoming and outgoing resources which are defined beyond just cash flows and are described as benefit and cost resource flows, respectively.

[2] Internal Rate of Return (IRR) is the (break-even) interest rate at which investors can expect to receive positive returns. The Economic Rate of Return (ERR) differs from the Financial Rate of Return (FRR) in that it takes into account the effects of factors such as price controls, subsidies, and tax breaks to compute the actual cost of the project to the economy.

KEY RISK AREAS

The key risk factors affecting financial and economic outcomes of FED project interventions include:

1. **Limited market access prevents farmers from selling increased production.** A comprehensive analysis is required to determine areas where ready markets exist or can be created. The paddy farming technologies should only be promoted in those areas.
2. **Drastic increases in paddy yields are likely to result in a significant price drop, therefore reducing financial returns of farming activities.** Although the economic returns will remain unchanged (reduced profits will be transferred from farmers to consumers through the price decrease), a significant price reduction may not allow farmers to break-even, and therefore can potentially jeopardize the project results.
3. **The financial and economic returns of FED interventions are highly sensitive to the change in paddy yields.** This can be explained by a significant increase in the cost of inputs required to achieve the high yields.

BENEFICIARY PROFILE

The FED project provided the following beneficiary information by value chain and gender:

Value Chain	FY15 total	Women	FY14 Total	Women	FY13 Total	Women	Total FY13 to FY15	Total Women	% Women
Rice	24,513	10,212	19,389	8,395	7,880	3,891	51,782	22,498	43%
Goat	2,161	578	2,060	800	318	160	4,539	1,538	34%

KEY CONCLUSIONS AND RECOMMENDATIONS

The ENPV of FED project, once the USAID cost is included, is a negative US$10.19 million, indicating the benefits of the interventions do not outweigh the costs. The ERR is 7.6 percent, 4.4 percent lower than the 12 percent threshold set by USAID. The recent Ebola outbreak and other factors (including high logistical costs in Liberia) contributed to the negative returns. The analysis concludes the following key factors contribute to the negative returns:

1. **The FED project's selected technologies result in high paddy yields**. Such yields are significantly above the in-house consumption of an average Liberian household. However, as there is limited access to markets (discussed below), the consequence is extremely high post-harvest losses because farmers are unable to sell the paddy.
2. **Limited access to markets prevents the timely sale of paddy and increases post-harvest losses even further.** The analysis, therefore, assumes that 40 percent of farmers can market their production. The negative rates of return for this product are highly sensitive to an assumed low rate of market sales. As discussed below, raising the share of rice produced that is sold to markets would yield positive rates of return.
3. **The increase in the cost of farming activities along with almost no access to credit prevents farmers from continuing with the improved production technologies when the provision of free inputs from FED is not in place.**

The main finding of this analysis is that farmers with no market access might not continue the FED project promoted activities in the second year of the project when the FED no longer provides free inputs. However, the group of project beneficiaries that do have access to markets will generate significant financial returns of 1,857 and 2,420 USD/hectare (ha) for upland and lowland rice production, respectively. Beneficiaries without market access will simply return to the pre-project practices, resulting in a very low adoption rate of the FED interventions. The current analysis assumes a 40 percent adoption rate. The break-even point for the adoption rate is estimated at 68 percent. That is, over 68 percent of rice produced needs to be sold in order to generate positive net present values for the assistance.

Even if the opportunity cost of family labor is omitted from the analysis, the increase in the cost of inputs for paddy production ranges from US $191 to US $212 for upland and lowland, respectively. When the opportunity cost of family labor is considered, the total incremental cost increases to US $352.10/ha. This is slightly below the US$ 365.00 for the extreme poverty threshold, indicating that the majority of the Liberian farmers simply cannot afford such paddy cultivation technologies.

The very limited market access exacerbates the problem even further. The selected production technologies, although technically very efficient, are not financially feasible given the current situation in Liberia. Poor infrastructure, limited market access, and the high cost of improved inputs make it unlikely that farmers will continue to introduce new technologies without continued input subsidies and a readily accessible market. Otherwise, they have no incentives to look beyond their own consumption.

If farmers are able to sell the paddy, the positive Financial Net Present Value (FNPV) of paddy production indicates that there is a strong potential for scaling up project activities without providing the direct subsidy to a number of farmers. In fact, a significant number of farmers may voluntarily change their production pattern once they observe success of their neighbors. This will only happen, however, if access to stable markets is assured. In addition, the drastic increase in yields is likely to depress paddy prices, negatively affecting estimated financial returns.

How can rice interventions be modified to yield positive net present values? If rice farmers are able to sell a greater share of their product, over the 68% break-even point according to our analysis, the interventions would yield positive net present values. It is critical in order to achieve these high sales levels for USAID to analyze and understand why current sales levels are so low, and what can be done to improve them. There may be market demand in Monrovia that could be satisfied by rice producers up country in a profitable way, if conditions were to change. Possible factors to explore are:

- Increase and improve rural primary and secondary roads to increase market access and decrease cost.
- Spread lower cost grid electricity to locations where mills will operate.
- Invest in sufficient mills to handle increased supply.

The present analysis is a CBA of current interventions, not a comprehensive value chain analysis, so the above are merely suggestions for consideration. USAID may want to consider further analysis (CBA or another methodology) to better determine what additional complementary interventions might help raise sales, and, therefore, net present values of current rice value chain interventions. For example, just the introduction of improved seeds

(without introduction of fertilizers and other chemicals) is estimated to increase yields by 60-80% which may lead to a positive economic return, even without improving market access.

Incremental introduction of production technologies could provide opportunities to eliminate other value chain constraints while also increasing production and income of farmers over the longer term. This is because farmers are more likely to continue these practices after the current project ends (as they will not need to purchase chemicals that are currently being provided for free). This and other options could be explored to identify which practices could yield the greatest benefits.

Benefits of use of power tillers and preparation of abandoned lowlands. The FNPV for paddy farmers of having access to power tillers is US$ 294/ha.[3] This finding supports the strong demand for such services observed during the field trips. However, a more detailed analysis is required to see if investments in power tillers are financially feasible from a private investor's point of view when there is no subsidy from USAID.

The FNPV of abandoned land rehabilitation using FED-promoted practices is estimated at US$ 2,345/ha, indicating that farmers with the access to markets are likely to adopt FED practices and invest in the initial preparation of abandoned lands. However, the FNPV of abandoned land rehabilitation without support from the FED project is negative US$ 43.00/ha, which explains the ongoing reluctance of farmers to cultivate paddy on abandoned lands using traditional practices.

Benefits of development of rice mills. The nominal Internal Rate of Return[4] (IRR) of investments for the establishment of private mills is 30 percent. This important finding indicates that private entrepreneurs that are willing to accept a 30 percent rate of return on their investment may be interested in making such investments. The cost of building, including the storage facilities, represents 90 percent of the investment cost, with buildings constructed by the FED project based on international standards. Though the cost of buildings constructed using locally available materials is unknown, one can reasonably argue that the cost will be lower. This implies that the financial returns are likely to be higher than 30 percent, providing on even bigger incentive to private investors.

CBA of goat value chain interventions.[5] The FNPV of the interventions in the goat VC is only US$ 51 per farmer. The significant increase in the cost required to boost production drives these marginal financial returns. The main cost drivers include salaries of livestock attendants and increased feeding costs at the management sites. Therefore, the overall outcome of the cost benefit analysis shows a negative ENPV of USAID's investment of $3.57 million, as seen above in Table 1. However, as discussed, the FED project support for the goat value chain focused on the establishment of goat management sites which used materials in line with international standards and supported improved nutrition and veterinary care in the shelters. The costs for development of the shelters are assumed to be extremely high for a typical farmer. The following conclusions and recommendations could be made:

[3] Assuming a service fee of US$ 32.4/ha is all-in cost of the power tiller service.
[4] Internal Rate of Return (IRR) is the (break-even) interest rate at which investors can expect to receive positive returns.
[5] The FED project provided support to a greater number of rice farmers than to goat farmers. Less information on the goat value chain was provided. Therefore, the CBA analysis to some extent provides a greater focus on the rice value chain.

1. Based on the current observations and assumptions, the significant cost of USAID investments greatly outweighs the marginal positive financial gains of the goat farming activities under the current FED project.
2. There may be ways to reduce the costs of establishing the shelters using less expensive materials and farmer labor (if not already used). The reduction in these costs would improve the overall outcome, though this would like not be sufficient, independent of other measures, to result in an overall positive ENPV for USAID.
3. USAID might also want to evaluate the possibility of assisting farmers in producing secondary products such as milk and cheese. This may lead to a more positive economic outcome and a greater probability that farmers will invest in additional sites on their own after the project is gone. However, additional data would need to be collected on costs and benefits of these additional activities to evaluate their feasibility. We also understand that this would mean introducing the idea of eating milk and cheese which is currently not common in Liberia.

METHODOLOGY AND MODEL DESCRIPTION

The Integrated Investment Appraisal (IIA) methodology is used to evaluate both the financial and the socio-economic effectiveness of FED interventions and assess their impacts from various perspectives. IIA is the only single-model approach to quantify the impact of every project-related transaction, from the investor (USAID) to tax revenues, fiscal expenditure, consumers, and the environment. Major development banks, donor agencies, and public investment units use this methodology in project evaluations.

The analysis is applied to a 20-year evaluation period, 2012-32, and compares "with-project" and "without-project" scenarios on an incremental basis, with real financial and economic discount rates set at 12 percent. The model is constructed on an annual basis with a base year of 2015. The results are expressed in 2012 prices. The model first derives nominal cash flows, which are then discounted using corresponding price indexes to derive real cash-flow statements. The analysis uses World Bank inflation and exchange rate data.