Impact Evaluation of the AfDB-Supported Small-Scale Irrigation Projects in Malawi

Executive Summary

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IDEV conducts different types of evaluations to achieve its strategic objectives.
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Introduction

This summary report presents the findings, conclusions, lessons and recommendations of an impact evaluation by the African Development Bank (AfDB, or the Bank) support to two irrigation infrastructure development projects in Malawi: Smallholder Crop Production and Marketing Project (SCPMP) and Agriculture Infrastructure Services Project (AISP). The two projects, each worth UA 15 million, were completed in 2014 and 2017, respectively. This report is prepared based on detailed technical reports.

What was the purpose and objectives of the evaluation?

The purpose of the impact evaluation was to generate lessons and provide recommendations to maximize the impact of ongoing and future irrigation development interventions. The objectives were to: i) estimate the impact of AfDB supported irrigation development interventions on key intermediate outcomes – yield, diversification, and crop intensity, and final outcomes – poverty reduction, food security, health and child nutrition; ii) identify explanatory factors that affect the development outcomes of these projects; and iii) generate lessons and provide recommendations for improving the impact of ongoing and future irrigation development interventions. The overarching evaluation question was, “what is the difference made by the Bank-supported irrigation projects in Malawi?”

What was evaluated by IDEV?

The impact evaluation covered the two aforementioned projects, SCPMP and AISP. The projects aimed at increasing agricultural productivity, farm income and food security in the project areas. Both projects provided a package of irrigation infrastructure and other complementary interventions such as capacity building of farmers and staff, storage facilities and market centers, and supporting the establishment of farmer organizations. The evaluation estimated the average impact of all components of the projects on development outcomes, that is, the estimation results reflect mainly the combined impact of all components of the projects.

How was the evaluation conducted?

The impact evaluation applied mixed evaluation methods comprising of quantitative and qualitative approaches. In quantitative methods, IDEV carried out household surveys in 1,800 households in 36 communities. To carry out the analysis, Endogenous Switching Regression (ESR) and Inverted Probability Weight Regression Adjustment (IPWRA) models were used to control for unobserved heterogeneity and selection bias. In qualitative methods, 14 sessions of Key Informant Interviews (KII) and 10 Focus Group Discussion (FGD) sessions took place in purposively selected six irrigation schemes across Malawi.

The results of the estimation had three limitations: i) there was no baseline data to capture changes over a period of time; ii) potential selection bias; and iii) results show only the average effect of all components of the projects.
What is the impact of irrigation projects on farmers’ livelihoods?

The evaluation found positive results of the impact of irrigation projects on crop productivity. It estimated that the projects led to positive and statistically significant increases in maize yields (by 36%) and total crop productivity (by 72%).

It also found that participating farmers increased their revenues from crop production. The evaluation estimated that revenue from maize and vegetables production increased by 103% and 159%, respectively. These figures also show that the rate of increase in revenues from vegetable farming was more than the rate of increase in revenues from maize production in irrigation interventions. In addition, farmers indicated that vegetables fetched better selling prices than maize. The introduction of irrigation projects also increased total crop revenue by 120%.

While the irrigation projects had a positive impact on crop diversity, crop intensity did not change as expected. The findings show statistically significant positive effects of irrigation on crop diversification, i.e. number of crops grown. The estimated indicator for crop diversification, the Simpson Diversity Index, was 0.05 points higher for households in the treatment group. However, there was no evidence to show that the irrigation projects increased Cropping Intensity (Cl), i.e. the number of times a piece of land is cultivated. Interviews with key informants and FGDs revealed the reasons for the lack of effects on crop intensity. First, underutilization of irrigation facilities due to poor governance and land conflicts; second, lack of ownership by farmers, and thirdly, absence of markets for the agricultural produce.

Irrigation activities improved food security where effective local leadership and markets existed. The findings show that Average Treatment Effects (ATE) of participation in irrigation on the Household Food Insecurity Scale (HFIAS) was statistically significant as expected. The estimated result showed that food insecurity had marginally reduced by 0.79 (on the 27-point scale) for households who participated in irrigation projects compared to who did not. This decrease in food insecurity is a result of both increased availability of food through increased productivity and food purchased using the increased revenues. The impact on Household Dietary Diversity Scale (HDDS) was also positive and statistically significant implying that participation in irrigation activities increased the diversity of diets. Households that participated in irrigation projects had a dietary diversity score of 0.55 higher than households that did not participate in the projects. Evidence from the FGDs and KIs revealed that food security improved only for households covered by well-functioning irrigation schemes and good community leadership. Where the irrigation schemes are non-functional, the beneficiaries reported a deterioration in their food security status.

The evaluation found no evidence of impact of the irrigation projects on child nutrition. The results indicated that the treatment effects on child nutrition status was not statistically significant, which suggests that irrigation projects did not improve child nutrition. This may imply that other factors such as food safety and hygiene, knowledge of nutrition in food preparation, the health situation of children and other social factors are vital to improve child nutrition.

The results also indicated unexpected negative impact on health. The evaluation showed that participation in irrigation increased the incidence of illness in the households who participated in irrigation farming by 1%, which is statistically significant. This may be due to the conducive environment created by irrigation infrastructure for vector-borne diseases such as malaria and bilharzia. This fact was also supported by the projects’ completion reports.
The evaluation demonstrated that Bank-supported irrigation projects had the desired effects on poverty reduction. Statistical evidence showed that, with irrigation development projects, expenditure per capita increased by about 42% and income per capita by 34%. There was also a reduction in multidimensional poverty when households participated in irrigation development projects. These results showed that irrigation projects reduced both income poverty and multidimensional poverty of the farmers’ households. Additionally, in subjective poverty measures, the evaluation found that participation in irrigation projects had the desired effect on self-reported improvements in poverty and well-being.

How are the irrigation benefits distributed among farmers?

**Gender:** Male-headed households had better intermediate development outcomes than female-headed households. The estimated effects of irrigation on maize yield and revenue, vegetable revenue and total crop revenue were higher for male-headed households. For example, irrigation projects increased maize yield for male-headed households by 40% and for female-headed households by 22%. Similarly, the rate of increase in total crop revenues was higher for male-headed households: 127% increase compared to 118% for female-headed households. This may indicate the existence of a gender gap in the distribution of benefits obtained from irrigation development, which deserves further attention.

Although male-headed households earned more income per capita from irrigation, it is female-headed households who experienced higher welfare change. The estimates showed that the irrigation effects on per capita expenditure was higher for female-headed (38%) than for male-headed (16%) households. However, the effects on income per capita was greater for male-headed (32%) than for female-headed (26%) households. This may be an indication that female-headed households focused more on meeting basic needs and spent more to improve the welfare of the household.

**Land size**: Land-constrained households benefited the most in terms of maize yield from the irrigation activities. The evaluation estimated that the increase in maize yield was 55% for relatively smaller landholdings compared to 35% for relatively large ones. That is, the effects of irrigation on maize yields was smaller in relatively larger land holdings. However, the finding on poverty estimates showed that households with relatively larger land holdings had lower levels of multidimensional poverty.

Are development benefits from the projects sustainable?

The sustainability of development outcomes of the two Bank-supported irrigation projects was highly unlikely. Under these projects, many irrigation schemes and market storages were either partially used or not entirely functional. Interviews with beneficiaries revealed that market storage facilities were merely “shelters from rain” rather than serving as market infrastructure. Several reasons contributed to this: i) poor irrigation schemes’ design, ii) weak organizational capacity of farmers – including poor leadership, iii) lack of market for agricultural products, iv) conflicts among beneficiaries on land and water resource management (upstream and downstream), and iv) beneficiaries’ sense of dependency for farm inputs and irrigation schemes’ maintenance.

**Lessons**

1. Inadequate attention to the capacity and governance systems of local institutions undermines achievement of sustainable outcomes from irrigation development. The evaluation found that weak organizational capacity and leadership problems hindered proper functioning of irrigation schemes. The Water User Associations (WUAs) or Water User Groups (WUGs) are the direct beneficiaries of
the irrigation schemes and are entrusted with the responsibility to maintain and operate them. Due to the weak capacity and lack of required legal status, these local organizations are unable to enforce rules for operating the schemes requisite to ensure sustained benefits. In addition, these organizations have the potential to influence the mindset of farmers towards taking up commercial farming, which is a shift from subsistence farming to farming as business. Thus, Bank support to enhance the capacity and governance systems of these local institutions could contribute to the effective use of the existing irrigation infrastructures and thereby yield sustainable development benefits.

2. **Building market infrastructure is necessary but not a sufficient condition to create markets for farmers.** The Bank supported construction of irrigation and other infrastructures related to marketing, such as market centers and storage facilities. However, the evaluation found that irrigation did not increase crop intensity, i.e., the frequency of use of a piece of land in a given year. Moreover, most of the market infrastructures remained unused. This is because although the irrigation schemes increased agricultural yield, it was difficult for farmers to find markets for their produce. The farmers lost interest in production as they failed to find a market, leading them to cultivate for subsistence only. It is essential that these infrastructures are adequately integrated into the country’s marketing system so that the improved yield leads to sustainable incomes and livelihoods.

3. **Technical quality of the construction designs of irrigation schemes should be ensured to enhance the effectiveness of the projects’ outcomes.** The evaluation found that faulty construction designs of irrigation schemes led to the underutilization of such schemes which in turn led to suboptimal agricultural production. For example, in the Mlambe scheme, which remains very active, the irrigation water can reach only part of the irrigable land due to design issues. Other schemes faced similar issues, which reduced their effectiveness e.g. pipe laying at the water intake was on a higher position, which made pumping difficult.

4. **Irrigated farming and resultant improved food security and food diversity may not necessarily lead to improvement in child nutrition.** The evaluation found that child nutrition did not improve in the project areas despite improvement in food security and food diversity. In order to enhance nutritional status of children, the irrigation project designs would need to provide targeted complementary interventions. Further studies are required to identify such interventions and incorporate them into project design.

5. **Empowering women to participate in irrigated farming can improve ultimate development outcomes, i.e., poverty reduction and household welfare.** The evaluation found that female-headed households spent more to satisfy the household’s daily needs and the effect of irrigation on their per capita expenditure was statistically significant and higher compared to the male-headed households. Interestingly, the level of poverty reduction was found to be statistically significant only for female-headed households. However, the findings also show that the total income earned was higher for male-headed households compared to female-headed households. It is essential to further explore the underlying causes of this gender gap in the participation in irrigation farming and address them in project designs to further empower women farmers and maximize their benefit. This includes not only the participation of women in training activities but also their access to irrigation land and finance for the purchase of inputs, which requires policy dialogue with the government and other stakeholders.
Recommendations

Recommendation 1. Support capacity and governance systems of local institutions. The Bank should support institutional capacity building, including the governance systems of WUAs or WUGs, who are the direct beneficiaries of the irrigation schemes and entrusted with the responsibility of maintaining and operating the irrigation schemes. Capacity building should include: i) training for members of the associations or groups in financial management; ii) procedures for getting legal status; iii) commercial farming; iv) scheme management; and v) agronomic practices. In this approach, the Bank should first ensure the use of existing infrastructures before embarking on similar interventions in Malawi.

Recommendation 2. Enhance agricultural market access. The Bank should support agricultural market access by going beyond building marketing infrastructures to linking them to the wider agricultural market for farm produce. This will require: i) the coordination of actors along value chains; ii) the establishment of a framework to support producers in meeting quality standards; iii) marketing information; and iv) support in establishing fair conditions for contract farming. To benefit from a greater synergy, the Bank should partner with the government and other key actors to support market creation thereby ensuring sustainable income for farmers.

Recommendation 3. Engage in knowledge work and policy dialogue. The Bank should engage quickly in policy dialogue with governments and other stakeholders on sector policy issues including: i) land tenure; ii) knowledge and support services systems in irrigated farming; and iii) gender equality. To engage effectively in policy dialogue, the Bank should invest in analytical and knowledge work to better understand the complexities of the sector policy issues. Land tenure systems would require reforms to embrace poor farmers with relatively small landholdings. Better understanding of the power and social relations in the community would help bridge the existing gender gap. The Bank’s dialogue with the government should urgently focus on fixing the design and operational problems of the existing irrigation schemes and provision of support services to maximize and sustain the benefits of irrigated agriculture.
About this Evaluation

This report summarizes the findings, lessons and recommendations from an impact evaluation of the African Development Bank’s (AfDB) support to the Smallholder Crop Production and Marketing Project (SCPMP) and the Agriculture Infrastructure Services Project (AISP) in Malawi. Worth UA 15 million each and completed in 2014 and 2017 respectively, both projects covered irrigation infrastructure and other complementary interventions.

The evaluation estimated that the projects led to positive and statistically significant increases in maize yields and total crop productivity, including substantial revenue increase of participating farmers. Statistical evidence showed that with irrigation development projects, expenditure per capita increased by about 42% and income per capita by 34%, indicating that both income poverty and multidimensional poverty of the farmers’ households were reduced. The sustainability of the development outcomes of the two interventions was however highly unlikely, due to shortcomings including weak organizational capacity of farmers and poor irrigation schemes design.

Five main lessons were identified, which could help improve ongoing and future irrigation development interventions. Three recommendations were made, including: i) support capacity and governance systems of local institutions; ii) enhance agricultural market access; and iii) engage in knowledge work and policy dialogue.