IMPLEMENTATION OF TISSUE CULTURE BANANA PROJECTS IN KENYA: THE NEXUS BETWEEN TECHNOLOGY AND SOCIO-ECONOMIC GAINS

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The purpose of the study was to evaluate the socio-economic gains from Tissue Culture Banana technology among smallholder farming households in Kisii County, Kenya.
Tissue Culture Banana (TCB) technology refers to the production of plants from very small plant parts, tissues or cells grown aseptically under laboratory conditions where the environment and nutrition are rigidly controlled (ISAAA, 2003).

Kisii highlands, by 2000, were leading producing national farmer average of 12t/ha against a potential of 60t/ha (Kwach, Makworo, Nasambu, & Onyango, 2000). The low average production is due to adoption of poor yielding cultivars, infestation of diseases and pests, poor farming methods and lack of clean planting materials.

To enhance uptake of TCB technology among the resource poor smallholder farmers, a credit scheme using a group based lending approach was adopted under the auspices of K–Rep Development Agency, an established micro-finance institution in Kenya.
LITERATURE REVIEW

- Technology is vital for production and its demerits compared to benefits are insignificant (Alston et al., 1995).
- Its adoption has been part of the agenda in international forums with studies showing significant influences of technology on the socio-economic welfare of adopters (Andrea et al., 2009; FAO, 2009; Qaim, 1999).
Gaps still exist in quantifying the importance of the fruit in Kenya and controversies about the influence of TCBs in smallholder farming persist with most of the existing studies done before the completion of the 10–year life cycle of bananas envisaged in tropical regions.

The question as to whether the technology has had socio-economic gains on participating households has remained unresolved thus this survey contributes to previous ex-ante studies by providing comprehensive survey data.
OBJECTIVES

1. To estimate the economic contribution of Tissue Culture Banana technology to smallholder farming households in Kisii County

2. To assess the social contribution of Tissue Culture Banana technology to smallholder farming households in Kisii County

3. To establish the combined socio-economic influence of Tissue Culture Banana technology on smallholder farming households in Kisii County
The districts that had benefited from the TCB technology were purposively selected. The sample size of 103 respondents was selected from a target population of 628 banana farmers by use of systematic random sampling technique, and interviewed using a questionnaire.

Statistical data collected was on technology adoption and agronomic issues.

Data was analyzed using Economic Surplus Model. Yamane (1967) formula \( n = \frac{N}{1 + N \cdot (e^2)} \) was used to calculate sample size for this study based on a 91% confidence level and precision \( (P) = 0.09 \) assumption.
Figure 1: Model of Technology progress in Kenya banana market
Technology Assessment

According to FAO (2009), socio-economic contribution of technologies can be assessed through eight approaches whose discussion is beyond the scope of this article.

This study adopted Economic Surplus Model approach that is able to ascertain distribution benefits between producers in the banana value chain with an ex-post period since the technology was already implemented in the field by farmers at varying levels of adoption.

In this approach, data needed to calculate socio-economic gain falls into seven categories.

This include household socio-economic characteristics, market information on prices and quantities, costs of the technology adopted, economic parameters on market response to change (elasticity of supply and demand, technology shift factor, supply share for producers and per unit cost reduction), technology adoption and agronomic evidence, total technology surplus, and sensitivity analysis of the technology.
RESULTS

- TCB technology had a positive social and economic influence in Kisii County.
- TCB technology improved welfare of residents & led to increased yields, rise in income and diversity in consumer satisfaction due to value addition.
- It led to an increase by 87% in quantity of bananas demanded for the market as compared to the conventional bananas.
Yields rose by 79% due to clean planting materials.

Survey established a high price elasticity of:

- supply and demand at 1.67 & 1.77 indicating the sensitivity of the banana fruit to price changes.

Enterprise was a worthwhile investment with 84% rise in income from banana earnings & Internal Rate of Return (IRR) of 34% on capital invested.
The study identified diseases, lack of farmer driven micro credit solutions, low transition rates from subsistence to commercial farming, poor transport network, and lack of sustainability as constraints to successful diffusion of the technology.

The researcher recommends that stakeholders should develop and implement appropriate technologies considering the status of adopters as resource constrained farmers to ensure cost effectiveness in adopting the project.
GAPS FOR FUTURE RESEARCH

TCB technology has had a wide-ranging spillover effects arising from cross border trade in bananas and invention of TCB hardening nurseries. The estimated influence in this study does not include these spillovers due to trade between the regions.

Comparative studies could be undertaken for knowledge sharing on lessons learned from regional projects (Cross-border TCB technology Uganda, Tanzania and Rwanda).
THANK YOU

Q&A