

**IMPACT OF ICT PROJECTS ON PRICE DISPARITIES AND
PRODUCER WELFARE IN AGRICULTURAL MARKETS
A CASE OF SELECTED COUNTRIES IN EAST AFRICA**

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Introduction and motivation

- The role of communication in marketing can best be explained by the notion that marketing involves exploring the customer needs so as to supply the goods at a profit
- The use of mobile ICT (information and communication technology) in agriculture provides a more efficient and cost-effective method for sharing and exchanging knowledge more widely. Farmers are benefiting as they can access key information such as pest and disease reports, weather conditions and market prices.
- Enhancing communication between farmers, extension workers, researchers and policy makers is essential to the improvement of agricultural efficiency

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- Although several countries including many African economies have embarked on programs to incorporate ICT in agriculture to improve information sharing, the most common information transmitted is price information in various markets to enhance the farmers' bargaining power. However this addresses only one side of the supply chain.
- ICTs should be viewed also from the consumer's and the trader's perspective in which case linking the supply side and the demand side. Therefore, apart from providing price information to farmers, ICT is useful providing market demand information and market intelligence over time which will be useful in the policy making arena.

The ICT Projects

- The Rwanda government through the Ministry of Agriculture and Animal Resources (MINAGRI) and the Rwanda Information Technology Authority (RITA), has launched an IT platform to provide market information in order to ensure that the country's smallholder farmers get updated information about market prices for their produce.
- The e-Soko platform, Agricultural Market Pricing Information System (AMIS), is part of the e-Rwanda initiative - a World Bank-funded ICT project being implemented by RITA - and is intended to mitigate against current information gap for farmers with the use of ICTs. The TeleCentres or BDCs are implemented in all the 30 districts of Rwanda and offer various services including farmers' training on new crop production methods and high-yielding varieties, basic ICT training as well as business plan writing at a fee for the community members (World Bank, 2011).

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- A similar portal exists in Kenya, the Pasha Centre initiative (previously called Digital Villages project) which is also funded by the World Bank and implemented by the Kenya ICT Board (Kenya) it focuses on the 47 counties of Kenya. The Pasha Centres, most of which are in the rural areas, are meant to help deliver the government's objective of ensuring that Kenyans have access to the internet, use it to access government e-services or e-government and improve their lives.
- Given that both Rwanda and Kenya are heavily dependent on agriculture especially for the improved livelihood of the rural communities and the potential of ICTs in improving agricultural marketing, this study seeks to evaluate the impact of ICT projects on price disparities and producer welfare in agricultural markets. It will be implemented in two East African countries where two ICT portals linked to agriculture exist namely E-soko in Rwanda and Pasha in Kenya.

Aims and Objectives of the Study

- The main aim of this study is to evaluate the impact of ICT projects on price disparities and producer welfare. Specifically, the study seeks
 1. To assess the kind of information transmitted through the ICT portals
 2. To examine the accessibility of the said information to farmers and traders
 3. To assess the level of usage of the portals among farmers and traders
 4. To establish the usefulness of the information provided in the portals for decision making
 5. To evaluate the impact of such information of market prices and agricultural sales volumes
 6. To examine the welfare effects of these ICT projects on farmers

Methodology

- Given that the projects were not randomly assigned at the start, it is not feasible to use an experimental design. This study proposes to use two methodologies a quasi-experimental approach and a non-experimental approach and compare the results. The study will be concerned with two types of people, the farmer who is the producer and the trader who is the consumer.
- Both farmers and traders will be assigned to an intervention and comparison group non-randomly using propensity score matching technique (PSM). The Matching will be conducted using results from a conditional probit regression of farmers and traders who have adopted the technologies.

Methodology

- In this study, the researchers anticipate that there is no baseline information collected before the intervention since the projects were not designed as randomized experiments.
- In this case a pre-test /post-test approach which would have been preferred may not be feasible. Therefore the researches propose to do a post-test only quasi-experimental design.
- The non-experimental technique will endeavour to compare respondents before and after the program using a Difference-in-Difference approach.. The key consideration in this study will therefore be to ensure proper matching of participants and non-participants with similar characteristics and accounting for any relevant differences in order to isolate effects of the intervention.

Sampling Technique and External Validity

- For the farmer groups, the study will work in two provinces in each of the countries: Central and Rift valley province in Kenya which are chosen purposely given that they constitute the largest farming communities in Kenya In Rwanda, the Southern and Eastern provinces will be chosen for the same reason.
- The external validity will be assured by a large, random sample of farmers and traders drawn from selected regions.
- Multi-stage cluster sampling technique will be used to choose the respondents in order to ensure external validity. Clustering will be done at the village level and then respondents will be picked randomly from each village. Some of the villages will be assigned to the treatment and others to the control groups. To encourage participation, every participating farmer will be given a fertilizer or seed voucher.

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- For the trader groups, the study will also work in two provinces one the city and the other one a rural market.
- In Kenya Nairobi county will be purposely chosen and central province will be chosen as the rural province. In Rwanda, Kigali region will be chosen as well as the southern province.
- Multi-stage cluster sampling will be used where individual markets will be used as the clusters and traders randomly chosen from each cluster.
- The respondents will be assigned to the treatment and control groups. To encourage participation every participating trader will receive credit voucher.

Data collection

- Data will be collected using questionnaires. One questionnaire designed to collect data from individual respondents on required variables will be designed to accommodate both control and treatment group. Qualitative information on the general views of the people per sampled county/region will be collected through focus group discussions.
- The selected groups will each constitute a probability sample of the universal. It is expected that the refusal rate will be low given that the issues under study are not too sensitive. The expected low refusal rate shall be one of the factors contributing towards survey's cost effectiveness. The research team will also be keen to ensure that the survey tools used are neutrally worded to avoid influencing responses and thus enhancing external validity. Given this, it will be possible to generalize the cause and effects outcomes of the study.

Sample Size and Power

- Following Aker (2010) who found that the price disparities in Niger which is an African State with almost a similar mobile phone coverage as the countries targeted in this study, it is assumed that the price disparity changes will be between 10% and 16%.
- For convenience purposes an average change is assumed to be 13% and is used to calculate the probable sample size for this study using STATA. Therefore with an expected change of 13% and a 0.05 precision level and 90% power, the sample size for each country will be 224 in total divided into $n_1 = 112$ which is the sample in the treatment group and $n_2 = 112$ the sample in the control group.
- The standard deviation is assumed to be 0.3 to reflect the average level of price inflation. It is assumed that price disparities among farmers are greater than that among traders although the price disparities are similar, therefore the standard deviation used to calculate the traders sample size is 0.2 which gives a sample size of 100 in total divided into $n_1 = 50$ which is the sample in the treatment group and $n_2 = 50$ the sample in the control group

Theory of Change

Need	Logical Framework				
	Inputs	Output	Intermediate Result	Strategic Objective	Goal
<p>To improve the efficiency of agricultural markets and farmers welfare by providing price information to farmers</p>	<p>Provide Price and demand Information through an ICT portal and mobile phones</p>	<p>Farmers get price information for different crops in various markets Farmers get demand information from traders</p>	<p>Farmers use that information to bargain for better prices with middlemen. Farmers choose where to sell their produce based on demand</p>	<p>Farmers have better bargaining power and information on demand making them make better marketing decisions The searching costs are reduced</p>	<p>Farmers welfare is enhanced by getting better returns for their produce and a wider market</p>

Empirical Model

- As mentioned earlier, the study proposes to use a quasi-experimental research design in this case regression discontinuity design (RDD) and two non-experimental designs namely difference-in-Difference (DD) and propensity score matching
- The model is specified as

$$P_{ist-1} - P_{ist} = \alpha_{ist} + \beta_1 phone_{ist} + \beta_2 portal_{ist} + \gamma_{is} Z_{ist} + \vartheta_{is} + \lambda_{is} + \varepsilon_{ist}$$

$P_{ist-1} - P_{ist}$ is the price disparity of commodity i in country s in time t

$phone_{ist}$ is a binary variable for whether the farmer received regular price updates on the phone

$portal_{ist}$ is a binary variable for whether the farmer checked price updates on the portal

Z_{ist} is a vector of individual-level characteristics

λ_{is} is a dummy variable for location

ϑ_{is} is a variable for country fixed effects

ε_{ist} is the stochastic error term

β_j is the treatment effect for the intervention

Deliverables

- Implementation manual
- Questionnaire
- Data
- Final Reports:
 - Impact of ICT Projects on Agricultural Marketing in East African Countries
 - Mobile phones and Price disparities in Eastern African Countries
 - ICT projects and producer welfare in Agricultural markets

Policy Relevance

- This evaluation will assess the implications of impact of ICT on agricultural marketing and development in Eastern Africa.
- This will inform the government whether their objective of revitalizing agriculture so as to create employment, reduce poverty and grow the economy has been realized.
- The results of the evaluation will inform employment and poverty reduction policies in Kenya and Rwanda, particularly as they relate to the agricultural sector.
- If the evaluation arrives at the conclusion that the key objectives have been achieved, then the government will know the programs are successful and can be continued, enhanced or replicated. If the objectives have not been realized, then the government will be justified to review the implementation strategy or the programs' operations.
- Policy recommendations based on findings of the evaluation will be discussed with various sectors of government both at national and sub-national levels.

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THANK YOU VERY MUCH