Contribution of Rural Infrastructure Development to Small Holder Farmers Market Access: A Case Study of Purchase for Progress Project in Bugesera District

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Abstract: *Domestic food markets are generally underdeveloped, informal and fragmented. Marketing chains for locally produced food are often long, with the commodity changing hands several times as it moves from the farm gate to the final consumer. As a result, the participation of the smallholder farmers in the formal market is limited. This project focused on examining the contribution of rural infrastructure development to smallholder farmer's market access case study of P4P project in Bugesera district Rwanda. The study adopted descriptive survey design and quantitative design. The population of the study was 574 farmers of maize and beans in three cooperatives in Bugesera district under P4P. A sample of 323 farmers was drawn from the population using Slovin's formula however only 279 returned the questionnaires representing return rate of 86.37%. Data was collected using questionnaires which was solely primary data. The correlation findings reported Pearson correlation coefficient of .85 with 0.001 value of significance indicating a high positive significant association between rural infrastructure development and smallholder farmers market access. Regression analysis further reported beta coefficient of 34% with 0.000 significance value indicating a strong positive significant contribution of rural infrastructure development on small holder farmers market access. The study recommends rural roads be rehabilitated and assistance in transportation of commodities to the market be provided to farmers and in addition farmers be assisted to access storage facilities for their produce.*

Keywords: Purchase for progress, market access, rural infrastructure, small holder farmers

1. Introduction

The pilot Purchase for Progress (P4P) initiative seeks to ensure that food assistance is part of a long-term solution to the food security and hunger challenges. By integrating its purchasing power with the technical contributions of other partners to connect small scale/low-income farmers to markets, WFP envisions that within five years (or five complete agricultural cycles), participating smallholders' low-income farmers will have realized higher annual income through an increased capability to connect to and benefit from markets as a direct result of their participation in the project. WFP intends to use the P4P pilot initiative to identify high impact best practices in pro-smallholder local food procurement, and in agricultural market development, and mainstream them in policies and programming practices of both the Organization and the Government. (Mashayo, E., 2010).

The P4P Country Implementation Plan for Rwanda is underpinned by three core principles. To ensure that appropriate food commodities are available to beneficiaries in a timely and cost-efficient manner; to experiment with innovative procurement and programming approaches and to strengthen and promote agricultural markets and agricultural development in ways that maximize the benefits to smallholder farmers. (Mashayo, E., 2010).

The Government of Rwanda acknowledges the P4P initiative as an important addition to the agricultural sector as it is wholly aligned with the National Agricultural Programme, the Comprehensive African Agricultural Development Programme and the Agricultural Sector Investment Plan. The P4P initiative in Rwanda is seen as timely, when Government is making efforts to promote cooperatives as marketing tools for small-scale/low income farmers and promote sustainable growth in agriculture. (Mashayo, E., 2010).

Market participation depends on access, and access depends partly on transaction costs, including those for transportation, storage, information gathering, trade finance and contract enforcement. High transaction costs put serious constraints on poor people, particularly by limiting production and production choices. Improving access to markets and reducing transaction costs through the development of infrastructure and institutions should be crucial elements of any food security strategy. (Valentinov, V., 2007.).

From the various literature on determinants of market access, its widely reported that proper infrastructure is a key recipe for market access not only for farmers but for businesses too. These may include good roads, electricity network and ICT infrastructure. In addition, a proper modern storage facility for farm produce is cited by various

development organizations as key strategy in supporting farmers market access (CFS, 2015).

Statement of the problem

Domestic food markets are generally underdeveloped, informal and fragmented. Marketing chains for locally produced food are often long, with the commodity changing hands several times as it moves from the farm gate to the final consumer. As a result, the participation of the smallholder farmers in the formal market is limited. Typically, a farmer sells produce to rural collectors, in the field (farm gate), along the roads or directly to petty traders in local weekly rural markets. The produce is then bulked and sold on to district/provincial traders for onward sale to urban wholesalers (Mashayo, E., 2010).

In Rwanda, significant barriers keep smallholder farmers from accessing formal markets; most smallholder farmers can find someone to buy their surpluses, but the transactions often net them little income. They suffer commercial disadvantages such as small land holdings and low production volumes combined with long distances from markets and poor infrastructure, which increase transaction costs and reduce selling options and prices (A Primer, 2012).

Objective of the study

To examine the contribution of rural infrastructure development to smallholder farmers' market access case of P4P project in Bugesera district Rwanda.

2. Review of Literature

Theoretical review

In many countries, FOs provided a viable entry point to support SHF, based on the assumption that FOs would establish relationships with quality-conscious buyers and evolve into a preferred marketing channel for SHF. By providing trainings, quality-enhancing technologies, and the demand platform of WFP, P4P developed the capacity of FOs to aggregate quality commodities, to negotiate, and to organize collective sales (WFP, 2011). Access to more lucrative, formal markets for staple commodity was expected to incentivize members of P4P FOs to invest in the production of high quality staples.

A Russian economist (Chayanov, 1923) came up with models that describe the nature of smallholder farmers in developing countries. These models looked at agricultural production in rural households and mainly centered on consumption and production. These models have been used extensively to explain farm household production behavior in the developing countries" rural economies (Taylor and Adelman, 2003). The models are divided into two classes which are the unitary and collective (or bargaining) household models (Hart, 1992). The unitary model represents a household as a single unit or an individual which makes its own decision making in production and consumption. Critiques of the unitary models of the household initially focus on the failure of the models to take into account intra-household inequality and conflict. The problem essentially involves on how to aggregate preferences made by these households and what decisions to

take in order to improve agricultural productivity in smallholder households.

The overall goal of Purchase for Progress (P4P) project in Rwanda is to strengthen the marketing capacity of farmers' cooperatives, so as to allow smallholder farmers to engage meaningfully with national and regional markets.
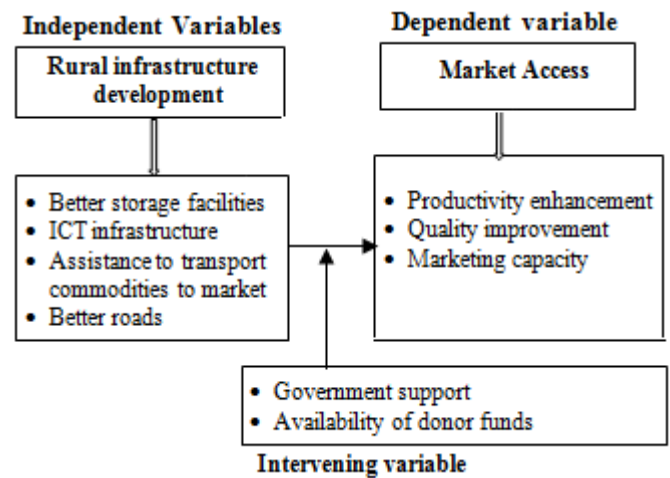

Figure 2.1: Conceptual Framework
Source: Researcher, 2020

Empirical review

Inadequate infrastructure limits smallholders' access to profitable markets. Examples include limited access to warehouses or market collection points or poor transportation infrastructure. P4P is working with partners to establish or renovate and equip warehouses and market collection points and to improve transportation infrastructure. This support includes providing equipment to smallholder farmers for the weighing, bagging, quality testing and storage of commodities. P4P and partners also train FOs in post-harvest handling practices and commodity quality standards and practices. (A Primer, 2012).

A study was conducted in Korea by Nyein Nyein et al (2018) to determine the critical factors that affect market access among small holder farmers. The study adopted descriptive design and data was collected from household farmers. The findings revealed that access to roads and distance from the market was very significant. This is an indication that infrastructure development is very important for easy access of market by farmers to sell their produce.

In another study in Kenya by Omiti J et al (2009), it was revealed that farmers near urban areas are able to access markets easily than their rural counterparts. The study was conducted to determine the factors influencing intensity of market access among farmers. The distance from the point of production to the point of sale heavily determines farmers easy access to markets. Market prices of output was also reported to influence market participation.

John and Dawit (2007) in Ethiopia carried a study to determine the factors for commercialization of small holder farmers' food crops. The study was conducted on maize and teff cereal products which are thein ones in Ethiopia. The study found that net sellers of these crops are better off than net buyers. The study cited poor roads and inadequate farm

equipment as resulting to this. Due to poor roads farmers are not able to reach the market on time neither are they able to supply enough to the market and this leads to limited market access by farmers

In a working paper number 28 by Emmanuelle Le Courtois et al (2011) an analysis was done on enhancing farmers access to markets for certified products. This was done in support of FAO. The study focused on infrastructure development as one of the key factors to look into for enhanced farmers market access. The paper identified the need to expand storage units for farmers produce in order to maintain the quality enabling the farmers to access the formal markets. Technology development is also needed to enhance new production processes and systems which improves production output and hence higher market supply with quality products.

U.I Ahmed (2016) conducted a study in Pakistan to determine access to output market by small farmers. The study looked at determinants of market access and their impact on farmers' income. The study adopted logistic regression model and data was collected from small farmers in various districts within Punjab Province. The findings indicated that cost of transportation, access to information and distance from the market determines farmers market access. The study enhanced transport infrastructure, market infrastructure and information to be boosted.

3. Research Methodology

Research Design
According to John et al. (2007) research design is a blueprint for fulfilling research objectives and answering research questions. In this study, the researcher used a descriptive survey design. Surveys are appropriate where the study covers a wider study area and large population. According to Larry, B. (2011), research designs are plans that guide decisions about when and how often to collect data, and what data to gather, from whom and how to collect data, and to analyze data. This research in addition used quantitative research design because it provides statistical description, relationships and explanations about numerical data.

Population and sample
The target population of this study included smallholder farmers of Maize and beans in Bugesera district who are under the P4P project. The study identified 3 cooperatives in Bugesera district which are working under the P4P project namely IZMGM, UMUCYO and INDAKUKI. The total number of small holder farmers in the 3 cooperatives is 574 which formed the population size.

From the population, the study employed Slovin's formula to compute the sample size per cooperative which was arrived at 323.

$$n = \frac{N}{1 + Ne^2}$$

where N is population, n sample size and e is the error margin.

Data collection methods
The study utilized primary data to achieve the objective. The data was collected using questionnaires which were distributed to the small holder farmers based on the sample size of three hundred and twenty three.

The study conducted reliability and validity tests on the questionnaire before actual use in data collection to increase accuracy and relevance of the instrument. Pilot testing was done to improve reliability of the instrument while experts' opinion was utilized to ascertain validity of the instrument.

Data analysis
Data cleaning was first done to arrange the data in a good way and ensure no errors and omissions on the data collected. The organized data was then entered on SPSS version 21 for processing. The analysis was guided by the study objective. Descriptive and inferential analysis was adopted to achieve the study objective.

Descriptive analysis involved seeking respondents' opinion on the various aspects of rural infrastructure development and their contribution to small holder farmers market access. Inferential analysis involved conducting correlation and regression analysis and get the output. computations were in form of percentages and frequencies. The study utilized tables and graphs in presentation of findings.

4. Findings and Discussion

Descriptive findings
The researcher sought opinion of respondents on various aspects of rural infrastructure development and how it contributes to market access. From the findings, it's evident that respondents widely accepted that infrastructure development in terms of good storage facilities for the produce and any assistance in transportation of commodities to the market is very key to market access by farmers. At least 95% of respondents indeed agreed with all the statements. Therefore, rural infrastructure development contributes greatly to market access

Table 1: rural Infrastructure development and Market Access

Statement	Strongly agree	agree	Neutral	disagree	Strongly disagree
1. Availability of crop storage facilities contributes to Market access	30%	68%	2%		
2. Use of storage facilities contributes to Market access	75%	20%	5%		
3. Assistance on transportation of commodities contributes to Market access.	70%	30%			
4. Type of storage facility contributes to Market access	65%	35%			

Source: Researcher, 2020

Inferential findings

Correlation Analysis

The degree of association between rural infrastructure development and Market access was determined by computing Pearson correlation coefficient which was found to be 0.85 more than 0.5 and the significance value was found to be 0.001 lower than 0.05 (table 2). Therefore, there is strong positive significant association between rural infrastructure development and market access.

Table 2: Correlation between rural infrastructure development and Market Access

		Rural infrastructure development	Market Access
Rural infrastructure development	Pearsons Correlation	1	.850[**]
	Sig. (2-tailed)		0.001
	N	279	279
Market Access	Pearsons Correlation	.850[**]	1
	Sig. (2-tailed)	0.001	
	N	279	279
Source: researcher, 2020			

Regression analysis

The ANOVA table 3 shows the calculated F statistic is 90.501 with a significance value of 0.000. The calculated F statistic is bigger an indication that the regression model used in this study is appropriate also supported by the significance value of 0.000 which is far much lower than 0.05.

The beta coefficients for rural infrastructure development is 0.34 with a significance value of 0.000. (table 4). This shows that rural infrastructure development has a positive significant contribution to market access among small holder farmers.

Table 3: ANOVA

	Model	Sum of Squares	Df	F	Sig.
1	Regression	43.565	4	90.501	.000[a]
	Residual	21.453	95		
	Total	64.918	99		
b. Dependent Variable: Market Access					

Table 4: Model Coefficients

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	0.312	0.117	0.118	0.00
	rural infrastructure development	0.34	0.057	4.676	0.00
a. Dependent Variable: Market Access					

5. Conclusion and Recommendations

5.1 Conclusion

From the findings, the study concludes that rural infrastructure development has a high positive significant contribution to small holder farmers' market access.

5.2 Recommendations

Infrastructure development needs to be given more effort in terms of enough storage facilities be put in place to enable farmers preserve their produce after harvest for quality maintenance and to allow enough time to look for better prices in the market to sell the produce. Additionally, rural roads should be rehabilitated and properly maintained to ensure faster and safe transportation of commodities to the market. Proper roads will reduce damage of farm produce transported to the market and this guarantees quality hence able to fetch better prices in the market.

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