The Impact of Quality Upgrading and Market Access on Farmers' Productivity and Profits in Uganda

Researchers:

Tessa Bold

Selene Ghisolfi

Frances Nsonzi

Jakob Svensson

Sector(s): Agriculture

Location: Kakumiro and Kibaale Districts, Western Uganda

Sample: 600 Small-scale Maize Farmers

AEA RCT registration number: AEARCTR-0002812

Research Papers: Market Access and Quality Upgrading: Evidence from Four Field Experiments

Partner organization(s): Swedish Research Council, Riksbankens Jubileumsfond

Small-scale farmers in low and middle-income countries often face low crop yields and low-quality output, limiting their ability to earn high prices and generate profits. In western Uganda, researchers conducted a series of randomized evaluations that assessed the impact of introducing a combination of post-harvest services, training on agricultural best practices, and access to a market for high-quality maize on farmers' productivity and profits. The results showed that giving farmers access to a market where high-quality crops were valued and commanded a premium led to an increase in both their productivity and overall profit from farming, highlighting the crucial role that markets can play in limiting growth.

Policy issue

Small-scale farmers in low- and middle-income countries often produce and sell low-quality crops, which lowers the price they receive for their product at market. Low-quality crops are a contributing factor to the low profitability of small-scale farming, and improving the quality of crops may be crucial to increasing farmers' profits and productivity. Despite this, many farmers do not invest in technologies and practices with the potential to improve the quality of their crops. This suggests that either the relationship between better quality and higher earnings is not as strong as thought, or there are barriers, potentially on both the buyer and seller side, that prevent farmers from breaking out of the cycle of low-quality, low-productivity farming.

For example, evidence suggests that buyers (demand side) may be unable to ascertain the quality of output in the market. Therefore, regardless of whether farmers invest in upgrading quality, buyers are unwilling to pay a higher price for higher-quality outputs. The lack of a market that values high quality output may disincentivize farmers from investing time and money in quality upgrading. While there is research that has examined the impact of incentives on quality upgrading, less is known about constraints related to the demand for raw, agricultural goods. Can providing information and access to a secure buyer affect small-scale farmers' decision to invest in upgrading quality and their productivity and profits?

Context of the evaluation

In Uganda, maize is the main crop produced, accounting for around 2 percent of Uganda's total exports with about 75 percent of its production coming from small-scale farmers. However, many farmers do not use modern agricultural inputs, such as hybrid seeds and fertilizer, which often leads to low yields. There is not a standard price for maize at market; instead, commercial buyers or local traders inspect the maize and agree on the quantity and price with the farmer at the point of sale. On average, commercial buyers pay 8 percent more for maize compared to local traders, who function as middlemen between the end buyer and farmers.

Most small-scale farmers typically cultivate less than 2 hectares of land, producing on average about 1.4 metric tons per hectare at a relatively low quality. The quality of maize in East Africa is determined using the East African Grading Standard, which separates maize into three categories based on moisture and impurities. High-quality maize is defined as having sufficiently large, dry kernels of the proper color, free from any impurities, and without any faulty grain. Prior to the start of the intervention, the researchers measured the quality of maize sold in the market. About 25 percent of the weight of a bag of maize sold by farmers was defective, and 70 percent of the bags were classified as “reject maize.

Farmer harvesting maize in Uganda.

Photo credit: James Karuga, Shutterstock.com

Details of the intervention

Researchers conducted a series of three randomized evaluations that assessed the impact of introducing a post-harvest service package, a combination of training on agricultural best practices, and access to a market for high-quality maize on farmers’ productivity and profits. The researchers randomly selected sixty villages from Kakumiro and Kibaale districts to participate in the returns to quality, market access plus extension services intervention, and extension services only intervention. From each village,

ten small-scale farmer households were randomly selected to take part in the study, yielding a total of 600 farmers. The evaluations were as follows:

Evaluation One: Returns to Quality

Researchers randomly assigned 99 enrolled farmers to either a comparison group or to receive a free service package that aided them in harvest and postharvest activities, such as drying, winnowing, and sorting. Trained agricultural workers delivered the services to farmers, utilizing portable agricultural equipment with supervision from the research team and lasted for an entire harvest season.

As the farmers prepared to sell their maize, trained enumerators visited farmers in both groups and visually inspected the maize quality and moisture content. Further, one bag was randomly selected from each farmer for quality inspection at a research lab. At the end of the selling season, researchers collected data on the sales volumes and prices from both groups through household surveys. The aim of the intervention was to test whether the local market would pay more for high quality maize.

Evaluation two: Market Access and Extension Services

This intervention created differences in access to a secure buyer of quality maize and provided information and training on how to produce high-quality maize. Researchers collaborated with an agro-trading company in Uganda, which committed to buying quality maize at a premium throughout seven harvest seasons. The intervention was rolled-out at the end of the third harvest season and was carried out for four consecutive seasons. To account for any exchange of information or services between villages and farmers near each other, the researchers randomly assigned twenty village clusters, which were groups of villages that were similar to each other on a set of characteristics, into two groups: the intervention group (twelve clusters) and the comparison (eight clusters). In the intervention villages, the agro-trading company's agents visually inspected the bags and used mobile moisture meters to verify quality and purchased bags that were considered higher quality.

Evaluation three: Extension Services only

To disentangle the impact of the market access and extension services in evaluation two, the agro-trading company implemented an extension service only program in all intervention villages. Eighteen village clusters were randomly assigned to two equal groups and followed for six harvest seasons. In the intervention group, trained agents taught farmers about the best pre- and post-harvest practices for producing quality maize. To do so, they created demonstration gardens in each village and held five farmer trainings during the last three seasons.

At the end of each selling season, the research team administered household surveys to gather data on the quantities harvested and sold, as well as the corresponding prices and revenues. Additionally, the survey collected detailed information on expenses related to preharvest and postharvest practices, seed varieties, and chemical usage. The survey also included data on hired and family labor, including labor hours and expenses.

Results and policy lessons

Researchers found that the extension services only intervention had little to no impacts on productivity and farmer profits. The farmers who gained market access and access to information produced maize of higher quality over time, sold their maize for higher prices, and experienced increases in profits compared to farmers who only received extension services.

Take-up: Take-up of the interventions was high. Less than 5 percent of enrolled farmers dropped out of the study by the end of the last survey. About 70 percent of farmers in the market access intervention group attended the trainings, while 78 percent of farmers in the extension services only intervention group attended. Although the training was open to other farmers in the intervention villages not taking part in the study, few attended.

Productivity and investments: Giving farmers access to markets increased their investments in various cultivation inputs and activities that enhanced quality and productivity. The farmers purchased more inputs, hired more labor for pre-harvest activities,

and spent more on postharvest activities such as proper drying, sorting, and winnowing. The researchers suggest that the results could be driven by the higher prices and, consequently, increased profits that farmers earned, which may have enabled the increase in productive investments. The total expenditure on improved practices and inputs was US$18 higher for intervention farmers (comparison group mean US$106) despite the area under cultivation remaining the same. The intervention farmers increased their yield per acre by 14 percent (comparison group mean 792 kg) and total harvest by 13 percent (comparison group mean 1,888 kg). The researchers suggest that the increase in yield per acre and total harvest may be driven by increased productivity of land and hired labor rather than an expansion of land under cultivation.

Quality upgrading: Farmers who obtained the agricultural service package increased the quality of maize they sold in the local market. Only 4 percent of maize bags had at least one visually verifiable defect compared to 86 percent of bags in the comparison group. The share of defective maize and waste per 200 grams of maize from the farmers who received the service package was 20 percentage points lower than the comparison group (13 percent compared to 32 percent in the comparison group). The researchers suggest that the result was driven by better harvest and postharvest activities (drying, winnowing and, sorting). There was a 45 percentage point increase in the share of farmers in the intervention group who sold high-quality graded maize to the agro-trading company, rising from 20 percent to 65 percent by the end of the study. The results indicate that providing farmers with access to a market for high-quality maize encouraged them to improve quality.

Price premium and farmer profits: Linking maize farmers to buyers of high-quality maize increased the harvest value and profits of the farmers. On average, farmers in the intervention group earned 11 percent more per bag of maize they sold (comparison group mean US$21). Specifically, the value of their total harvest increased by US$79 every season compared to the comparison group mean of US$286, which roughly translates to a value increase of 28 percent. As a result, farmers in the intervention villages increased their profits by 36 percent per season relative to farmers in the comparison group (mean profits US$177). The increase in profits was, however, dependent on how family labor was valued. The researchers attribute the profit increase to both increases in farm productivity (yield per acre and total harvest) and higher prices.

The study revealed that agricultural extension training alone was insufficient to increase productivity and profits; having a clear buyer and end market that valued quality was key. The researchers suggest that low-income countries can boost markets for high-quality output by investing in facilitating the entry of small-scale farmers into the high-quality export market, enforcing quality standards, investing in infrastructure, and considering subsidies to raise returns for small-scale farmers. [1]

Bold, Tessa, Selene Ghisolfi, Frances Nsonzi, and Jakob Svensson. 2022. "Market Access and Quality Upgrading: Evidence from Four Field Experiments." *American Economic Review* 112, no. 8 (August) 2518-52. https://doi.org/10.1257/aer.20210122

---

1. Bold, Tessa, Selene Ghisolfi, Frances Nsonzi, and Jakob Svensson. "Market Access and Quality Upgrading: Evidence from Uganda." *VoxDev*, May 27, 2022. https://voxdev.org/topic/agriculture/market-access-and-quality-upgrading-evidence-uganda