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Smallholders and Quality Infrastructure. Safeguarding Quality of Agricultural Products and Natural Resources by Ghanaian Farmers*

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Abstract

Global consumers of agricultural products are disconnected from food growers. Food safety and quality of products are commonly assured through Quality Infrastructure (QI) services. Assured quality enables agricultural producers to access new markets, beyond the local level. Examples of QI services include the use of laboratory tests, universal measurements, and certification schemes.

Ninety percent of Ghana's agricultural sector is characterised by smallholder production. Do smallholders have equal chances to engage in product quality assurance as do large farmers? Is there a need to examine soil properties in times of growing land pressure? These and other questions guided this research commissioned by the German National Institute of Metrology. The study looked into the utilisation of QI by maize and pineapple smallholders. In the maize value chain some analysed aspects included the use of laboratory services and test field kits to determine grain moisture and mycotoxin levels. The pineapple value chain was analysed with respect to, amongst others, the utilisation of soil testing and weighing scales on farm level. Main study sites were in Ghana's capital Accra, Brong-Ahafo, a maize growing region, and the emerging pineapple growing Volta region. A qualitative methodological approach consisting of 137 extensive semi-structured interviews, 7 focus group discussions and a workshop allowed interviewing 105 farmers and 137 representatives of ministries, traders, scientists and other stakeholders. Additionally, four soil analyses were performed to assess soil profiles and estimate the need for good soil management. Benefits of fertiliser interventions were assessed with the help of cost benefit analyses.

The results showed that very few smallholders use QI services. In contrast, products from large scale farmers undergo food safety and quality tests which allow them to access export and processing markets. Further findings revealed that incentives to use QI for reducing economical, health and environmental pressures need to be linked with other identified obstacles. Such obstacles include lacking market connections, storing facilities and access to finances for smallholders. Soil analyses showed soil deterioration. With the help of QI, soil fertilisation can be improved with relatively low costs, thus contributing to ensuring food safety in times of rising demand for land.

Keywords: Ghana, maize, pineapple, quality infrastructure, rural areas, smallholders, value chains

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Introduction

Twenty-two per cent of Ghana's GDP is produced in the agricultural sector, which currently employs 45 per cent of the country's total labour force (WORLD BANK DATABASE, 2015; GHANA STATISTICAL SERVICE, 2014). The sector is characterized by a smallholder production base (MINISTRY OF FOOD AND AGRICULTURE, 2011). Agricultural production is compromised by several factors, including limited access to markets and processing facilities, high post-harvest losses as a result of poor post-harvest management, a low level of mechanization as well as low level and ineffective agricultural finance (GOVERNMENT OF GHANA, 2010). This results in low productivity of land, poverty, low investment capacity and lack of economic opportunities. At the same time there is a growing middle class in Ghana's cities who demand agricultural products from rural areas. In this exchange from rural to urban areas, trade is being stretched over much greater distances, requiring, in theory, transparent and universal communication on quality. A sound and appropriate national quality infrastructure (QI) must be in place to prove the compliance of goods and services with compulsory regulations and voluntary standards that outline quality requirements. QI is based on five components that are closely interrelated and form a network whose logical links are based on a technical hierarchy (SANETRA, MARBÁN, 2007): standardization, testing, metrology, certification and accreditation. Within an existing national QI system, the application of quality control measures and practices can elicit increased farm incomes, e.g. through increased market value, access to new markets, or savings in required inputs. However, measures and services to ensure high quality of products and proof quality characteristics to buyers require investments and know-how. Codified quality requirements may therefore put certain groups of farmers at a disadvantage. The "Physikalisch-Technische Bundesanstalt" (PTB), the German National Metrology Institute, commissioned a team of the Centre for Rural Development (SLE) to examine the use of QI services by smallholders, focusing on the maize and pineapple value chains (VCs) in Ghana. Maize is the most important cereal crop on the domestic market in Ghana (IFPRI, 2014). The quality of maize and maize products is mainly compromised by Aflatoxins, toxic carcinogenic by-products of the moulds *Aspergillus flavus* and *Aspergillus parasiticus*. Mould is caused by insufficient drying and storage, in combination with humid, warm conditions.

Pineapple differs from maize in its nature as cash crop and piece good. Challenges related to the quality of pineapple are less obvious as compared to maize. This is particularly true for pineapples that are destined for the local market where the quality of a fruit is usually determined through shape, size and color. With respect to international markets, however, pineapple production in Ghana is not effective in supplying the right quality to meet the demands of those markets (FAO, 2013). Challenges related to the quality of pineapple include fertilizer misapplication, pesticide residues as well as an inadequate selling mode.

Material and Methods

The study looked at smallholders who cultivate approximately 2 to 8 acres (0.8 to 3.2 hectares) of land and who sell their produce on local markets, national markets or for export. Due to different growing conditions of maize and pineapple, one study region was selected per commodity. For maize, the Brong-Ahafo region was selected as a highly commercialised production area, hosting the most important supranational maize market in Techiman. For pineapple, the emerging pineapple growing Volta region was selected. Analyzed services in the maize VC included the use of laboratory services and test field kits to determine grain moisture and mycotoxin levels. The pineapple VC was analyzed with respect to, amongst others, the utilization of weighing scales when trading pineapple and the utilization of soil testing and other testing services such as the measurement of pesticide residues. Given the exploratory purpose of the study, a multiple methods approach was chosen, focusing on different qualitative methods. They included focus group discussions, semi-structured interviews and a workshop. In total 144 interviews were

conducted, recorded and qualitatively analyzed. Additionally soil tests were performed in four locations in order to determine soil quality and fertilizer requirements.

Results and Discussion

Role of quality infrastructure for smallholders

This research on the use of numerous QI services revealed that smallholders rarely utilize the services, in contrast to large-scale farmers or other actors in the VCs. For example, in the pineapple VC it was observed that large-scale farmers directly use services such as certification of land and testing on pesticide residues and hence can engage in trade on export markets. Smallholders, however, access those services only indirectly through contracts with large farmers or processing companies. A very similar picture can be drawn for the maize VC. While smallholders don't check for maize moisture content when trading, some processors have recognized economic benefits of moisture meters and are using these devices.

The examined use of soil testing revealed no access to and no perceived need for soil tests by smallholders. At the same time, the conducted soil analyses showed soil deterioration. The study looked into micro and macro elements essential for growth, foremost Nitrogen, Phosphorus and Potassium contents in soil. Certain soil nutrients were found in excess whereas others were lacking. However, to respond to test outcomes, farmers would need assistance in interpretation of the results. Additionally, there was a limited availability of and accessibility to specific single fertilizers that would be necessary as a response to soil testing results. Instead, the common practice in horticulture is to use a fertilizer mix conditioned for the needs of cocoa bean production.

Economic benefits were calculated for the users of QI services. In the pineapple VC, for instance, the use of weighing scales was researched on. The typical practice amongst Ghanaian smallholders is to sell pineapple per piece, sometimes all fruit at one price but most commonly in different sizes for different prices. One smallholder was found who weighs her fruit when trading. For her case it was calculated that there will be an economic benefit if the fruit are heavier than 1.17 kg. Since an average fruit of a regular sized pineapple weighs 1.5 kg (FAO 2015), selling per kg would generate realistic economic gain for other smallholders as well. The farmer in question, however, was not aware of this economic gain. She sells per kilogram to reduce the time necessary for sorting into different sizes and in this way, she can mix sizes and sell all fruit. Furthermore, the use of weighing scales does not require a complex technical knowledge.

Moisture meter introduced to a farmer.

Pineapple smallholder using a weighing scale.

Identified non-quality infrastructure obstacles

Various obstacles that would trigger the use of or access to QI by smallholders were identified. Smallholders often lack market connections, as was evident in previous investigations (WILL 2010). In most instances smallholders don't know where to sell their produce or depend solely on one market type. Another obstacle is a lack of basic facilities on the farm level, e.g. facilities for storing and drying to ensure and prolong quality of products. On top of everything, any investments in basic and quality infrastructure are very difficult since the access to finances by smallholders is inexistent or unfavorable.

Conclusions and Outlook

There may be various reasons why smallholders are not engaging more in use of QI services. In general the incentive to use QI is weak. Four general variables could be observed to increase QI utilization. A smart management of both, voluntary and obligatory measures is needed to increase the demand for QI. In particular, consumers haven't used their power to improve quality through consumer protection mechanisms. Centrality of QI services seems to be a hindering factor for smallholders that the Ghanaian QI, which has its laboratories in the major cities, has yet to overcome. For example, for testing on aflatoxins a very few centralized testing facilities in affected regions may suffice but soil test kits should be offered throughout the country to encourage its use. The observed inconsistent and unorganized maize and pineapple VCs do not contribute to the desired utilization of QI services. Therefore, organizational structures in VCs and trust among VC actors and as well between them and the national QI need to be strengthened. Finally, higher value of agriculture productions (cash crop vs. staple crop farming) is likely to increase the use of QI amongst smallholders.

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