LISA 2020: Impacting Agricultural Productivity in Tanzania Through the Wheels of Statistics

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Abstract

The Tanzania economy relies on agriculture, which employs more than 75% of the labor force. Having an excellent potential for agriculture-led economic growth, Tanzania needs more sustained agricultural growth to reduce overall poverty in the country. Farmers need to get the right information on how to turn technology (e.g. improved seeds) into increased productivity. Research leading to more tangible results can play this role. The statistical collaboration laboratory at Sokoine University of Agriculture (SUA) in Tanzania provides a venue for statisticians at SUA to collaborate with agricultural researchers and support and mentor them in statistical thinking, analysis, and education, which in turn will help them to turn their research into tangible results for Tanzanian farmers.

Keywords: statistical collaboration laboratory; research collaboration; statistical capacity building; agricultural research.

1. Introduction

According to the National Agriculture Policy (NAP) 2013 (NAP 2013), agriculture is the mainstay of the Tanzanian economy, contributing to 24.1% of GDP and 30% of export earnings. The agriculture section employs about 75% of the total labor force. Tanzania’s agriculture is the driving force of the country’s economy and therefore its development is of paramount importance. To achieve agriculture-led growth, the sector must grow at 6% or more (NAP 2013).

This paper presents a new approach to make statistics and statistical thinking more impactful for researchers in general and agricultural researchers in particular, hopefully leading to increased agricultural productivity. In our approach, Tanzanian statisticians will collaborate with agricultural researchers in Tanzania to provide innovations and solutions for Tanzanian farmers.

It should be stressed from the outset that this paper is not an empirical study, but rather a description of a program to provide increased agricultural productivity in Tanzania. Section 2 describes the problem of stagnant growth of the agriculture sector in Tanzania. Section 3 provides an overview of previous attempts to grow the agriculture sector in Tanzania. Sections 4, 5, and 6 describe our program to try grow the agriculture sector and some early results. Sections 7 and 8 conclude with some of the challenges we face and our attempts to overcome them in trying to achieve our goal of improving agricultural productivity through the wheels of statistics.

2. Stagnant Growth of the Agriculture Sector in Tanzania

According to NAP (2013) the rate of growth of the agriculture sector has averaged about 4.4% over the past decade, indicating a stagnant growth. The rate of growth in agriculture is higher than the average annual population growth rate of 2.6%, implying that incomes have grown. However, the average agricultural growth rate of 4.4% is insufficient to lead to significant wealth creation and alleviation of poverty, given the low level of agricultural development. Attaining poverty alleviation requires annual agricultural growth rate of between 6% and 8%.
One major constraint to agricultural growth is related to inadequate support services, that is, agricultural training, research, and extension services are lacking in Tanzania (NAP 2013). A conclusion of the NAP report (2013) is that research and extension programs have not been able to fully include farmers’ needs in their priorities, and linkages between research and farmers’ productivity have been weak.

Despite the existing challenges, the agricultural sector has a number of opportunities that, if utilized effectively, will lead to increased production and productivity and will thus act as a basis for poverty alleviation in rural areas (NAP 2013).

3. Previous Attempts to Grow the Agriculture Sector

In order to address the stagnating growth of the agricultural sector, a number of reforms such as KILIMO KWANZA Resolve, the Tanzania Food Security Investment Plan (TAFSIP), Southern Agriculture Growth Corridor of Tanzania (SAGCOT), Feed the Future Program, and Bread Basket Initiative have been initiated (NAP 2013).

In response to economic challenges, including stagnant growth in the agriculture sector, the Government of Tanzania developed and approved the Agriculture Sector Development Strategy in 2001 (ASR 2009).

Recognizing a serious decline in the quantity and quality of agricultural statistics in many developing countries, the World Bank, the United Nations, and the United Nations Food and Agriculture Organization (FAO) developed a global strategy to improve agricultural and rural statistics (2010). One of the three pillars of this strategy is to improve statistical capacity to collect and analyze agricultural data.

Several projects have been established in Tanzania to help the agricultural sector grow to the level that it can drive further economic growth. Vance and Magayane (2014) point out the establishment of the Innovative Agricultural Research Initiative (iAGRI) program in Tanzania. iAGRI is a five-year program led by The Ohio State University and funded by USAID at the level of 25 million U.S. dollars. Five universities in the U.S. are partnering with Ohio State on this project. Principal partners in Tanzania are the Sokoine University of Agriculture (SUA) and the Ministry of Agriculture Food Security and Cooperatives. iAGRI’s principal objectives are to provide graduate education to the next generation of food and nutrition experts in Tanzania; to undertake research on major constraints hampering achievement of food security in Tanzania; and to strengthen the capacity of SUA to be a model 21st century university leading the Tanzanian agricultural sector.

4. Statistical Collaboration to Grow the Agriculture Sector

With a strong support network, just one statistician trained to communicate and collaborate with non-statisticians can enable and accelerate up to 50 or more research projects per year. Each research project can impact hundreds or thousands of people (Vance in press).

To spread out and promote the value of statistical thinking in all phases of scientific research, LISA (Virginia Tech’s Laboratory for Interdisciplinary Statistical Analysis) has a program to help establish 20 statistical laboratories in developing countries by the year 2020. According to Vance (2015), the vision of the LISA 2020 Program is to empower purpose-driven statisticians from developing countries to make a greater impact in their local communities, countries, and regions. These statisticians will be educated and trained within a worldwide network of statistical collaboration laboratories to learn the essential skills that will unlock their collaborative potential and enable them to increase the impact of statistics. As of mid-2015, two such statistical labs have been created in Nigeria (Awe et al. in press), one in Ethiopia, one in Brazil, and one in Tanzania.
Members of iAGRI have worked with administrators and members of the academic staff at Sokoine University of Agriculture (SUA) to create a statistical laboratory to help agricultural researchers design experiments, collect and analyze data, interpret the results, solve problems, and make decisions to help feed the future (Vance and Magayane 2014).

The Sokoine University of Agriculture Laboratory for Interdisciplinary Statistical Analysis (SUALISA) was established under the University Act and began operation in December 2014 as part of the LISA 2020 Program. It is the second statistical collaboration laboratory to be established in the LISA 2020 Network. The SUALISA is currently supported financially by the iAGRI program. Statisticians from the Department of Biometry and Mathematics in SUA and statisticians from other units of SUA form the base personnel for the statistical collaboration operations.

SUA remains the only agricultural university in Tanzania, and most agricultural research in the country is carried out by researchers at SUA, including students (graduate and undergraduate), research fellows, and academicians. SUALISA statistical collaborators work hand in hand with researchers at SUA to help them incorporate statistics at all phases of their research.

5. SUALISA Operations
SUALISA adopted the three services offered by LISA of Virginia Tech, namely walk-in consultation, collaboration meetings, and short courses. The laboratory is currently served by five statisticians from the Department of Biometry and Mathematics and two statisticians who were recruited from other units of the university.

Awe (2012) argues that if training and teaching of statistical consulting skills is conducted in African universities, it will promote the use and knowledge of statistics in all fields in which statistics can contribute to a better understanding of scientific and social phenomena. Two of the SUALISA collaborators obtained collaborative skills through training at LISA at Virginia Tech on how to communicate and collaborate with non-statisticians to help them solve their research problems (Vance in press). The two SUALISA collaborators then trained fellow statisticians at SUA on how to effectively communicate and collaborate with agricultural researchers.

Most clients who visit the SUALISA are graduate students; a few are members of the academic staff. Due to lack of manpower, a client visiting the laboratory is attended by one statistical collaborator to discuss a client project, rather than two as is the custom at LISA. The statistical collaborators hold a weekly meeting, during which they discuss projects that need special attention.

6. Early Results of SUALISA
We believe that involvement of SUALISA statistical collaborators in all stages of a research will help researchers to better design their studies and experiments, collect useful data, properly analyze their data, and correctly reporting and interpreting the study results. This will help agricultural sector practitioners in the country to get the right information at the right time.

As of August 2015, SUALISA has helped 168 clients via walk-in consultation and 20 clients via longer collaborations meetings. The collaboration meetings involved only one collaborator and a client as compared to the LISA model at Virginia Tech where a client is attended by two statistical collaborators. Clients’ projects are discussed during weekly meetings among the SUALISA statisticians to ensure that clients get the best advice for their projects.

Most of the clients that visited the SUALISA laboratory had already collected data and were seeking advice on how to best analyze their data to answer their research questions. Some sought specific advice on how to use statistical software, mainly SPSS.
7. Challenges and Attempts to Overcome Them
SUALISA is facing challenges in fulfilling its mission to impact agricultural research conducted at SUA due to the following:

1. Lack of manpower. The Department of Biometry and Mathematics currently has five statisticians as members of the academic staff. These statisticians are also involved in other university operations, mainly teaching. The department does not offer any degree in statistics and thus cannot rely on students to work in SUALISA. To try overcoming this challenge, SUALISA recruits statisticians from other units of the university.

2. Some clients that visit the laboratory need to apply statistical software that are not yet available at SUALISA, for example, GENSTAT, PAST, and others. Some of these software packages are expensive and hard to get. To overcoming this challenge we suggest our clients learn to use free statistical software like R (R Core Team 2015). SUALISA will soon teach short courses for the university community on how to use R.

8. Conclusions
Establishing only the second statistical collaboration laboratory in a developing country posed many challenges, and we are still working to overcome them. Growing and sustaining the SUALISA will undoubtedly present a variety of new challenges that will also be overcome in time. Ultimately, statisticians trained to effectively communicate and collaborate with agricultural researchers will lead to these researchers conducting high quality research, resulting in innovations to grow the agriculture sector in Tanzania. We hope that successes with this program in Tanzania will encourage additional universities and institutions to adopt similar programs and join the LISA 2020 Network of statistical collaboration laboratories and that innovations in agriculture driven by the wheels of statistics will improve the lives of farmers and lead to economic growth.

References


