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Capitalizing on Agricultural Potential in Rwanda: Strategies for Sustainable Development

Delice Twahirwa & Ben L Henson

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^{*1}Delice Twahirwa & ²Ben L Henson

^{*}Email of the Corresponding Author: delice@sacpp.org

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Abstract

This paper examines gaps in agricultural knowledge transfer to smallholder farmers in Rwanda, focusing on the challenges and successes of agricultural development projects. Beginning with Rust et al.'s (2021) observations, which outlined many farmers' preference for learning from peers rather than traditional experts, the discussion focuses on how the trust deficit between farmers and agricultural researchers has harmed the effectiveness of development initiatives. Despite significant foreign investment in mechanization and large-scale agricultural projects like the Nasho and Kagitumba irrigation projects, the results have frequently been disappointing. This paper contrasts these large-scale efforts with successful models such as the European Union's DeSIRA program and the Sustainable Agriculture Community Partnership Program (SACPP), both of which have focused on participatory, locally adapted solutions that prioritize farmer involvement and respect for existing knowledge. The study demonstrates that, while Rwandan agriculture faces challenges, particularly in maize production, smallholder farms have enormous potential for increasing productivity through context-based innovations. The paper advocates for a shift from top-down, large-scale interventions to farmer-led processes that understand local conditions and foster long-term trust and respect. Successful models show that agricultural development in Rwanda can flourish by aligning strategies with farmers' realities and building trust through sustained, participatory engagement.

Keywords: *Capitalizing, Agricultural Potential, Rwanda, Strategies, Sustainable Development*

1.0 Introduction

In 2021, in the article "Have Farmers Had Enough of Experts?" Rust et al. asserted that farmers predominantly relied on fellow farmers to acquire knowledge regarding novel soil practices. They exhibited diminished trust in conventional 'experts,' especially agricultural researchers from academic and governmental entities, whom they perceived as lacking empathy for farmers' requirements. Some farmers may have grown disenchanted with conventional 'experts,' opting instead to depend more on their peer networks for learning and innovation. Farmers predominantly relied on fellow farmers rather than conventional 'experts' to acquire knowledge about innovative soil practices. A significant number of farmers perceived that agricultural researchers from academic and governmental entities exhibited a deficiency in understanding farmers' requirements, prompting them to increasingly depend on their peer networks for knowledge and innovation. (Rust et al., 2021). This raises the issue of the deficiencies in knowledge transfer to farmers and identifies the most effective methods. This paper examines certain experiences within a Rwandan context. I cultivate more than 2000 acres in the United States and possess a 50-hectare farm in Rwanda, which is considered extensive by Rwandan standards. I have worked in international development across fourteen countries over the past few decades. As a farmer, my experiences have led me to alter my agricultural practices. I was most proficient in knowledge transfer during my tenure in agricultural development. This document presents a viewpoint on effectively engaging with farmers. Although no singular methodology is universally applicable, certain approaches have demonstrated considerable success and yield sustainable long-term results.

1.1 Context and Current State of Rwandan Agriculture

In Rwanda, approximately 81% of the population works in agriculture, but approximately 33% of children are stunted due to malnutrition (Ngaruye et al., 2023). Despite the fact that the vast majority of Rwandan children grow up on farms, one-third will suffer from physical and mental disabilities. Malnutrition and low farm incomes can be attributed to a decrease in farm plot sizes as properties are passed down to the next generation, as well as an increasing population, which means more mouths to feed. These realities necessitate farmers desperately needing higher crop yields to feed their families. However, the needed yield increase is not occurring. Crop yields are stagnant, and unfortunately, they remain at an extremely low level. Taking maize, a staple crop, production has improved very little over the last 15 years, despite millions of dollars invested in maize production in Rwanda. According to reports from the Helgilibrary, Rwandan maize yields in 2013 averaged 1.6 tons per hectare; a decade later, in 2023, the average was 1.5 tons per ha.

1.2 Large Scale Agriculture Project Introduction

There have been efforts to improve Rwanda's much-needed agricultural improvements. In the last decade, Rwanda has seen the introduction of a number of large-scale projects aimed at improving the country's agricultural status, particularly maize yield. Foreign aid agencies and other agricultural development organizations have made significant investments in these efforts. For example, the Nasho Irrigation Project installed 63 center pivots for \$54 million, while the Kagitumba Project installed 17 pivots for \$32 million. These are just two of many other Rwanda Agricultural Development projects with combined budgets of hundreds of millions of dollars, but the results of these projects and mechanization efforts are insufficient. The Rwandan government's emphasis on agricultural mechanization and land consolidation coincided with these large-scale efforts, but the outcomes of these projects and mechanization efforts are disappointing. When

viewed through a macroeconomic lens, there have been no positive results. Using maize as an example, two-thirds of Rwandan farmers grow it. Despite the large population involved in maize agriculture and investment efforts, maize yield and smallholder farmer practices have not improved significantly. Between 2012 and 2014, Rwanda imported 100,000 tons of maize per year. In contrast, between 2021 and 2023, the average annual maize importation increased to more than 120,000 tons. Despite significant investments in agricultural development, there has been no significant increase in maize yields in Rwanda.

1.3 Identifying the Gaps

Rwanda's Ministry of Agriculture and Animal Resources reported in 2023 that 36% of the 1821 projects implemented in the country failed to deliver on schedule, 76% failed to deliver within the expected budget, 56% failed to deliver all of the expected functionality, 33% did not continue after the project funder's withdrawal, and 66% failed to deliver the expected quality of functionality (Kalisa & Aforabi, 2024). This evaluation report demonstrates that these projects frequently fail to deliver long-term results. The central issue is not a lack of effort or funding, but rather that these are frequently misaligned with the realities of smallholder farmers (Mugabo & Warner, 2024). Machinery designed for large, open fields is unsuitable for Rwanda's dispersed farm plots. In addition, many of these projects fail completely when external funding runs out, leaving farmers with dysfunctional systems and eroding trust and credibility in agricultural development initiatives. The study found that farmers frequently perceived outsider scientists/'experts' to operate on different geographic scales than farmers, often prioritizing large-scale, generalized methods tested in multiple locations. Furthermore, the way this information was communicated was out of sync with the real challenges that farmers face, reinforcing the perception that these scientists lacked empathy and understanding of their actual circumstances. Farmers, on the other hand, wanted research that was specific to their local needs and conditions. This is frequently discovered by learning from a neighbor.

Although many development projects have focused on mechanized agriculture and large-scale farming, research has shown that small farms are 2 to 20 times more productive per unit area than larger farms (Rosset, 1999). This is where efforts should be focused. Many development focus areas outside of agriculture have been very successful. According to Macrotrends, the percentage of Rwandan homes with access to electricity has increased from less than 16% in 2009 to 50% today. According to Rwandan government statistics, 57% of Rwandans now have access to potable water. Why are these efforts successful, whereas agricultural development improvement measures have a smaller impact? Why does agriculture differ? In construction, you can hire a large company to design and build a road or a water purification facility. The designs and engineering can be copied from similar facilities built in Kenya or the United States. Engineers who have attended a US university or a university in Cypress can expect to have similar skill sets, as well as knowledge that is portable and capable of meeting expectations. The method for building a bridge to span a 100-meter gap is consistent across geography. Doctors in Rwanda can also expect to be able to remove an appendix using techniques similar to those used in the United States. Agriculture is not the same. It is as complex as a science, with a large population segment. In Rwanda, that segment accounts for more than 80% of the total population; success in agricultural development is dependent on educating and inspiring that population segment to adopt a new methodology. Inspiring a large population segment to change becomes much more difficult when credibility and trust are eroded and proposed changes ignore the community's inherent

strengths and knowledge. It is also critical to recognize the cultural component of agriculture. It is critical to understand interventions that have been successful in this Rwandan context. It is also important to understand the strengths and advantages of the current Rwandan system.

1.4 Successful Projects and What Can Be Learned from Them

The European Union's DeSIRA program has successfully introduced new forage species to smallholder dairies in the Nyagatare district. Their strategy was to plant the forages in demonstration fields and run field schools for farmers. They demonstrated the forage's utility by grazing dairy cattle on it. Adopting a new forage species is a low-risk decision for farmers. This intervention demonstrated patience and understanding of the farmer's mentality, meeting farmers where they were. Early adopters were typically the best farmers, and as they demonstrated the benefits of the new forages, neighboring farmers were expected to follow suit. The IFAD RWEE program (Rural Women Economic Empowerment) has also successfully established Farmer Field Schools (FFS), which are managed by local women. These schools are demonstration farms, with the following development strategy: "The RWEE project aims to combat malnutrition through improved farming techniques that have been tested and validated in FFS." The FFS provides training and practical, experiential educational opportunities for rural women, thereby improving their lives.

Another success story is the current collaboration between the Sustainable Agriculture Community Partnership Program (SACPP) and the University of Hawaii's Department of Tropical Plants and Soil Science. This collaboration is also aimed at increasing maize production in Rwanda. This program uses the SACPP farm as a demonstration platform to teach a group of farmers about new maize crop production techniques. That conversation and demonstration lasted a year, following a decade of SACPP developing trust and credibility in the community as a neighboring farm. The results showed that maize yield increased from 1.5 tons/ha to 7 tons/ha in that group. These farmers meet on a regular basis to discuss next season's strategies based on lessons learned. SACPP is attending these meetings and will incorporate lessons learned from these farmers into their cropping strategy. The farmer group expanded significantly in the following seasons, and farmers in the surrounding area who were not part of that group were observed applying various aspects of the methodology and improving their farming methods. In addition to increasing maize yield, farmers in this group have been applying what they've learned to other crops to improve farm sustainability practices. These success stories have one thing in common: farmers actively participated in the changes that were implemented. They did not tell farmers how to do things differently. Instead, they demonstrated the system's functionality to farmers on the field, allowing them to be team players rather than beneficiaries. Farmers' experiences were taken into account as the system evolved. These successful projects prioritized farmer participation, taking into account local conditions, and allowing farmers to observe a system in action before changing farms. The farmers were able to validate the system before taking the risk associated with changes because the systems proposed were appropriate for the size of the farms and the results were achievable using technology and techniques the farmers were already familiar with.

1.5 Conclusion

While Rwanda faces significant challenges in agricultural development, particularly in terms of increasing yields and improving smallholder farmer livelihoods, there is real potential for large-scale improvement. The challenges encountered by large-scale, externally driven projects

highlight the importance of aligning development strategies with the potential of smallholder farms. These opportunities will be maximized once it is recognized that farmers prefer and trust learning from their peers over external 'experts.' This emphasizes the importance of knowledge transfer strategies that prioritize trust, empathy, respect, and the incorporation of local knowledge. The success of the DeSIRA, RWEE, and SACPP programs has demonstrated the importance of participatory, hands-on approaches that allow farmers to interact directly with innovations in a low-risk, locally tailored setting. These programs have all been long-term, demonstrating that with time, patience, and a focus on farmer-driven solutions, meaningful improvements in productivity and sustainability are possible. Rwandan agriculture is at a crossroads: if approached correctly, smallholder farmers can play a critical role in driving the country's agricultural transformation. A shift away from top-down, mechanized interventions and toward collaborative, localized solutions that value farmers' existing knowledge and conditions has the potential to have a massive impact. By fostering trust, encouraging farmer participation, and implementing long-term engagement strategies, Rwandan agricultural development can evolve into a sustainable growth model that not only improves food security but also empowers the communities that rely on it.

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