PROCEEDINGS OF THE TANZANIA SOCIETY OF AGRICULTURAL EDUCATION AND EXTENSION (TSAEE) HELD AT THE VIJANA HALL, DODOMA 07 - 08 DECEMBER, 2020

THEME: The Contribution of Agricultural Extension Services to Industrial Development in the country

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OPENING SPEECH FOR TSAEE CONFERENCE BY THE PERMANENT SECRETARY FOR MINISTER OF AGRICULTURE, HONOURABLE GERALD M. KUSAYA HELD ON 07-08 DECEMBER, 2020 IN VIJANA HALL, DODOMA

Permanent Secretary, PORALG

Permanent Secretary, Ministry of Livestock and Fisheries

Development Stakeholders,

Directors from the ministries of Agriculture, PORALG, Livestock and Fisheries

Extension Officers from the different Councils

Experts

All Guests

Ladies and Gentlemen,

First of all, let me thank the Almighty God for making it possible for us all to be gathered here today.

I am also grateful to have this opportunity to participate in this important gathering to discuss pertinent issues related to the strengthening and spearheading of the agriculture, livestock and Fisheries sectors to boost productivity and hence raise income which will eventually reduce poverty and generate employment opportunities.

The goal of these efforts is to boost the agriculture sector which is the main employer of Tanzanians and by doing so the economy will improve and problems related to poverty and unemployment will be addressed.

Dear Participants,

The Government is determined to improve the agriculture sector by transforming it from subsistent agriculture to modern and commercial agriculture with enhanced productivity through the use of modern technologies including the use of appropriate agricultural inputs and improving the whole value chain which will eventually increase the production of raw materials for our agro-based industries but also for the export market.

Dear Participants,

The agriculture sector still faces major challenges including low productivity due to the dismal use of proven agricultural technologies such as inorganic fertilizers and agricultural implements as well as inadequate agricultural extension staff and working tools. In addition, there are problems related to inappropriate land use, lack of a database of stakeholders in the entire value chain, lack of capital and sustainable mechanism of accessing extension services, lack of markets for agricultural commodities and the lack of appropriate storage facilities leading to the post-harvest losses of between 30 to 40 per cent especially horticultural crops. It is thus cardinal for the country to address these challenges to have our farmers boost productivity and profitability.

Dear Participants,

Very recently, the President of Tanzania, Honourable Dr John Joseph Pombe Magufuli, during the inauguration of the 12th National Parliament of the United Republic of Tanzania on 13th November 2020 in Dodoma, in his address directed the Ministry of Agriculture to invest more effort in promoting increased production of food and cash crops including the strategic crops, namely, cotton, cashew nuts, tea, coffee, tobacco, sisal, palm oil, cocoa, sunflower and sugarcane. The efforts must also go beyond to include commodities that are currently imported including wheat. The Ministry must also promote irrigation from the present 561,383 to 1.2 million hectares in 2025 to reduce our dependence on rainfed agriculture. This will have to go in tandem with readily available and affordable agricultural inputs and machinery, that is, improved seeds, fertilizers, pesticides, herbicides and tractors. Efforts must also address the post-harvest losses which imply the construction of improved storage facilities in different parts of the country. The Ministry must also promote horticultural production including fruits, vegetables, flowers and spices. Thus the Ministry would like to see that all directives are implemented accordingly. This is likely to yield positive results in terms of boosting farmer incomes and the national economy at large.

Dear Participants,

I have been told that you will be here for two days, during which you will hold the Annual General Meeting of the Tanzania Society of Agricultural Education and Extension with the general theme being **"The Contribution of Agricultural Extension Services to Industrial Development in the country"**

I have also been informed that you will receive the TSAEE Chairperson's Report which will spell out the progress of the Society for 2019, enrollment of new members, and coming up with strategies to improve agriculture including strengthening agricultural extension services. During this time, it is also envisaged that the meeting will come up with resolutions and recommendations to the Ministry of Agriculture to address these challenges. The recommendations will also be directed to the respective sectors and departments to strengthen the agricultural sector.

Dear Participants,

The Government is currently providing and monitoring agricultural extension services to farmers through different policies, strategies and programmes including the Agricultural Sector Development Program (ASDP II) which values the provision of extension services by partnering between the Government and the private sector. I hope that through this meeting, complaints from our beneficiaries of the services will be addressed.

Dear Participants,

By 2019 there was a total of 7,307 agricultural extension officers working in over 12,319 villages countrywide. So far there are more than 5000 villages without an extension officer. The low farmer/extension officer ratio makes it unlikely for all farmers to access extension services. This calls for the need to have more qualified extension staff to reach all farmers out there.

The Ministry of Agriculture has now introduced a digital/electronic system (M-KILIMO) that was inaugurated by the then Minister for Agriculture Hon. Japheti Hasunga (MP) on 18/05/2020. The system has been piloted in some councils in Dodoma, Tanga and Iringa which have shown positive results. The Ministry aims to outscale this technology to cover all councils in the country through which farmers will be able to ask questions on agricultural matters and get answers in a relatively short time. It is anticipated that this system will provide a vital link between extension officers and beneficiaries at all levels from village, ward, district, region and the Ministry.

Dear Participants,

Let me also recognise the valuable contribution of the private sector and international agencies through their agricultural development projects in providing the much-needed agricultural advisory services in this country. However, in this respect, one challenge is the lack of transparency in terms of statistics such as the numbers of extension staff deployed in extension and also the financial commitments made. We however realize that some stakeholders have been working with some private institutions in the country through various Memoranda of Understanding (MOU) or some other types of jointly worked out agreements. For now, these are not legally recognised by the Ministry.

Dear Participants,

We have very recently been informed that Tanzania is now in the lower-middle-middle-income category. This calls for mobilization towards industrialization and each region has been directed to have at least 100 new industries. It is anticipated that the bulk of these industries will be involved in processing agricultural products at various stages in the value chain. This means relevant ministries together with PORALG will have a major role to play in meeting the increasing demand for raw materials.

Dear Participants,

Given the major undertaking described above, thus through this meeting, I would like to advance to you the following directives:

i. TSAEE should serve as an instrument to advise the Government through particular agricultural-related ministries;

ii. TSAEE should be the link between the different stakeholders with the mandate to provide agricultural extension services;

iii. TSAEE should ensure that professionalism for all agricultural extension staff is sustained in the process of providing the much-needed services; and

iv. TSAEE should also ensure financial sustainability in order to sustain its activities.

Dear Participants,

Finally, I expect that you will use this forum to discuss important issues that will be instrumental in addressing the challenges facing the agricultural sector and hence help in the growth of the sector and identify opportunities for the relevant sectors to circumvent these challenges in agriculture, livestock and fisheries through the implementation of the Agricultural Sector Development Program II. The Government will also continue partnering with development partners who show real commitment to advancing the economy of the country through transforming the agricultural sector. Let me also reiterate the instrumental role of TSAEE in providing an avenue for collaboration between different stakeholders in this country.

After these few remarks, it is now my pleasure and honour to declare that this Conference is now officially opened.

Thank you very much for listening.

Evidence-Based Evaluation of RIPAT Approach towards Execution of National Development Programmes and Plans: A Case of RIPAT-SUA Project in Morogoro, Tanzania.

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Abstract

Successful implementation of a project, among others, relies on the approach employed towards the execution of such a project. Non-adherence to national programmes, and local specific economic and social aspects in connection to a project has been reported among the factors leading to the failure of innumerable projects, agriculture-related projects inclusive. Cognizant of that, the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach was initiated as one of the extension approaches for reinforcing agricultural extension services in Tanzania. While this approach has been considered to be useful, there is a lack of adequate basis for evidence-based advocacy of the approach. It is against this background that this article documents an evaluation of the RIPAT approach to justify its validity as an extension approach which unleashes national development plans while addressing local specific economic and social aspects in connection to a project. Field visits involving a team of 20 staff from SUA and RECODA were conducted in Morogoro Municipal Council and Mvomero District in Morogoro Region with the intention of further testing and validating the RIPAT approach to generate a sound basis for evidence-based advocacy of the approach. Participatory approaches enabled the participants to observe, discuss and learn from existing RIPAT projects and stakeholders (including project beneficiaries, lead farmers and extension officers). Household surveys, field visits, brainstorming, group discussions, key informant interviews with RIPAT project staff and beneficiaries, presentations and plenary discussions were employed to generate information to test and validate the RIPAT approach. It was found that RIPAT projects, from their design, consider national programmes and specific economic and social aspects of the community where a particular project is implemented. An evaluation of the RIPAT-SUA project showed that the project contributed to improvement in households' food security, nutrition and income. These findings demonstrate a clear alignment and contribution to the attainment of the Agricultural Sector Development Programme (ASDP) and accordingly the Tanzania Development Vision (TDV) 2025. It was further observed from the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis that projects employing the RIPAT approach have higher chances of sustainability and that the benefits accruing from or promised by the RIPAT approach outweigh the weaknesses and threats. It is concluded that the RIPAT approach has the potential to unleash national programmes/plans and guarantee project

success, given the presence of other factors. Up-scaling of the RIPAT approach and incorporation of the same in the government extension system is crucial.

Keywords: Evaluation, National Programmes, RIPAT, SWOT, RECODA, SUA

1.0 Background Information

The 21st century, which started on 1st January 2001, has been taken as the era of competition whereby successful competitiveness will demand visionary and dedicated leadership, corporate accountability and sustained investment in technologies (Zahra, 1999). There has been a serious series of global and national programmes and plans to improve the livelihoods and well-being of the humankind. Among the global programmes are the Millennium Development Goals (MDGs) which started in September 2000 and lasted for 15 years in 2015, with the aim of, among other things, halving the number of people who live on less than one dollar a day (UN, 2000). Sustainable Development Goals (SDGs) followed immediately, aiming at a better and more sustainable future for all through addressing poverty, hunger and inequality, among others, by 2030 (UN, 2017).

Tanzania, in 1999, set a long term plan of 25 years known as Tanzania Development Vision 2025 (TDV 2025) aiming at guiding economic and social development efforts characterized by high-quality livelihoods; peace, stability, and unity; good governance; a well-educated and learned society; and a competitive economy capable of sustainable growth and shared benefits. The TDV 2025 was supported by short-term plans including the National Strategy for Growth and Reduction of Poverty (NSGRP I, 2005 - 2010; NSGRP II, 2010 - 2016), well known as MKUKUTA I & II.

Again, to facilitate interventions towards TDV 2025 attainment, Tanzania Long Term Perspective Plan (LTPP) (2011/2012–2025/2026) was set to outline a development path that was divided into three sequential phases of five-year development plans, each with a specific development agenda of removing the economy's growth constraints to unleash the growth potential of the country, nurturing an industrial-based economy whilst developing the country's agriculture and agro-processing sectors and boosting exports of manufactured goods with sharpened competitiveness. In addition, there has been Agricultural Sector Development Programme (ASDP) I and II. The ASDP I had the objective of creating an enabling and conducive environment for improving the profitability of the sector as a basis for improved farm incomes and reduction of rural poverty in the medium- and long-term. According to URT (2016), ASDP is one of the key instruments that the government uses to meet TDV 2025 and implement the Agricultural Sector Development Strategy (ASDS). ASDS aims to achieve a sustained agricultural

growth rate of 5% per annum, primarily through the transformation from subsistence to commercial agriculture. ASDP II was built on ASDP I with some improvements based on ASDP I evaluation results.

Based on the good performance of national development programmes and plans, the World Bank declared Tanzania to be a lower-middle-income country on 1st July 2020. This is a result of the country's strong economic performance of over 6% real gross domestic product (GDP) growth on average for the past decade, leading to increased gross national income (GNI) surpassing 3,036$ per annum (Battaile, 2020). However, the increased GNI per capita is not enough to meet the TDV 2025 due to the need of investing in both human development and physical capital which is key to achieving the broad goals of the vision and improving the quality of life for all Tanzanians. There is also a concern that the main contributors to GDP are not the sectors involving the majority of people. For example, agriculture employs about 67% of the total labour force but its current average growth rate of 3.6% (URT, 2018) is insufficient to lead to significant wealth creation and alleviation of poverty (URT, 2016). Therefore, there is no shortage of national development programmes and plans, but there is a serious need of enforcing/rolling-out the development programmes based on the local conditions in question. It has been noted that, in Tanzania, there are well-crafted development plans, locally available resources, and technologies for poverty alleviation and food security, but the problem is the implementation of the plans.

Development projects, to quote Das and Ngacho (2017), "are essentially community-driven in nature and aim at redistributing national resources to the community to bring facilities and services closer to people to alleviate poverty, create employment, and eventually raise people's standard of living through better schools, healthcare facilities and the like". Attainment of national development relies on innumerable programmes and plans executed in the context of a particular country in wide-ranging sectors and subsectors (Appiah-Adu andBawumia, 2020). However, there exist countless critical success factors (CSFs) which have been observed to influence the performance of development projects in line with those projects' key performance indicators (KPIs) (Das and Ngacho, 2017).

Non-adherence to national programmes, and local specific economic and social aspects in connection to projects has been reported among the factors leading to the failure of innumerable projects, agriculture-related projects inclusive. In Tanzania, a country where agriculture contributes significantly to gross domestic product, employment and rural livelihood too (O'Neill,2022; Sarris *et al.,* 2006), in the quest to register national development, countless initiatives and approaches have been implemented to boost agricultural productivity.

Successful implementation of these projects, among others, has very much relied on the approach employed in their execution. Despite the efforts observed, Rutatora and Mattee (2001) have noted the unsatisfactory performance of the agricultural sector which is attributed to numerous factors including weak agricultural services delivery system which, among others, include agricultural extension services provision. Under the agricultural extension services provision, there have been numerous projects and plans which have been employing various approaches, yet the situation on the ground has not been that much promising. It is in this context that the government of Tanzania has recently been increasingly encouraging the responsibility of the private sector and users in the delivery of agricultural extension services.

Cognizant of that, the Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach was initiated as one of the extension approaches for reinforcing agricultural extension services in Tanzania. While this approach has been considered to be useful, there is a lack of adequate basis for evidence-based advocacy of the approach. It is against this background that this article documents an evaluation of the RIPAT approach to justify its validity as an extension approach which unleashes national development plans while addressing local specific economic and social aspects in connection to a project. Specifically, the article addresses three questions: i) To what extent are the objectives of the projects applying the RIPAT approach in line with the national development programmes/plans? ii) What is the influence of the RIPAT approach on the implementation of the national development programmes/plans? iii) To what extent have the projects applying the RIPAT approach achieved their national development programmes/plans-related objectives?

2.0 Methodology

2.1 Study Area

The study was conducted in areas where the RIPAT-SUA project was under implementation, particularly in villages/streets adjacent to Sokoine University of Agriculture (SUA), covering land catena of the Uluguru Mountains in three agro-ecological zones (i.e., highland, midland and lowland areas) in Mvomero District and Morogoro Municipality. The areas are in the Eastern zone of Tanzania. Morogoro Municipality is located in the Northeast of Morogoro Region between 6º 00' and 8º 00' latitudes South of the Equator and between longitudes 36º 00' and 38º 00' East of the Greenwich Meridian. Mvomero District is located between latitudes 06º 26' South of the Equator and between longitudes 37º 32’ East of the Greenwich Meridian. According to Tanzania’s 2012 Population and Housing Census, in 2012, Morogoro Municipality had 56,723 households, and Mvomero District had 58,314 households with total populations of 286,248 and 312,109 respectively (URT, 2012).

2.2 Research Design, Sampling Procedure and Data Collection Methods

The study adopted a cross-sectional research design which has been recommended by several scholars (Babbie, 2010; Delice, 2010) due to its cost and time effectiveness in data collection. The design entails the collection of data on more than one case at a single point in time. According to Bryman (2012), the design enables the collection of a body of quantitative and qualitative data on two or more variables that can be examined to detect patterns of association.

Primary data were collected through a survey using a questionnaire, key informant interviews (KIIs) and discussions using checklists of items. Moreover, Participatory Rural Appraisal (PRA) was used whereby a transect walk was employed to appreciate interventions implemented under the projects applying the RIPAT approach.

Data collection was carried out in two phases. The first phase involved a visit to the RIPAT-SUA project area by a team of 20 researchers (11 male, 9 female) from Sokoine University of Agriculture (SUA) and Research, Community and Organizational Associates (RECODA). The visit was preceded by a brief introduction to the RIPAT approach and the RIPAT-SUA project. The fieldwork involved a transect walk, unstructured interviews and a discussion involving the project stakeholders and the researchers.

The transect walk entailed the researchers and farmers walking across two demonstration plots and some farmers' fields. The demonstration plots belonged to the Nuru group from Changarawe village and the Umoja group from Mlali village which are farmer groups formed during the "RIPAT start" and "RIPAT spreading"[1] phases respectively. Through the visit, workshop participants were able to learn about different activities done by farmer groups under the RIPAT-SUA project and also had an opportunity to ask questions and get responses from the farmers. The visits were followed by a discussion at Changarawe village with the District Project Coordinators (DPCs)[2], Lead Farmers (LFs)[3] and Extension Officers (EOs) who jointly explained their roles in the RIPAT-SUA project and answered questions asked by the

[1] The RIPAT approach project is essentially a 2 to 4-year project where the first and/or second year is used as "RIPAT start" for building the community-based capacity i.e., lead farmers (LFs) and Extension Officers (EOs) who are used in "RIPAT spreading" to ensure adoption and up scaling of the interventions under reduced costs. The RIPAT spreading phase lasts for a year.

[2]DPCs are representatives of District Executive Directors/Municipal Directors to the projects applying the RIPAT approach

[3]LFs are individuals who, during the project implementation period, are identified as people who had developed social entrepreneurship as agents for change and are among the successful farmers from within the group (Vesterager *et al*., 2013)

researchers. After the fieldwork, a two-day retreat was organized to provide an opportunity for the researchers to critically reflect on the RIPAT approach and the performance of the projects applying the approach. During the retreat, discussions and presentations were conducted. To facilitate the discussion, three groups, each with at least six participants, were formed and carried out strengths, weaknesses, opportunities and threats (SWOT) analysis of the RIPAT approach. Ultimately, the findings from the three groups were consolidated and future research topics were agreed upon.

In addition to the fieldwork, a desk review was conducted for both the first and second phases. It involved reviewing documents with information about the performance of the projects applying the RIPAT approach to unveil the results attributable to the RIPAT approach, particularly those associated with the national development programmes/plans/strategies. Relevant documents in this regard included the farmers' choice book, which entails articles on evaluation of the projects applying the RIPAT approach, the RIPAT-SUA project's final report and end-line evaluation report, the RIPAT manual and journal articles on the RIPAT approach.

The second phase involved a survey. Proportionate stratified sampling was employed to ensure fair representation of the three distinct altitudes of the project area namely lowland, midland and highland areas (Table 1). In each of the altitudes, the representatives of households were selected through simple random sampling using random numbers which were created in MS Excel using the "=RAND( )" command. Household heads whose serial numbers corresponded chronologically with the random numbers that were generated were selected.

The target population (N) was all RIPAT-SUA project beneficiaries from 8 RIPAT start groups comprising 205 households. The sub-populations of the study in different altitudes were 84, 49, 72 households in highland, midland, and lowland areas of the Uluguru Mountains respectively. From the population of 205 households, 136 households were selected as shown in Table 1.

Table 1:Selection of respondents on different altitudes

Location	Group names	Population (N)	Number of households selected (n)	District group located
Highland	Faraja	84	52	Morogoro Municipality
	Twikindem			Mvomero
	Chikena falls			Mvomero
Midland	Uchumi	49	36	Mvomero
	Tupendane			
Lowland	Amani	72	47	Mvomero

	Nuru			
	Mshikamano			Morogoro Municipality

The sample size was determined using a formula by Yamane (1967), which is $n = N/ [1 + (N*e^2)]$, where: n is the sample size, N is the population or sampling frame, and e is the sampling error, i.e., 0.05. Therefore, $n = 205/ [1 + (205 * 0.05 * 0.05)] = 205/1.6 = 136$.

The study employed purposive sampling in the selection of key informants (KIs) who included EOs, District DPCs, village leaders, a Programme Manager from RECODA and SUA instructors involved in the RIPAT-SUA project. EOs and DPCs were selected because of their direct involvement in the RIPAT-SUA project and therefore were aware of the project activities.

2.3 Data analysis

Data from the key informant interview and discussion were analysed using content analysis. Transcription of the audio files from the key informants was done, followed by thematic analysis (Braun and Clarke, 2006). In this regard, the many words of text transcribed from recorded information were compressed into fewer content categories resulting in synthesized meaning based on study objectives. Secondary data obtained from the RIPAT-SUA project's final report were analysed to generate descriptive statistics (frequencies, percentages and averages) relevant to the study.

Data from the survey were analysed using the IBM SPSS computer software version 20 and Microsoft Excel. To ensure the quality of the data and output of the results, data cleaning was done. Descriptive statistics (i.e., frequencies, percentages, averages, and minimum and maximum values) were computed. As part of descriptive analysis, multiple response analysis was used to analyse the benefits of the RIPAT-SUA project.

3.0 Results and Discussion

3.1 Overview of the RIPAT Approach

The Rural Initiatives for Participatory Agricultural Transformation (RIPAT) approach is an extension approach, whose aim is to bridge agricultural technology gaps and enhance diffusion of good agricultural technologies (Rockwool Foundation and RECODA, 2013). The overall goal of RIPAT is to contribute to the development of socially and economically sustainable livelihoods among poor rural communities. It attempts to promote self-confidence and to create a vision of, and a belief in, a better future–a 'yes we can' spirit–among participating individuals and communities. RIPAT has been implemented in a series of projects in a variety of socio-

economic, farming, and biophysical environments, with the overall aim of alleviating poverty and increasing food security among rural farming families (Maguzu*et al.,* 2013). According to Lilleor and Lund-Sorensen (2013), RIPAT is a pragmatic mix of traditional extension approaches and more recent participatory extension approaches.

The RIPAT approach is founded on three cornerstones: i) Creation of a vision of a better future through careful sensitization of communities to the potential for change and mobilization of farmers to take charge of their development; ii) Establishment of strong farmer groups with good leadership to enable the transfer of appropriate agricultural technologies through participatory demonstrations using experimental and reflective learning techniques; and iii) Close collaboration with local government authorities, village leaders, and government agricultural extension officers to ensure the continuation of the project and its further spread to the wider community (Maguzu*et al.,* 2013).

3.2 An assessment of the RIPAT Approach regarding its Strengths, Weaknesses, Opportunities and Threats.

A desk review of the external (opportunities and threats) and internal (strengths and weaknesses) environments of the RIPAT approach in the provision of agricultural extension services was conducted. The review, coupled with focus group discussions and field visits by a team of 20 researchers from SUA and RECODA to the RIPAT-SUA project area, found that the RIPAT approach has the following strengths, weaknesses, opportunities and threats.

Table 1: SWOT analysis of the RIPAT approach

Strengths	Weaknesses
• Availability of committed, motivated and skilled manpower, which favours the possibility of sustainability • The uniqueness of RIPAT as a hybrid of the existing top-down and bottom-up approaches • Inbuilt spreading mechanism • Basket of options allows wide choices among farmers • RIPAT is a home-grown, organic, approach that can easily be adopted by communities • Emphasis on food security • Emphasis on mindset transformation • Involvement of local authorities which helps to develop trust • The approach being cost-effective • Diffusion of technologies through farmer groups and demonstration plots • Farmers learn by doing, and therefore some technologies	• Marketing is not adequately covered • Gender is valued by numbers only • No deliberate effort to get female-headed households • Lack of deliberate focus on the poorest of the poor

deliver/demonstrate quick results • Availability of step-by-step guide/manual • Readily available testimonies by successful groups • The approach imparts knowledge-seeking behaviour among farmers • RIPAT is an approach that offers hands-on skills to farmers • Formalized collaboration among actors is among the cornerstones on which the RIPAT approach is founded	
Opportunities	**Threats**
• RIPAT approach offers room for agricultural technologies to reach many people in a reasonably short time; it is an avenue for enhanced adoption of technologies that increase productivity • The approach is acceptable to local government authorities • Shortage of extension staff can be addressed through the RIPAT approach • There is a wide range of extension service providers (NGOs, private companies) who can use the approach • RIPAT can be employed in facilitating the diffusion of user-friendly and labour-saving technologies • RIPAT can be used to address non-agricultural issues, such as health and environment. For example, the approach could be applied in schools to promote tree nurseries through environmental clubs • Farmer groups can sell their services to other farmers (e.g. labour-saving technologies) • The approach offers an opportunity to improve the nutritional status and income of families • The approach is relevant for different agro-ecological zones • The approach is relevant for mitigating climate change challenges • There is a demand for the approach within and outside Tanzania • Availability of external partners willing to support the approach • Plenty of untapped technologies at the disposal of farmers • The approach is in line with the Tanzanian policy framework	• Inadequate government budget allocation for the agricultural sector • General preference for approaches developed outside the country • Initial resistance to the adoption of new technologies • Unreliable weather, the outbreak of diseases and pests • Maintenance of standards as the demand grows

Based on the findings above, the benefits accruing from or promised by the RIPAT approach outweigh the weaknesses and threats. That is, it is possible to employ the strengths of the approach to use the opportunities, address the weaknesses and avoid the threats. For example, currently, the RIPAT approach is being taught to some Bachelor's and Master's Degree students at SUA, following the incorporation of the approach in the degree programmes' curricula. This strength is presented in the study findings as "availability of committed, motivated and skilled manpower, which favours the possibility of sustainability", and can be employed to address the

threat of "maintenance of standards as the demand grows" because the graduates, well versed with the RIPAT approach, are likely to uphold its standards when applying it.

It is also worth noting that during the retreat that was organized to critically reflect on the RIPAT approach and the performance of the projects applying the approach, the participants came up with research topics aimed at addressing some of the issues raised during discussions. One of the topics is the RIPAT approach and gendered technology dissemination, for which researchers have written a book chapter (in press). In the same vein, research is underway to determine the possibilities of incorporating a stronger marketing component in the RIPAT approach. A key informant from RECODA said:

> *"RECODA, ADRA and SUA are currently implementing a project known as KilimonaMasoko (Farming for the Market) which, among others, attempts to test complementarity of RIPAT and Farmer Market School approaches"*.

These efforts are aimed at addressing the weaknesses seen in gender and marketing.

3.3 Influence of the RIPAT Approach on the Implementation of the National Development Programmes/Plans

3.3.1 Formalized collaboration between projects' implementing organizations and local government authorities

The study revealed that among the main areas where RIPAT has been used in the implementation of the national development programmes is through designing and implementing joint agricultural projects with local government authorities with a clear memorandum of understanding (MoU) showing the roles of each partner (Vesterager, 2017). Among the three pillars (cornerstones) of the RIPAT approach is formalized collaboration between project implementing organizations (IO) and Local Government Authorities (LGAs). During project mobilization, meetings with district officials are conducted to agree on the procedures for collaboration by stipulating the roles and responsibilities in a written MoU. A District Project Coordinator (DPC) is nominated, and lists of villages to be covered in the RIPAT "Start" phase to build community-based experts i.e. lead farmers and government extension officers (EOs) who are later used in the RIPAT "Spreading" phase are identified. In the project area, the use of LFs is mainstreamed in the government extension structure; hence all the institutions under the LGAs comply with the roles of the LFs. The use of LFs has helped to curb, to a great extent, the shortage of extension officers with which it would be impossible for LGAs to reach all the farmers. According to Ringo *et al.* (2020), the interaction (interplay) of LFs and EOs helps in narrowing the extension-farmers ratio and hence enables the majority of the farmers to access new agricultural technologies and capacity to turn the knowledge into actual

development. Based on the MoU, there are project quarterly meetings, joint trainings between EOs and LFs, planning together field days, study visits, and sharing of various experiences and project reports.

3.3.2 Public-private partnerships

The roles and relationships played by different institutions in influencing the performance of LFs under the projects applying the RIPAT approach signify the realities of the importance of public-private partnership (PPP). According to Roman (2015), a PPP is conceptualized as a contractual agreement between one or more governments/public agencies and one or more private sector or non-profit partners to support the delivery of public services or financing, designing, building, operating and/or maintaining a certain project. Roman (2015) added that facing increasingly constrained budgets and an inability to generate additional revenues, many governments have turned to partnerships with the private and non-profit sectors. Under the RIPAT approach, the implementing organization (IO), apart from funding the project, was even required to play a key role in coordinating other institutions so that they can collaborate well in the performance of LFs. Below is a relevant quote from one of the District Agriculture, Irrigation and Cooperatives Officers (DAICO):

> *"As the government, we would like to see successful projects but many projects merely fail to achieve the expected outcomes because each actor works in isolation. It is our mandate to coordinate all projects but, to me, the project IO should be supportive because they are the main project designer and with funds which they have to be willing to share with other actors as well".*

The working relationship between local government and project IO in this case is project coordination to ensure the participation of various stakeholders, which if not observed properly can lead to project failure.

3.3.3 Use of lead farmers (LFs) under Improved Obstacles and Opportunities to Development (O&OD)

President's Office – Regional Administration and Local Government (PO-RALG), in 2019, put it mandatory for local government to use improved opportunities and obstacles to development IO&OD) in guiding Ward Facilitators (WFs), Extension Officers (EOs), and Local Community Facilitators (LCFs) in facilitating communities on community development processes (URT, 2019). The O&OD manual identified a close relationship (interplay) in working with the RIPAT approach, especially in areas related to community sensitization for mindset change and mobilization for groups formation and taking actions to improve countries' welfare (Vesterager *et al.*, 2017; URT, 2019). It is stated under the RIPAT approach that the most important and

demanding part of a RIPAT project is community mobilization and the initial stages of group formation (*ibid*.).

Community empowerment is the most critical idea in O&OD as a factor for the promotion of community initiatives (CIs), the sustainability of project outcomes, and even the fundamental condition for collaborative relationships between the government and communities (URT 2019). It is further stated under O&OD that the collective efforts of people surely enable them to overcome more problems than those of segmented individual efforts; thus, people's organisational capability is the main focus of community empowerment. Therefore, O&OD and RIPAT approaches are both used by institutions in facilitating community development. While O&OD is broad, putting into consideration any type of community development initiatives, the RIPAT approach is more specific to the projects dealing with the development of small-scale farmers through bridging the agricultural technology gap. This implies that, when it comes to the use of EOs, O&OD implementers can use LFs, guided by the RIPAT approach. The foregoing discussion suggests that O&OD and the RIPAT approach mesh well towards shaping the interaction between LFs and EOs.

3.3.4 Advocacy for local institutions to support lead farmers

Another contribution of the RIPAT approach in the implementation of government plans and transforming rural livelihoods is seen in the improvement of agricultural extension services in Tanzania. A policy brief advocating the adoption of the RIPAT approach indicates that the transformation of Tanzania's smallholder farming households' livelihoods requires an easy and cost-effective implementable grassroots approach such as the RIPAT approach (Urassa*et al.,* 2020). Development projects applying the RIPAT approach have been instrumental in rolling out the ASPD and five years' agricultural development plans through District Agricultural Development Plans (DADPs). Projects applying the RIPAT approach reach the grassroots communities who, in most cases, are overlooked in rolling out of national development programmes and projects. The approach augments TASAF plans in that, through community mobilization which is embedded in the approach, it facilitates the poor of the poorest to utilize local resources and opportunities offered in a basket of options (BOs). The BOs emanates from a situation analysis and therefore deals with specific people and areas. It counteracts the 'one size fits all phenomenon'.

Cognizant of this contribution, the RIPAT approach has been identified by the Sokoine University of Agriculture (SUA) as among the extension approaches worth incorporating in its academic curricula. In the same vein, Urassa*et al.* (2021) revealed that the Sokoine University of Agriculture (SUA) in collaboration with the Ministry of Agriculture has been working with the

Commission for Science and Technology (COSTECH)[4] to promote the activities of the RIPAT approach in the country. Thus, the RIPAT approach is widely spreading.

The use of LFs is not a new concept to many projects and development actors as it is used in combination with other extension approaches in which the farmer extension agents are variously referred to as lead farmers (LFs), model farmers, farmer promoters or trainers, or extension multipliers (Franzel and Simpson, 2013). What is new under the RIPAT approach is the extensive use of LFs who work in collaboration with EOs.

3.4 Assessment of the RIPAT-SUA Project with a Lens of the National Development Programmes/Plans/Strategies

3.4.1 Alignment of the RIPAT-SUA project with the national development strategies, plans or programmes

RIPAT-SUA is an agricultural development project which was implemented jointly by Sokoine University of Agriculture (SUA) and Research, Community and Organizational Development Associates (RECODA) between 2018 and 2021 to demonstrate how applying the RIPAT approach in agricultural projects facilitates bridging agricultural technology gaps, among other things. Specifically, one of the objectives of the project was to enhance the adoption of agricultural technologies to small-scale farmers in the land catena of Uluguru Mountains. The project was therefore implemented in three distinct altitudes of the Uluguru Mountains, namely highland, midland and lowland (RIPAT-SUA project, 2021).

The RIPAT-SUA project applied the RIPAT approach, which uses the basket of options (BOs) in which different agricultural technologies are presented to the farmers, and farmers are allowed to select the technologies they are capable of implementing in their fields. The project included the following agricultural technologies in the basket of options:

i Perennial crops: improved banana varieties;
ii Root crops: orange-fleshed sweet potatoes (OFSP) and cassava;
iii Annual crops: conservation agriculture through maize intercropped with beans or planted as a sole crop;
iv Horticultural crops (vegetables and fruits;
v Livestock: dairy goats, pigs and local chickens; and
vi Microfinance: Village Savings and Loan Association (VSLA).

[4]COSTECH is a parastatal organization with the responsibility of coordinating and promoting research and technology development activities in Tanzania. It is the chief advisor to the Government on all matters pertaining to science and technology and their application to the socio-economic development of the country.

The project worked with 22 farmer groups, each with an average of 26 farmers, from Morogoro Municipal Council and Mvomero Districts. Other project target groups include Extension Officers and SUA community (RIPAT-SUA project, 2021).

SUA and RECODA, which have been collaborating since 2014, are committed to contributing to the efforts to attain Tanzania's national development priorities. Involvement of the two organizations in the implementation of the RIPAT-SUA project was influenced by the understanding that RIPAT aims to bridge the technology gap and promote the adoption of new farming technologies which in turn are likely to improve food security and nutrition, household income and the environment (Vesterager *et al.,* 2013).

The goal of the RIPAT approach and the specific objective of the RIPAT-SUA project shown above aligns well with the main thrust of the Agriculture Sector Development Programme (ASDP) and, accordingly that of Tanzania Development Vision 2025 (TDV 2025). ASDP is one of the key instruments that the government uses to meet TDV 2025 and implement the Agricultural Sector Development Strategy (ASDS). According to URT (2016), in line with TDV 2025, the goal of ASDS II is to contribute to the national economic growth, reduced rural poverty and improved food security and nutrition in Tanzania. The key ASDS II strategic objectives are to: (i) create an enabling policy and institutional environment for enhancing the modernized competitive agriculture sector, driven by inclusive and strengthened private sector participation; (ii) achieve sustainable increases in production, productivity, profitability and competitive value chain development of the agricultural sector driven by smallholders; and (iii) strengthen institutional performance and effective coordination of relevant public and private sector institutions in the agricultural sector at national and local levels, enabled by strengthened resilience. ASDP II (2016/2017–2025/2026), on the other hand, aims at addressing the critical constraints and challenges to agricultural sector performance and to speed up agriculture GDP, improve growth of smallholder incomes and ensure food security by 2025 (URT, 2016).

From this background, the expectations are that, through the RIPAT-SUA project, SUA and RECODA would have contributed to the attainment of the ASDP II and, accordingly, to the TDV 2025. The following sections shed light on the results of the project compared to the key strategic objectives of ASDS II.

3.4.2 Contribution of RIPAT-SUA project towards the attainment of the ASDP II and TDV 2025

3.2.2.1 RIPAT-SUA Project and sustainable agricultural production and Productivity

The second key strategic objective of the ASDP II is to achieve sustainable increases in production, productivity, profitability and competitive value chain development of the agricultural sector driven by smallholders (URT, 2016). In line with this objective, the RIPAT-SUA project implemented several interventions to ensure agricultural sustainability. The findings of the study show that the practices that were adopted, with the proportions of the respondents who adopted them in brackets, are the incorporation of crop residues into the soil (62.5%), intercropping (52.2%), application of farmyard manure (51.5%), mulching (27.2%), planting cover crops (24.3%), and fallowing (2.9%).

Elaborating on the most highly adopted practice, a key informant from Changarawe village said: *"Incorporation of crop residues in the soil was mostly done when ploughing the land".* Crop residues incorporated in the soil decompose to form humus, which is important for soil micro-organisms and plants. Intercropping, which was adopted by more than half of the respondents, is relevant for diversifying food (nutrition) and income sources; facilitates the use of nutrients and water from different soil depths; supports mixing leguminous crops, which trap nitrogen from the air for use in the soil, with cereals which requires nitrogen to perform well; and reduces the impacts of raindrops thereby reducing soil erosion. Moreover, intercropping reduces the risk of failure in crop production as when one crop species fails there are chances of harvesting the other crop(s) (UMADEP/UMEMCP, 2010).

Regarding farmyard manure, which was also adopted by more than half of the respondents, a key informant from Mnyanza village said: *"… application of farmyard manure was more relevant to farmers who were involved in banana production and maize production under conservation agriculture"*. The application of manure improves soil fertility and water retention capacity as well as microbial activities of the soil. The findings corroborate information in an FAO report (2012) that farmyard manure has a high proportion of organic material which nurtures soil organisms and is essential in maintaining an active soil life. The improvement of soil water retention capacity counteracts the impacts brought by climate change which, most of the time, is associated with uneven distribution of rains in the cropping season. Furthermore, the application of manure is associated with high yields of banana and maize crops which, in turn, increase household food security and income thereby reducing poverty.

Transect walk and FGD participants indicated that the banana, as a perennial tree-like crop, improves the environment through the provision of soil cover and shade, acting as a windbreak, and controlling soil erosion as bananas are planted across the slope. Leguminous beans improve soil fertility and fit well in intercropping with maize. Root crops, especially cassava, were described as drought tolerant and, therefore, were among the crops considered to be

important for ensuring food security. Other crops which were described as helpful in improving food and nutrition security were iron-rich beans and orange-fleshed sweet potatoes (OFSP). The two crops supply protein and vitamin-A respectively. Corroborating the literature (UMADEP/UMEMCP, 2010), the transect walk participants commented that the introduced crops had different nutrient requirements and their roots occupy different soil depths, optimizing the use of soil nutrients and water.

During the wrap-up session, transect walk participants indicated that integration of livestock production with crop production was important in that the system ensures the production of manure, food (crops, milk, eggs and meat), and income (selling crop products, and live animals and/or their products). A key informant from Tangeni village said the following when explaining the importance of adopting a livestock-crop production system: *"Crop-livestock integration brings about cycling of nutrients in that livestock feed on crop residues and by-products and in turn produce manure for use by crops".* The livestock types that were promoted by the project include pigs, dairy goats, and chickens. Income increase among smallholder farmers aligns well with the FAO food security definition which shows that among the components of food security is accessibility (FAO, 2017). Thus, an increase in income translates into improved food accessibility.

In an attempt to improve water use efficiency and sustain crop production, the RIPAT-SUA project promoted soil and water conservation measures and rainwater harvesting practices namely contour ridges (constructed across the slope), mulching, banana planting across the slope and construction of water pans (RIPAT-SUA, 2021). These practices facilitated *in situ* rainwater harvesting while also controlling evapotranspiration, especially in the lowland areas of the Uluguru Mountains where temperatures are relatively high compared to the mid and highland areas. Water pans, which are small dams lined with polythene sheets, proved to be effective in harvesting rainwater for use during the dry season. It was revealed, through key informant interviews, that various rainwater harvesting techniques had helped farmers to be employed in farm activities all year round, compared to the past when they were busy only during the rainy season. URT (2016) shows that, with the ASDP II, interventions will be undertaken with climate change considerations factored into the interventions, including climate-smart agriculture in landscapes and appropriate climate change mitigation strategies.

Another initiative promoted by the project was Village Savings and Loan Association (VSLA) through which a member was able to take a loan worth three times their shares. The avenue for farmers to access loans helped them to get capital for investing in the introduced agricultural technologies such as planting materials, holes making for banana and maize,

contour ridge making/terracing, and establishment of water pans. Moreover, VSLA provided an avenue for farmers to come together and discuss matters of interest for development. According to the RIPAT-SUA project (2021), the VSLA members had been meeting at least once every week. Mahonge*et al.* (2021) observe that VSLA serves as the glue for crop and livestock production activities and a safety net for other activities.

3.2.2.2 RIPAT-SUA project and smallholder farmers' household income, food security and nutrition

Households' eating patterns and eating habits were considered when estimating the contribution of the project to food security and nutrition. In this regard, the household heads that were interviewed were asked whether, due to their implementation of the RIPAT-SUA project, their households' food consumption patterns and food security status had changed in terms of improvement or otherwise. The results showed that, among 88.2% and 82.4% of the households, food consumption patterns and food security situation, respectively, had improved, as indicated in Table 1.

The respondents said that the main reasons for improvement in food consumption patterns, with the proportions of those who gave the reasons, were: benefits brought by the project, especially enabling them to plant different crops which enabled them to eat more diverse food items (15.4%), using crop production technologies which increased crop yield (10.3%), planting crops which contain high nutrients (8.1%), and obtaining various nutrients due to consumption of OFSP (6.6%).

Concerning improvement in the food security situation, the respondents said that the main reasons for the improvement, with the proportions of them who gave the reasons, were more households affording eating three meals per day (18.4%), increased yields of crops grown (11.8%), and eating three meals containing more nutrients (11.0%).

Table 1: Whether food consumption patterns and food security situation had changed due to the implementation of the RIPAT-SUA project (n = 136)

Consumption pattern and food security situation	Status as a result of the project	Frequency	Per cent
Consumption pattern	Changed	120	88.2
	Not changed	16	11.8
Food security situation	Changed	112	82.4
	Not changed	24	17.6
All	**-**	**136**	**100.0**

Source: Field data

The situations of food consumption patterns and food security in Table 1, with the reasons for the same, mean that the RIPAT-SUA project contributed to improvement in food security

quantitatively and qualitatively. Quantitatively, the participants in the RIPAT-SUA project were able to eat more meals, and qualitatively they were able to eat more nutrients. Those benefits had the potential to spread to some other households which did not participate in the project through the household members copying from their neighbours, relatives, and friends the introduced technologies. The spread of the benefits would further reduce poverty in terms of improvement in food security and income. According to URT (2016), ASDP II aims to improve smallholder incomes and ensure food security, among others. URT (2016) shows further that the goal of ASDS II is to contribute to the national economic growth, reduced rural poverty and improved food security and nutrition in Tanzania.

This improved food consumption pattern and food security in the project area is attributable to the adoption of crop varieties and livestock species, and improved husbandry practices promoted by the project. Data from the RIPAT-SUA project show that 73.6% of the targeted farmers in the project area (700 smallholder farmers) had adopted improved chicken production, 71% improved banana production whereas 29% had adopted dairy goat production (Table 2).

Table 2: Project achievement with reference to the indicators of the overall and specific objectives (as per the logframe)

Results (outputs)	**Status by the end of the project**
Diversified production of crops and livestock	• 73.6% are rearing improved local chickens • 29% are keeping 226 dairy goats • 71% of the farmers adopted improved banana varieties • Farmers also adopted cassava and orange-fleshed sweet potatoes (OFSP) to diversify food crops and income
Farmers acquired the capacity of procuring clean planting materials of the newly introduced crops i.e. OFSP, pigeon peas, maize, etc.	• Groups are selling planting materials and harvests of their crops for income generation. Seeds sold include improved banana varieties, OFSP and beans. • 70% of the farmers understand good ways of preserving and producing different varieties of seeds, for example, banana, OFSP, quality declared seeds (QDS) of maize, cassava, iron-rich beans, etc.

Source: RIPAT-SUA project (2021)

Data reported in a RIPAT-SUA project of 2021 show further that 60.5% of the targeted farmers had adopted more than two production options thereby diversifying their production activities. ASDP II emphasizes the need to diversify crop and livestock production to increase farm incomes and to reduce risks in light of both production and price fluctuations (URT, 2016).

According to the report, through the solidarity chain, dairy goats continue to be passed on to project participants. The solidarity chain, according to Vesterager *et al.* (2013), entails all participating farmers training three other farmers in the community on what they have learned and adopted. Each group member who adopts the improved banana technology is expected to give three times the number of banana suckers they received through the project to other interested farmers who are not group members in the community and to train them on improved cultivation techniques. For goats, sheep and pigs, farmers repay by passing on the first two female offspring to others in the group, following a predefined list.

Table 3 provides insight into the household incomes among the smallholder farmers in the project area as a result of the project. By the end of the project, the total incomes earned by the farmer groups through selling banana suckers and banana fruits were TZS 3,387,000 and TZS 8,823,400 respectively. Income gain from selling chicks was TZS 35,053,000 whereas from OFSP the groups earned TZS 985,500 (Table 3).

Table 3: Number of items sold by project farmer groups and income earned

Item sold	Number of Item	Amount earned (TZS)
Banana suckers	2,291	3,387,000
Banana bunches	2,389	8,823,400
Chicks	8,379	35,053,000
OFSP	1,860 kg	985,500

Source: RIPAT-SUA project (2021)

From the data in Table 3, the average income earned per farmer from their group activities (not inclusive of their activities) during the project period was TZS 119,428. This achievement is in line with the view of the ASDP II to support farmers to graduate from subsistence farming to semi-subsistence/semi-commercial status, practising farming as a business. According to URT (2016), ASDP II recognizes that food security is a necessary condition for escaping poverty, but it is not sufficient—household cash incomes must also increase from their current very low levels.

4.0 Conclusions and Recommendations

Based on the study findings, it is clear that RIPAT projects, from their design, consider national programmes and specific economic and social aspects of the community where a particular project is implemented. The RIPAT approach aims to bridge the technology gap and promote the adoption of new farming technologies thereby improving food security and nutrition,

household income and the environment whereas the goal of ASDS II, in line with TDV 2025, is to contribute to the national economic growth, reduced rural poverty and improved food security and nutrition in Tanzania. The findings that the RIPAT-SUA project contributed to improvement in households' food security, nutrition and income demonstrate a clear alignment and contribution to the attainment of the ASDP and accordingly to the attainment of the TDV 2025.

RIPAT approach embraces a formalized collaboration with the local government authorities (LGAs), and therefore, designing and implementing of agricultural projects are done jointly with the LGAs. The findings show that the use of lead farmers who collaborate with government extension officers in disseminating project interventions beyond the project period is emphasized in this collaboration. This implies that organizations implementing projects applying the RIPAT approach operate in line with the LGAs' plans leading to synergistic relationships and therefore higher impact than it would be if each party operated in isolation. Therefore, to achieve synergy and remarkable impact, as demonstrated by the RIPAT projects, the designing and implementation of development initiatives ought to be informed by the national development plans/programmes.

A critical reflection on the RIPAT approach showed that the benefits accruing from or promised by the approach outweigh its weaknesses and threats. It is concluded that the RIPAT approach has the potential to unleash national programmes/plans and guarantee project success, given the presence of other factors. A wider adoption of the RIPAT approach in the planning and implementation of agricultural projects is recommended.

The fact that, through the RIPAT approach, the extension-farmers ratio improves and, as demonstrated in this study, projects applying the approach align well with the national development plans/programmes, calls for up-scaling of the approach. Therefore, the incorporation of the RIPAT approach in the government extension system is recommended.

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