THE STATE OF EXTENSION SERVICES PROVISIONSIN URBAN AREAS OF TANZANIA: A CASE OF VEGETABLE GROWERS IN MOROGORO MUNICIPALITY

ABSTRACT

In urban areas of Tanzania, the extension service framework is deficient, marked by a decreasingly small number of public extension personnel when compared with rural areas; hence, many farmers still face challenges in accessing and utilizing them effectively. Consequently, farmers lack appropriate knowledge and skills in vegetable production. This study therefore examined the implication of extension services to urban vegetable production.A mixed-method research design was used to collect data from 60 respondents. Questionnaires and interviews were used in the data collection process. Descriptive analysis was used inanalyzing quantitative data, while content analysis was used for qualitative data. The finding show that the mean score of respondent's perceptionsimplied that there is inadequate provision of technical knowledge (3.28), limited extension services increasethe difficulties in overcoming vegetable production challenges (4.38), public extension services is diluted by private extension services (2.30), low demonstration of modern crop production principles (2.20) and public extension services contribution is not appreciated (4.60). The study further found that 46.7% and 66.7% of the respondents were never visited by extension officersper month and had no access to public extension services during their vegetable production cycle, respectively. It also, found that there is a statistically significant relationship between access to extension services from extension agents and knowledge level in vegetable production with *P*-value= 0.000. The multiple linear regression model shows a statistically significant relationship between various socio-economic characteristics (household size (*P*= 0.014), marital status (*P*= 0.042), and age (*P*= 0.044)) and vegetable production. It is recommended that Morogoro Municipal Council reconsider increasing the number of public extension staffs in all wards in the urban area.

Key words: Extension services, Knowledge, Sources, Vegetable production, urban agriculture

1.0 Introduction

In Tanzania, the extension service delivery system is a vital component of the country's agricultural development strategy, aimed at empowering farmers, improving productivity, and enhancing livelihoods. It is a non-formal education that provides people with knowledge and skills to cope with their socio-economic problems(Raidimi & Kabiti, 2019). Studies have

shownthat agricultural extension is the best source of agricultural information for farmers, supporting them with important knowledge on various agricultural practices *(Moshobane et al., 2022)*. Without extension services, farmers are likely to suffer failure to access the support and services required to improve their production skills and ongoing market demands *(Olayemi et al., 2021)*.

The Ministry of Agriculture is tasked with overseeing and organizing extension services nationwide, with a predominantly top-down approach to their delivery*(Masanja et al., 2023)*. Under this system, ministry personnel stationed at various levels, from central to regional and district offices, were responsible for providing these services. However, this setup proved ineffective as it failed to align with the needs and preferences of farmers (Msuya, 2021).

The agricultural sector in Tanzania has continued to faceseveral challenges including poor agricultural extension services resulting in low performance, low levels of production, and low output quality*(URT, 2001)*. Consequently, the Government has made significant efforts to improve access to agricultural extension services through the launched Agricultural Sector Development Program II (ASDP II), which aimed at decentralizing the delivery of extension services to local governments by hiring at least one extension officer per village to make sure extension services are more accessible to farmers (URT, 2017). Despite all the efforts made by the Government, experience shows that the system did not work as expected due to different setups of rural and urban agriculture toarticulate farmers' needs in their respective setups *(Masanja et al., 2023)*.

In Tanzania, urban agriculture has relatively been a recent phenomenon compared to its rural counterparts, reflecting global urbanization trends. In the middle of the 1960s, the areas around Dar es Salaam experienced vegetable production, which was highly commercialized compared to the smallholder-oriented out grower schemes provided by agro-industries in rural areas (Kidunga & Shomari, 2021) . It might not be profitable or worthwhile to farm in small urban areas without the right inputs or technology. Moreover, urban areas are argued to offer favorable markets for vegetables, concentration of labor force, rapid assimilation of innovations, high consumption-oriented demand, and expansion of surfaces kept agricultural activities linked for a food security system and environment*(Eigenbrod & Gruda, 2015).*

Urban agriculture is a very common practice and involves livestock keeping, cultivation of crops and horticulture. It includes a variety of activities which can increase income, improve food security, reduce poverty and improve the well-being of the people (C.Howorth et al., 2001),. Besides, as a part of informal sector, urban agriculture has a number of characteristics such as ease of entry, reliance on indigenous resources, small scale of operations, labor intensity, lack of formal training, etc. However, its activities (vegetable cultivation), which is outside mainstream economy, have historically been under-reported. Because there is a shortage of space in urban areas, growing crops coexists with non-agricultural activities, sometimes in environmentally dangerous regions (Sazili et al., 2023). Consequently, this calls for extension services in urban agriculture so as to equip vegetable growers' best practices, including intensive cultivation methods suitable for limited space and contamination mitigation strategies to ensure food safety.

Research has consistently indicated a notable bias in the focus of extension services towards field or cash crops, often at the expense of vegetable production. Rivera and Alex,(2004) found that extension programs in several regions disproportionately allocate resources and attention to major cash crops such as grains and oilseeds, neglecting the unique challenges faced by vegetable farmers. This skewed focus may result in insufficient support and guidance for vegetable producers, hindering the growth and sustainability of this crucial sector.

The implications of this disproportionate focus on field crops are profound, is affecting not only the economic viability of vegetable farming but also food security and nutrition. A comprehensive review by Pingali, (2015) underscores the critical role of vegetables in addressing malnutrition and promoting diversified diets. However, the bias in extension services towards field crops exacerbates the challenges faced by vegetable farmers, impeding their access to modern technologies, market information, and best practices. This unbalanced approach jeopardizes the resilience and sustainability of agricultural systems, ultimately hindering efforts to address broader societal issues related to food security and nutrition.

Man et al. (2017)argued that extension services are essential for urban vegetable growers as they provide vital information and support on urban agriculture practices tailored to the specific needs and challenges of urban environments. The author's further point out that urban vegetable production often faces unique constraints such as limited space, water contamination, soil contamination, and pest management issues. In response to this, Prasetyo et al. (2020) suggest that extension services can offer guidance on suitable crop varieties, innovative cultivation techniques like vertical gardening or container gardening, and environmentally sustainable practices to optimize production while mitigating urban-specific challenges.

Vegetable production in Morogoro municipality is commonly carried out along the river banks, streams and drains that cut across the municipality. Common vegetables grown include Matambele, Amaranthus, pumpkin leafs, salad, chinese and cabbage. In order to increase vegetable production within the city, extension services act as intermediaries that bridge the knowledge gap between research institutions and farmers, empowering them to make informed decisions (Kabir, 2015). According to Zoundji et al. (2018) most vegetables with high nutrient value are susceptible to pest, and disease and are highly perishable which make it necessary to use of insecticides, fungicides, and herbicides. The authors further report that most farmers in Africa have little knowledge of the proper handling of vegetables and thus need to be enhanced with agricultural information through various extension programs.

The impact of extension services on vegetable producers in Tanzania, particularly in urban settings, is profound and wide-ranging. Research indicates that access to extension services positively correlates with improved farming practices and increased vegetable yields (Maginga et al., 2018). Extension agents contribute significantly to enhancing crop quality, implementing effective pest management strategies, and promoting sustainable soil fertility practices (Antwi-Agyei & Stringer, 2021). Through technical assistance and knowledge dissemination, extension services empower vegetable producers to adopt climate-smart practices, contributing to environmental sustainability in urban agriculture.

According to Sheng Tey et al., (2018), agricultural information sources include both public (government employed extension officers), private sources of information including family and friends, input suppliers, NGOs, mass medias and researchers. Farmers need proper agricultural information in order to make well-informed decisions on, among other things, the type and quantity of inputs to use. In addition to that Mapiye et al., (2021) depicted that public extension system is the largest and common source of information for small holder farmers in developing countries.

Furthermore, the effectiveness of extension services in urban areas, particularly concerning their impact on vegetable farmers, remains a critical concern (Bushesha, 2018). Public extension agents in urban areas are employed by the local government at the ward level, who are tasked with serving all farmers in the ward, regardless of number, to provide agricultural extension services in urban areas. Because not all wards have extension workers who are knowledgeable about vegetable growing (Masele, 2024), Morogoro's urban vegetable farmers are unable to take advantage of these services for increased productivity.

Mgalama, (2015), depicted that, agricultural extension services and the role of extension agents are integral components of Tanzania's agricultural development strategy. The impact of these services on vegetable producers, especially in urban areas, is substantial, encompassing improvements in farming practices, economic outcomes, social cohesion, and environmental sustainability. Yet small holder farmers are still dissatisfied by the public extension officers services (Nyawo & Mubangizi, 2021). As urban agriculture continues to grow in importance, the continued emphasis on extension services will be vital for ensuring the resilience and sustainability of vegetable production in Tanzania's urban areas.

According to the study conducted in Magu town by Busungu et al., (2019)found that the ratio of extension officers to farmers was 1:1172 for crop farmers. MoreoverSanga et al., (2013), found that in most developing countries, there are few extension officers to serve many farmers, proving an insight of the situation in Kenya where the ratio of farmers to extension officers is 753:1. This ratio is lower than the one extension staff per village set by the Tanzanian Ministry of Agriculture and falls short of the 1:200–500 World Bank recommended standard ratio.

The agricultural extension service is a critical structure the government created to attain its agricultural developmental goals and precisely support the smallholder vegetable sub-sector. These goals could be achieved by providing appropriate agricultural information and knowledge to enable and capacitatefarmers towards improved, sustainable, and economic development (Maoba, 2016). Several studies have investigated the role of extension services towards the smallholder sub-sector (Abbeam et al., (2018); Msuya et al., (2017); Nyawo and Mubangizi, (2021). Considering various challenges vegetable farmers face(Musa et al., (2018); Rana and Rahaman, (2021), there is no doubt that there is still much to be done in/by the public extension services to ensure its relevance and effectiveness towards the small scale vegetable production. Thus, assessing the value and significance of the public extension services towards small scale vegetable growth and development is required. In light of this, the objectives are to (1) to assess the perceived implications of extension services in urban vegetable production (2) to determine the frequency of visits by public extension agents per month to Morogoro urban vegetable farmers (3) determine the access to public extension services by agricultural small scale vegetable farmers in Morogoro Municipality and (4) testing the relationship between socio-economic characteristics of Morogoro urban vegetable farmers with income in vegetable production.

1.1 Theoretical framework

This study is guided by the agency theory and service delivery theory. Combining agency theory and service delivery theory provides a robust framework for analyzing extension services among Morogoro urban vegetable farmers.(Eisenhardt, 1989; Bosse and Phillips, 2016) explained that, agency theory focuses on the relationship between principals (farmers) and agents (extension service providers) and how this relationship influences behavior and outcomes. In context to this study, Morogoro urban vegetable farmers interact with extension agents who represent government or non-governmental organizations providing agricultural advice and support. The frequency and quality of interaction between farmers and extension agents are crucial. According to agency theory, agents may prioritize certain farmers based on perceived outcomes or incentives, potentially neglecting others if resources are limited. Furthermore, Jensen and Meckling, (1976) depicted that farmers' access to extension services may be influenced by the incentives provided to agents and the monitoring mechanisms in place. If agents are incentivized based on the number of farmers they assist or the adoption rates of recommended practices, this can affect the distribution and quality of services.

Service delivery theory examines how services are provided to and accessed by users, considering factors such as accessibility, quality, and responsiveness. Baig and Aldosari,

(2013) ; Swanson and Rajalahti, (2010) found that, Urban farmers' access to extension services may be influenced by physical proximity to extension offices or outreach points, as well as the availability of mobile extension units. Limited access due to geographic barriers can hinder service uptake. Davis, (1989) found that farmers' perceptions of the relevance, reliability, and timeliness of information provided by extension agent's impact their willingness to engage with and adopt recommended practices. Service delivery theory emphasizes the importance of responsive and tailored services to meet farmers' diverse needs.

2.0 Methodology

This study was conducted in Morogoro Urban district, situated at longitude 37 degrees east of the Greenwich meridian and is one of six districts in the Morogoro region of Tanzania. Morogoro Urban district comprises 19 wards: Mwembesongo, Mjimpya, Kingo, Magadu, UwanjawaTaifa, Saba Saba, Kiwanja cha Ndege, Mzinga, Mlimani, Mjimkuu, Bigwa, Kilakala, Kichangani, Boma, Sultan Area, Kihonda, Mazimbu, Mafiga, and Mbuyuni. The selection of Morogoro Urban was based on its urban and peri-urban nature, where small-scale horticultural farming is practiced due to limited access to urban land for agricultural activities, despite significant population growth*(Masele, 2024)*.

Data available indicates that urban agriculture in Morogoro Municipality engages 32% of the population and contributes approximately 2% to the national horticultural production, primarily in vegetable cultivation (Masele, 2024). Urban horticulture production serves as a crucial survival strategy in Tanzania (Mhango et al., 2014), with Morogoro having distinct advantages over many other regions in Tanzania. Its fertile land, abundant water sources, irrigable areas, and low population density make it an attractive area for horticultural investments.In the urban areas of Morogoro, small-scale vegetable farmers are concentrated in the Ngerengere, Kikundi, and Kichangani river basins, facilitating the distribution and administration of questionnaires.

The population for this study consisted of small-scale vegetable farmers and ward extension officers, chosen for their substantial knowledge of the subject matter. A mixed-method research design was adopted for data collection, combining qualitative and quantitative techniques, based on the specific problem, available resources, time constraints, and desired accuracy level. This approach was deemed advantageous as it allowed for complementary data collection methods, enhancing confidence in the study's conclusions.

Methods employed included interviews and questionnaires featuring both open-ended and closed-ended questions. Sixty respondents completed the questionnaires. Purposive sampling was used to select two ward extension officers and four lead farmers from four horticultural crop production areas: Kichangani, Mazimbu, Kingo, and Magadu. Additionally, a convenience sampling technique was utilized to select the 60 respondents to answer the questionnaire, ensuring ease of distribution and administration. This technique was chosen for its cost-effectiveness and time efficiency.

Qualitative data were analyzed using content analysis. Quantitative data were analyzed using the Statistical Package for Social Sciences (version 20) softwarewhereby descriptive statistics such as frequency, percentages, mean and standard deviation were used to make analysis. The tables for mean were used to show differences across subgroups from which inferences and conclusions were made.To establish the association between access of extension services from public extension officers and level of knowledge and skills of the vegetable producers, a critical examination utilizing statistical analysis is imperative. Chi-square at 0.05 level of significancewas used in this study, the analysis is a pertinent tool for determining the significance of associations between categorical variables. Furthermore, the multiple linear regression model was used to showa statistical significance on the

relationship between various socio-economic characteristics (household size, marital status, and age) with vegetable production in terms of income.

The model: Y =$\beta 0+\beta 1X1 + \beta 2X2+ \beta 3X3 + \beta 4X4 + \beta 5X5 +$ ..... + $\beta nXn + \varepsilon$

Whereby: $\beta 0$=Y-intercept, β= Regression coefficient, ε=Error term, $X1$ ….Xn= Independent variables, Y The dependent variable = vegetable production (income from vegetable production) X 1 = Household Size X 2 = Marital status X 3 = Sex X 4 = Age X 5 = Total number of the source of extension services.

The socio-economic characteristics of the respondents were analyzed with frequencies and percentages. Individual variables relating to the farmers (Age, sex, and marital status, level of education and frequency of visits by extension agent per month and sources of agricultural information within the demographic area) were recorded and provide information about the farmers. Farmers' perceived role of agricultural extension in vegetable production in the Municipality was measured using mean count. Farmers' perceived implication of agricultural extension services in urban vegetable production in the study area was organized in 11 statements (items). Farmers' perception of each of these items was scaled in a five point Likert-type scale of: strongly agree (5), Agree (4), Neutral (3), disagree (2) and strongly disagree (1). Values of the points were summed to get 15 and divided by the number of values to get 3 as the mean. In order to ascertain the perceived need of the farmers and determine the best approach to enhance their perception of the topic, the items were grouped into three categories according to their mean scores. Items with mean score of 0 to 2.49 were categorized into negative perception; items with mean score of 2.5 to 3.49 were categorized into neutral perception, while items with mean score of 3.5 to 5 were categorized into positive perception.

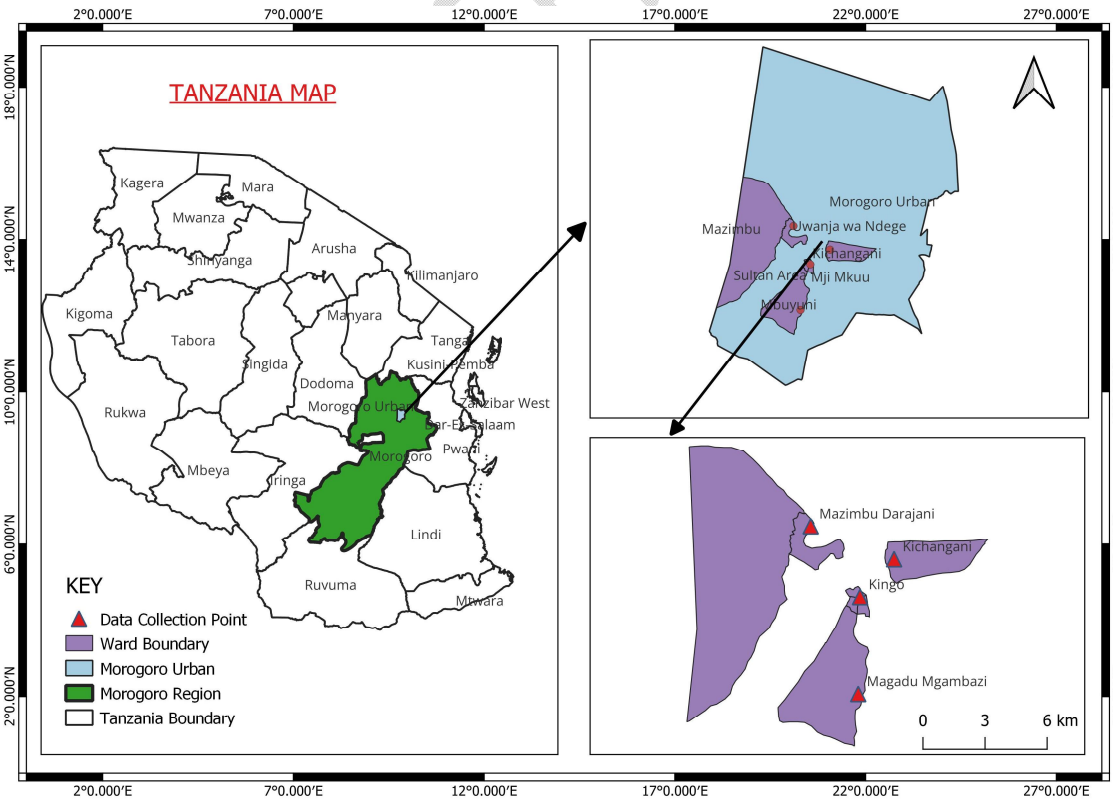

Figure 1: Map of Morogoro Urban district showing the location of the study area

3.0 Results and discussion

Socio-economic characteristics of respondents

The section presents the demographic information including age, sex, marital status, and education level of the respondent.

Table 1: Socio-economic characteristics of respondents (N=60)

Respondent age(years)	*Frequency*	*Percent*
18-28	6	10.0
29-39	7	11.7
40-50	17	28.3
51-61	20	33.3
Above 61	10	16.7
Sex of the respondent		
Male	43	71.7
Female	17	28.3
Marital status		
Single	12	20.0
Married	48	80.0
Education level		
Non formal education	4	6.7
Primary education	49	81.7
Secondary education	7	11.6

Table 1 shows the age of the respondents. Out of 60 respondents, 6 respondents(10.0%) fall under the age group of 18-28; 7 (11.7%) fall under the age group 29-39; 17 (28.3%) fall under the age group 40-50; 20 (33.3%) fall under the age group of 51-61 and 10 (16.7%) fall under the age group of 62 and above. Sex of the respondents. Out of 60 respondents, 43(71.7%) were males while, and 17(28.3%)were females. Majority of farmers (71.7%) were males.

The marital status of vegetable growersindicates that, 12 respondents (20.0%) were single, and 48 (80.0%) were married. In regard to the respondents' education level, the findings indicate that, 4 (6.7%) had the non-formal education level, 49(81.7%) had the primary level education while 7(11.6%) had secondary level education.

The reported monthly income varies widely, with the minimum income being Tsh.2000, the maximum income reaching Tsh.800,000, and an average (mean) income of Tsh.167,700. The relatively high standard deviation indicates a considerable dispersion or variability in the income levels among the respondents.The data on the size of the garden indicates that respondents have gardens ranging from 0.0250 acres to 3.0000 acres. On average, the reported size of the gardens is 0.610417 acres. The standard deviation of 0.6638724 acres suggests a moderate degree of variability in the garden sizes among the respondents. In summary, these statistics provide a snapshot of the income levels and garden sizes among individuals involved in vegetable production. The range, mean, and standard deviation offer insights into the diversity and dispersion of these variables within the sample.

Table 2: Respondents income levels and Garden sizes.

Variables	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Respondent monthly income	60	2000	800000	167700.00	169225.885
Size of the garden	60	.0250	3.0000	.610417	.6638724

3.1 Results and discussion based on objectives

The study findings are presented following the objectives of the study which are to assess the perceived implications of extension services in urban vegetable production, frequency of visits by public extension agents per month to Morogoro urban vegetable farmers, access to public extension services by agricultural small scale vegetable farmers in Morogoro Municipality and testing the relationship between socio-economic characteristics of Morogoro urban vegetable farmers with income in vegetable production.

3.2: Farmers' perceived implication of agricultural extension services in urban vegetable production

Farmers' perceived implication of agricultural extension services in urban vegetable production was measured using mean count and was organized in 11 statements (items). Farmers' perception of each of these items was scaled in a five point Likert-type scale of: strongly agree (5), Agree (4), Neutral (3), disagree (2) and strongly disagree (1). Values of the points were summed to get 15 and divided by the number of values to get 3 as the mean. In order to ascertain the perceived need of the farmers and determine the best approach to enhance their perception of the topic, the items were grouped into three categories according to their mean scores. Items with mean score of 0 to 2.49 were categorized into low perception; items with mean score of 2.5 to 3.49 were categorized into moderate perception, while items with mean score of 3.5 to 5 were categorized into high perception.

The perception levels of vegetable producers can vary widely, influenced by factors such as education, experience, and access to information. While some producers may have formal education in agriculture, others rely on traditional farming practices passed down through generations.

Table 3indicates that farmers perceived highly on seven out of eleven item statements tested. First "Extension services contribution is not acknowledged as helpful to vegetable producers"(mean=4.60), this imply the minimum contact that vegetable producers have with public extension services. Second "The information and skills provided from extension services should improve the performance of vegetable production and farmers attitudes" (mean=4.32), this suggests that public extension service delivery is still needed for the vegetable producers to improve their production. Third "the extension services provided acknowledged the local knowledge and built from it" (mean =4.23), this imply the little knowledge that vegetable farmers have is appreciated by public extension officer before introducing new knowledge. This also entail a bottom up approach of extension service. Fourth, "extension services provided should cover wide range of issues affecting vegetable producers and production" (mean=4.33). This is the case because vegetable producer face multidisciplinary problem and the little public extension service they received did not cover much. Fifth, "extension services increased my knowledge and skills on vegetable production" (mean=4.20), this is a positive implication as vegetable producers appreciated the knowledge and skills imparted to them. Sixth, "absence of extension services increases the difficulties in overcoming vegetable production challenges" (mean=4.38), this was widely emphasized as majority of vegetable producers needed technological support to overcome their production challenges. Last but not least "Urban vegetable producers recognizes both extension services from public and private extension providers" (mean=4.13). Here the implication is that due to limited public extension services, vegetable producers appreciated the existence and support from private extension provider who also are not readily available. Farmers with a good access to extension services are more likely to implement best practices and adopt innovative techniques in their urban farming operations.

On the other hand, items that have score for very low perception are extension services are offered to farmers for the purpose of demonstration of modern crop production principles (mean=2.20), This could imply that extension services in this context may have ineffectively prioritize the demonstration of contemporary agricultural practices to the vegetable producers. And, urban vegetable producers acknowledged that public extension services are diluted by private extension services (mean=2.30). The statement suggests that urban vegetable producers, on average, perceive that private extension services are having a negative impact on the influence or effectiveness of public extension services in their context. This could have implications for how agricultural support systems are structured and funded in urban areas, as well as for the choices made by producers in seeking advice and guidance for their vegetable farming activities. This may call for a better way to reach vegetable producers in urban areas by adopting ICT mediated extension services which will enable farmers to access extension services more conveniently (Sanga et al., 2013).

Table 3: Farmers' perceived implication of agricultural extension services in urban vegetable production

Statement	Mean	SD
Extension services are offered to farmers for the purpose of demonstration of modern crop production principles	2.20	.684
Extension services contribution is not recognized by many but is helpful to vegetable producers	4.60	.694
Extension service providers are required to provide technical knowledge about vegetable production	3.28	.454
The information and skills provided from extension services should improve the performance of vegetable production and farmers attitudes	4.32	.469
The extension services provided acknowledged the local knowledge and build from it.	4.23	.593
Extension services provided should cover wide range of direct and indirect issues affecting vegetable producers and production	4.33	.572
Extension services increased my knowledge and skill on the vegetable production	4.20	.403
Vegetable producers recognize the extension service provided from other sources other than public extension officers	3.08	.432
Absence of extension services increases the difficulties in overcoming vegetable production challenges	4.38	.490
Urban vegetable producers recognizes both extension services from public and private extension providers	4.13	.343
Urban vegetable producers acknowledged that public extension services is diluted by private extension services	2.30	.809
Grand Mean	3.73	

3.3Frequency of visits by extension agents

Frequency of visits were also determined in this research study. The findings show that 46.7% of the respondents said that they were never visited by public extension agents, 23.3% were visited one to two times by public agricultural extension agents, 5% said that they were visited three to four times per month by public agricultural extension agents, and 25% were visited every time they needed the public agricultural extension agent. The fact that nearly half of the respondents have never been visited by public extension agents suggests that there is a significant portion of the urban vegetable producers in the study area that are not benefiting from the expertise, guidance, and resources that public extension services can provide taking into consideration most of the vegetable growing circle takes about three months and amaranth which takes only three weeks to harvesting. This implies that collaboration and coordination between extension services and urban vegetable

producers should be strengthened. These results agree with Masele, (2024)who reported that vegetable farmers in Morogoro urban district lack frequent contact with extension agents and among the possible reasons were thought to be lack of motivation by extension agents or even failure of extension agents to perform their job well. Also, it could be because of extension agents playing roles other than their primary roles and/or the failure of farmers to demand extension services. Some urban vegetable farmers might not see the value in extension agent visits, especially if they believe their farming practices are already successful or if they lack awareness of how extension services can help them improve their operations.This was supported by one of the key informant who revealed that:

""We don't get to see the extension agent in our area because it is too far, hilly, and mountainous, which makes it not easily accessible for the extension agent to visit frequently. Perhaps if our ward had more than one extension agent, these services could be available whenever needed (One of the Lead farmer, 14th February 2023)".

In addition, another lead farmer was quoted saying,

".……We have seen an extension agent here, but he is not competent in dealing with the pests affecting our crops and doesn't know how to obtain the appropriate pesticides to minimize our crop losses. Sometimes he visits us, we discuss our production challenges, and he promises to return with possible solutions, but we haven't seen him since then."(April 4, 2023, Kingo)

Extension contact is very much essential to acquire knowledge and skills on latest technological developments on farm activities. According to Nayak andBanerjee, (2022), good extension contact helps in acquiring technological information regularly for use in their farm activities. Contacting the extension officials pertaining to their field of occupation is important for the vegetable growers. They might be regularly approaching the concerned officers to update the information regarding new improved practices related to vegetable cultivation. In the study done by (Nyawo & Mubangizi, 2021), it was found that farmers were never visited by public extension agent even though they needed assistance in agricultural practices like seed selection, and farmer relied on the traditional knowledge of farming.

Table 4:Frequency of visits by extension agents per month in the study area (N=60)

Frequency of Visits	Frequency	Percent
Never visited	28	46.7
One to two times	14	23.3
Three to four times	3	5
Every time i needed him/her	15	25

3.4Access to extension services from public extension agents.

This part aimed at discussing the level of farmers' access to agricultural extension services from public extension agents.Results show that majority (66.7 %) of the respondents had no access to public agricultural extension services, while only 33.3 % of the respondents had access to public agricultural extension services. This finding is in line withGwary and Ogunbameru, (2008) and T. O. Fadiji, (2005). This finding has various implications to vegetable producers in the study area. The findings of this study match those of the study conducted by Myeni et al., (2019), on the barriers affecting the sustainable agricultural productivity of smallholder farmers in the Eastern Free State in South Africa. They discovered that many farmers (99%) did not have access to extension services, with only 1% having access to extension services on crop production.This was supported by one of the key informant who revealed that:

"Some Wards in Morogoro Municipality currently have no public extension agents, farmers rely more on indigenous knowledge, input suppliers and fellow farmers to overcome challenges during production like managing pest and diseases. Also we are facing market problems as for now the production cost have been so high but the price in the market is still very low. Given this scenario, farmers need to be more aware about market opportunities and value addition which could help in raising the price of vegetables around the city (One of the Ward Extension officer, 16th February 2023)".

Table 5: Access to extension services from public extension agents.

	Frequency	Percent
Access Yes	20	33.3
No	40	66.7

3.5 Chi square analysis to test association.

Table 6shows that there is association between access of extension services from public extension officers and level of knowledge and skills of the vegetable producers. This association was found to be significant at 5% which was similarly observed by (Shausi & Ahmad, 2021) who reported that there is an association between access to extension services and farmers' skills and knowledge in crop production through access of agricultural related information from extension providers.

Table 6: Associations between access to extension services and knowledge and skills level.

Access to extension services		**Knowledge and skills level in the vegetable production**				
		Strongly agree	Agree	Neutral	Strongly disagree	Total
No	Count	1	1	0	1	3
	Expected	1.8	1.2	0.1	0.1	3.0
Yes	Count	34	22	1	0	57
	Expected	33.3	21.8	1.0	1.0	57.0
Total	Count	35	23	1	1	60
	Expected	35.0	23.0	1.0	1.0	60

In summary, the results suggest a significant association between access to agricultural extension services and respondents' opinions about whether these services increased knowledge and skill in vegetable production. The Pearson Chi-Square Test=0.000 with degree of freedom=1 and n=60 and Linear-by-Linear=0.003 Association tests show stronger evidence of association. However, the caution is advised due to the low expected counts in some cells.

Table 7. Chi square table

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.412a	3	0.000
Likelihood Ratio	6.513	3	0.089
Fisher's Exact Test	8.530		
Linear-by-Linear Association	9.002c	1	0.003

N of Valid Cases	60		

3.6 Socio-economic characteristics relation to vegetable production

Table8: Multiple Regression Model (MRM)

newvar	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Hhs	0.422	0.165	2.55	0.014	0.09	0.753	**
Maritalstat	0.17	0.081	2.09	0.042	0.007	0.333	**
Sex	-0.287	0.158	-1.82	0.075	-0.604	0.029	
Age	-0.141	0.068	-2.06	0.044	-0.278	-0.004	**
Varr	0.114	0.054	2.10	0.040	0.005	0.223	**
Constant	9.592	0.374	25.63	0.000	8.842	10.342	***

R-squared	0.263	Number of obs	60

**** p<.01, ** p<.05, * p<.1*

Table 8 shows the coefficients of the model and the results of the t-test, used to study the significance of the regression coefficients. P-values < 0.05 were considered statistically significant. The p-value was less than 0.05 for the household size (hhs), the head of household marital status (Maritalstat), age of head of household (Age) and total number of the source of extension services (varr). Among these variables that significantly influence vegetable production that measured in form of income (newvar), the household size has the highest coefficient in accordance with the definition of vegetable production (newvar). R squared is 0.263 which specify that the model predictor variables described the target variable by 26% which is acceptable (Ozili, 2023).

The findings presented indicate a statistically significant relationship between the independent variables of household size (*P=0.014*), marital status (*P*=0.042),total number of the source of extension services (*P*=0.040), age (*P*=0.044), and the dependent variable vegetable production. This means these variables significantly influence income from vegetable production.

Household size negatively and significantly (*P*=0.014) with the coefficient of 0.422 influenced vegetable production, implying that the larger household, the higher the vegetable produced hence increased income to household. The results are in contrast with the results in the previous findings as presented under factors contributing to vegetable production. However, these findings are in conformity with the results in the study by Masanja et al., (2023) and Kimambo et al., (2022)who observed that the larger the household size, the greater the responsibilities, especially, in a situation where many of the household members do not generate any income but only depend on the household head.

The association between marital status and vegetable production was positive and statistically significant (*P*=0.042) with the coefficient of 0.17. This implies that married people had more access to vegetable production activities than the rest, but this shouldnot be a surprise since a couple has a great impact in decision making in regard to vegetable production. This finding is consistent with the findings reported by Osei et al., (2017)and Mhango et al., (2014)that urban vegetable farming is probably practiced to provide food and income for families.

The age of the household head had a negative coefficient(0.141) that was significant (*P*= 0.044), this probably indicate that the older the household head, the lower the probability that the household would engage in vegetable production which will lead to low income. This

finding is consistent with the findings reported by Mdoda, (2023)and Mhango et al., (2014) that urban vegetable farming is generally practiced by adults aged 20-40 years and starts to decrease beyond that. This is the most active group in farming activities, a reflection of the fact that the majority ofurban farmers in the study were adults, and could be assumed to be active and adventurous, given the energy-demanding nature of vegetable farming. These farmers were more likely to patronize a wide variety of information sources.

Total number of the source of extension services was significant (*P*= 0.040), with a positive coefficient of 0.114, this indicates that as farmers' easily access extension services from different sources the more he/she is likely to engage more in vegetable production hence increase in income.This finding is consistent with (Adesiji and Kehinde, 2013;Anim, 2010; T. O. Fadiji, 2005) who found that regular access to extension services from various sources can effectively change farmers impression and attitudes to the extension services and subsequently innovation being promoted. Consequently, frequent visit from extension agents may increase vegetable production which will lead into increased income level.

4.0 Conclusion and Recommendations

The study found that, many vegetable producers are still struggling with limited knowledge and skills in producing vegetable and they still had a challenge accessing and utilizing the information from extension services. The findings show that the limited public extension services implied that there is inadequate provision of technical knowledge, limited extension services increases the difficulties in overcoming vegetable production challenges, public extension services is diluted by private extension services, no demonstration of modern crop production principles and public extension services contribution is not appreciated.The fact that nearly half of the respondents have never been visited by extension agents suggests that there is a significant portion of the urban farming community that is not benefiting from the expertise, guidance, and resources that extension services can provide.

Effective extension services are essential for enhancing the knowledge of vegetable producers, ultimately leading to increased productivity and improved livelihoods. Therefore, there is an urgent need for increasing the number of extension staffs in urban areas.This suggests that there are few number of public extension officers and that more public extension service is needed.

Urban vegetable producers and extension services should take this opportunity to address gender equity issues in agriculture and promote the inclusion and empowerment of female participants. Therefore, it is important to encourage more women to engage in urban vegetables agriculture. However, it's also important not to neglect other age groups. Extension services and urban vegetable producers should consider strategies to engage and educate individuals of all ages to ensure the long-term viability of urban agriculture.

Also, in terms of extension services or agricultural programs, recognizing the diversity in marital status allows for more targeted and relevant outreach efforts. Extension services may need to tailor their information and support to accommodate the unique circumstances and needs of both married and single farmers.

Consent

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etchave been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

5.0 References

Abbeam, G. D., Ehiakpor, D. S., & Aidoo, R. (2018). Agricultural extension and its effects on farm productivity and income : insight from Northern Ghana. *Agriculture & Food Security*, 1–10. https://doi.org/10.1186/s40066-018-0225-x

Adesiji, G. B., & Kehinde, F. B. (2013). *Women Farmers ' Attitudes Towards Agricultural Extension Services in Southwestern Nigeria*. *7*(June).

Anim, F. D. K. (2010). Effects of extension services of firms offering contract farming: A case study of small scale maize farmers in the Limpopo province of South Africa. *African Journal of Agricultural Research*, *5*(7), 514–517. https://doi.org/10.5897/AJAR09.645

Antwi-Agyei, P., & Stringer, L. C. (2021). Improving the effectiveness of agricultural extension services in supporting farmers to adapt to climate change: Insights from northeastern Ghana. *Climate Risk Management*, *32*(March), 100304. https://doi.org/10.1016/j.crm.2021.100304

Baig, M. B., & Aldosari, F. (2013). Agricultural extension in Asia: Constraints and options for improvement. *Journal of Animal and Plant Sciences*, *23*(2), 619–632.

Bosse, D. A., & Phillips, R. A. (2016). Agency Theory and Bounded Self-Interest Journal: Academy of Management Review Academy of Management Review Agency Theory and Bounded Self-Interest. *Journal of Financial Economics*, *15*(3), 857–878. http://dx.doi.org/10.1016/j.jfineco.2015.12.003%0Ahttp://search.ebscohost.com/login.aspx?direct=true&db=aph&%2338;AN=4369846&%2338;site=ehost-live

Bushesha, M. . (2018). The role of Urban Ugriculture on livelihood in Bariadi township Simiyu Region Tanzania. *Huria Journal*, *25*(2), 96–117.

Busungu, C., Gongwe, A., Naila, D. L., & Munema, L. (2019). COMPLEMENTING EXTENSION OFFICERS IN TECHNOLOGY TRANSFER AND EXTENSION SERVICES : UNDERSTANDING THE INFLUENCE OF MEDIA AS COMPLEMENTING EXTENSION OFFICERS IN TECHNOLOGY TRANSFER AND EXTENSION SERVICES : UNDERSTANDING THE INFLUENCE OF MEDIA AS CHANGE AGENTS. *International Journal of Research -GRANTHAALAYAH*, *7*(6), 248–269. https://doi.org/10.29121/granthaalayah.v7.i6.2019.802

C.Howorth, I.Convenry, & P.O.Keefe. (2001). *Gardening to reduce hazard: Urban agriculture*

in Tanzania.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339. https://doi.org/10.2307/249008

Eigenbrod, C., & Gruda, N. (2015). Urban vegetable for food security in cities. A review. *Agronomy for Sustainable Development*, *35*(2), 483–498. https://doi.org/10.1007/s13593-014-0273-y

Eisenhardt, K. M. (1989). Agency Theory : An Assessment and Review Linked references are available on JSTOR. *Agency Theory : An Assessment and Review*, *14(1)*(1), 57–74.

Gwary, M. M., & Ogunbameru, B. O. (2008). *Analysis of Farmers ' Access to and Perception of Extension Service Delivery in Borno State , Nigeria*. *12*(1).

Jensen, M. C., & Meckling, W. H. (1976). Also published in Foundations of Organizational Strategy. *Journal of Financial Economics*, *4*, 305–360. http://ssrn.com/abstract=94043Electroniccopyavailableat:http://ssrn.com/abstract=94043http://hupress.harvard.edu/catalog/JENTHF.html

Kabir, K. H. (2015). *Attitude and Level of Knowledge of Farmers on ICT based Farming General Background changing world has been recognized as an essential mechanism the door step of the farmers . productive and profitable than they could be . The reasons at the right time and*. *II*(10), 13177–13196.

Kidunga, J., & Shomari, A. (2021). Urban Agriculture: Critical Issues Of Land Administration for Expansion of the Farming Of Vegetables in Dar es Salaam. *Journal of the Geographical Association of Tanzania*, *36*(1), 1–14. https://doi.org/10.56279/jgat.v36i1.136

Kimambo, J. J., Macharia, J., & Nenguwo, N. (2022). Johnson James Kimambo John Macharia Ngoni Nenguwo. *The Pharma Innovation Journal*, 13353–13371.

Maginga, T. J., Nordey, T., & Ally, M. (2018). Extension System for Improving the Management of Vegetable Cropping Systems. *Journal of Information Systems Engineering & Management*, *3*(4). https://doi.org/10.20897/jisem/3940

Man, N., Umar, S., & Tiraieyari, N. (2017). Urban and Peri-Urban Agriculture for Sustainable Livelihoods in Malaysia: The Role of Extension Services. *Urban Farming in Malaysia: Improving Food Security While Greening the Environment*.

Maoba, S. (2016). FARMERS' PERCEPTION OF AGRICULTURAL EXTENSION SERVICE DELIVERY IN GERMISTON REGION, GAUTENG PROVINCE, SOUTH AFRICA. *S. Afr. J. Agric. Ext.*, *44*(June), 167–173.

Mapiye, O., Makombe, G., Molotsi, A., Dzama, K., & Mapiye, C. (2021). Towards a revolutionized agricultural extension system for the sustainability of smallholder livestock production in developing countries: The potential role of icts. *Sustainability (Switzerland)*, *13*(11). https://doi.org/10.3390/su13115868

Masanja, I., Shausi, G. L., & Kalungwizi, V. J. (2023). Factors Influencing Rural Farmers' Access to Agricultural Extension Services Provided by Private Organizations in Kibondo District, Tanzania. *European Journal of Agriculture and Food Sciences*, *5*(5), 115–122. https://doi.org/10.24018/ejfood.2023.5.5.722

Masele, J. J. (2024). Information needs and sources used by small-scale horticulture farmers in Morogoro urban, Tanzania. *University of Dar Es Salaam Library Journal*, *18*(2), 115–

135. https://doi.org/10.4314/udslj.v18i2.9

Mdoda, L. O. and L. (2023). SERVICES TOWARD SUSTAINABLE LIVELIHOODS AND SELF-RELIANCE IN. *African Journal of Food, Agriculture, Nutrition and Development*, *23*(4), 23000–23025.

Mgalama, P. V. (2015). The role of agricultural extension services in socio-economic development of east Africa: A critical review. *Africanus: Journal of Development Studies*, *44*(1), 53–64. https://doi.org/10.25159/0304-615x/61

Mhango, S., Sewando, P., & Magesa, R. (2014). Urban vegetable production as a survival strategy in Tanzania : A case of Morogoro municipal Urban vegetable production as a survival strategy in Tanzania : A case of Morogoro municipal. *International Journal of Innovation and Scientific Research*, *2*(September), 177–189.

Moshobane, M., Maake, S., & Antwi, M. A. (2022). Farmer ' s perceptions of effectiveness of public agricultural extension services in South Africa : an exploratory analysis of associated factors. *Agriculture & Food Security*, *7*, 1–15. https://doi.org/10.1186/s40066-022-00372-7

Msuya, C. P. (2021). Changes in the Agricultural Sector and Extension Workers Roles: Implications to Training Sector in Tanzania. *Tanzania Journal of Agricultural Sciences*, *20*(1), 1–14.

Msuya, C. P., Annor-Frempong, F. K., Magheni, M. N., Agunga, R., Igodan, C. O., Ladele, A. A., Huhela, K., Tselaesele, N. M., Msatilomo, H., Chowa, C., Zwane, E., Miiro, R., Bukeyn, C., Kima, L. A., Meliko, M., & Ndiaye, A. (2017). The Role of Agricultural Extension in Africa'S Development, The Importance of Extension Workers and The Need for Change. *International Journal of Agricultural Extension*, *5*(1), 59–70.

Musa, K., Van, N. P., & Retief, C. P. (2018). Challenges of contract farming among small-scale commercial vegetable farmers in Eastern Cape South Africa. *Journal of Agricultural Extension*, *22*(3), 195–206. https://doi.org/10.4314/jae.v22i3.19

Myeni, L., Moeletsi, M., Thavhana, M., Randela, M., & Mokoena, L. (2019). Barriers affecting sustainable agricultural productivity of smallholder farmers in the eastern free state of South Africa. *Sustainability (Switzerland)*, *11*(11), 1–18. https://doi.org/10.3390/su11113003

Nayak, B., & Banerjee, P. K. (2022). An analysis of socio-economic profile characteristics of vegetable growers in Odisha. *The Pharma Innovation Journal*, *11*(8), 1770–1774.

Nyawo, J. C., & Mubangizi, B. C. (2021). PERCEPTION OF AGRICULTURAL SMALLHOLDER FARMERS ON PUBLIC EXTENSION AND ADVISORY SERVICES IN ETHEKWINI MUNICIPALITY, KWAZULU-NATAL PROVINCE. *JOURNAL OF SOUTHWEST JIAOTONG UNIVERSITY*, *56*(june), 1–12.

Olayemi, S. S., Ope-oluwa, A. A., & E, S. O. (2021). Agricultural Extension Theories and Practice in Sub- Saharan Africa : A Critical Agricultural Extension Theories and Practice in Sub- Saharan Africa : A Critical Review. *Journal of Agricultural Science and Soil Science*, *1*(1), 20–28. https://doi.org/10.5281/zenodo.4587438

Osei, S. K., Folitse, B. Y., Dzandu, L. P., & Obeng-Koranteng, G. (2017). Sources of information for urban vegetable farmers in Accra, Ghana. *Information Development*, *33*(1), 72–79. https://doi.org/10.1177/0266666916638712

Ozili, P. K. (2023). The acceptable R-square in empirical modelling for social science

research. *Munich Personal RePEc Archive*, *115769*.

Pingali, P. (2015). Agricultural policy and nutrition outcomes – getting beyond the preoccupation with staple grains. *Food Security*, *7*(3), 583–591. https://doi.org/10.1007/s12571-015-0461-x

Prasetyo, A. S., Aulia, A. N., & Sinaga, A. S. (2020). Performance of Agricultural Extension Workers in Implementing Urban Agriculture Programs in Banyumanik District, Semarang City, Indonesia. *Journal of Socioeconomics and Development*, *3*(1), 29. https://doi.org/10.31328/jsed.v3i1.1315

Raidimi, E. N. and Kabiti, H. M. (2019). A REVIEW OF THE ROLE OF AGRICULTURAL EXTENSION AND TRAINING IN ACHIEVING SUSTAINABLE FOOD SECURITY: A CASE OF SOUTH AFRICA. *S. Afr. J. Agric. Ext.*, *47*(3), 120–130.

Rana, M. M., & Rahaman, H. (2021). Problem Confrontation of Vegetable Growers in Production and Marketing of Vegetables: Evidence from Northern Region of Bangladesh. *Journal of Agriculture, Food and Environment*, *02*(04), 33–40. https://doi.org/10.47440/jafe.2021.2406

Rivera, W. M., & Alex, G. (2004). Extension system reform and the challenges ahead. *The Journal of Agricultural Education and Extension*, *10*(1), 23–36. https://doi.org/10.1080/13892240485300051

Sanga, C., Kalungwizi, V. J., & Msuya, C. P. (2013). Building an agricultural extension services system supported by ICTs in Tanzania: Progress made, Challenges remain. *International Journal of Education and Development Using Information and Communication Technology*, *9*(1), 80–99.

Sazili, S., Ju'im, J., Sri, I., & Riyanto, E. (2023). International Journal of Social Science Research and Review. *International Journal of Social Science Research and Review*, *5*(1), 159–165.

Shausi, G. L., & Ahmad, A. K. (2021). *Attitude of Crop Farmers towards Public Agricultural Extension Services : Implication for Extension Programming in Tanzania*. *1*(1), 40–47.

Sheng Tey, Y., Brindal, M., Li, E., Gill, G., Bruwer, J., Abdullah, A. M., Radam, A., Ismail, M. M., & Darham, S. (2018). Factors Affecting the Selection of Information Sources of Sustainable Agricultural Practices by Malaysian Vegetable Farmers. *Journal of Agricultural and Food Information*, *19*(2), 162–175. https://doi.org/10.1080/10496505.2017.1328310

Swanson, B. E., & Rajalahti, R. (2010). Extension and Advisory Systems: Procedures for Assessing, Transfomring, and Evaluating Extension Systems. *World Bank Agriculture and Rural Development Discussion Paper 45*.

T. O. Fadiji, T. K. A. and J. P. V. (2005). SOURCES AND USE OF EXTENSION INFORMATION AMONG MAIZE. *JOURNAL OF AGRICULTURE AND SOCIAL RESEARCH*, *5*(1), 11–17.

URT. (2001). *The United Republic of Tanzania: Agriculturalsectordevelopmentstrategy.Pdf* (p. 4).

URT. (2017). *The United Republic of Tanzania: Agricultural sector development programme*. *May*, 1–55. http://www.fao.org/righttofood/inaction/countrylist/Tanzania/Tanzania_ASDP_GovernmentProgramnmeDocument.pdf (Accessed 10 September 2011

Zoundji, G. C., Okry, F., Vodouhê, S. D., Bentley, J. W., Zoundji, G. C., Okry, F., Vodouhê, S. D., & Bentley, J. W. (2018). *Towards sustainable vegetable growing with farmer learning videos in Benin*. *5903*. https://doi.org/10.1080/14735903.2018.1428393