RURAL PLANNING JOURNAL
Website: https://journals.irdp.ac.tz/index.php/rpj

DOI: https://doi.org/10.59557/rpj.26.1.2024.78

Factors Affecting Access to Agricultural Inputs among Smallholder Tobacco Farmers in Kahama District, Tanzania

Hija W. Mwatawala[1*] Talita J. Lupembe[2] and Mihayo M. Maguta[1]

[1]Institute of Rural Development Planning, Donbosco Road, 41213 Mbwanga, P. O. Box 138 Dodoma, Tanzania
[2]Shinyanga Regional Commissioner's Office, P. O. Box 320, Shinyanga,Tanzania

*Corresponding author: hmwatawala@irdp.ac.tz

Abstract

Appropriate application of agricultural inputs plays a significant role in offsetting the adverse effects of climate change on agriculture including in tobacco production. Use of agricultural inputs has been reported to improve quantity, quality and market value of tobacco worldwide. In view of that, this study was undertaken to assess the factors affecting access to agricultural inputs among tobacco smallholder farmers in Kahama District. Additionally, the study determined the effects of inputs applications on tobacco production. The interview method using structured questionnaires was employed to collect primary data from a sample of 180 tobacco smallholder farmers obtained through random sampling. The data were analysed through descriptive and inferential statistics. Findings revealed that 77.2% of smallholder farmers had an access to agricultural inputs while 22.8% did not. Access to these agricultural inputs was through Agricultural Marketing Cooperative Societies (AMCOS) (100.0 %), fellow farmers (68.3%), and agro-input dealers (48.2%). Furthermore, findings showed that price (p=0.029), AMCOS membership (p=0.000), awareness (p=0.045), frequency of usage (p=0.000), credit accessibility (p=0.012) and farm size (p=0.048) were the significant factors that influenced smallholder farmers to access agricultural inputs. Moreover, the effects of agricultural inputs applications on tobacco production were; increase of tobacco leaf size (100.0%), resilience to pests and disease (97.3%), quality of produced tobacco (91.3%) and amount of produce (80.6%). The study concludes that most farmers have access to agricultural inputs, and that access is influenced by a number of important factors. There are several ways that inputs impact tobacco production. The study strongly suggests that in order to improve accessibility and input usage, farmers should be encouraged to join AMCOS and get access to credit.

Keywords: Agricultural Inputs, Access, Tobacco farming, Smallholder farmers

1.0 Introduction

Globally, tobacco is grown in over 120 countries, on over 4 million hectares of land (Barla and Kumar, 2019). In the past 20 years, the production of tobacco leaves has decreased by more than one-third in developed countries and increased by two-thirds in developing countries (World Bank, 2020). Over the past 20 years, tobacco companies have been encouraging more and more countries to grow tobacco, thus creating an oversupply of raw tobacco that results in low prices for the crop (Eriksen *et al.*, 2016). Agricultural production plays an important role in the world economy, as over one billion people worldwide work in agriculture, generating up to $8.35 trillion for the global economy (World Bank, 2017).

Tobacco is one of the most important cash crops and is considered as a domineering industrial crop. Tobacco is more proficient than any other crop in producing a massive amount of biofuel if cultivated for energy production instead of smoking (Andrianov et al., 2010, Barla and Kumar, 2019). In Indonesia, Ananda et al. (2019) reported that the tobacco industry positively impacts the economy through significant contributions to state revenue, employment creation, and linkage to job opportunities in various economic sectors.

In 2020, sub-Saharan Africa was home to five of the top tobacco-producing countries in the world, including Zimbabwe (4th), Mozambique (7th), Malawi (10th), and Tanzania (11th) (FAO, 2022). Tanzania has a huge potential for tobacco production, which is dominated by smallholder farmers, constituting about 70%. Since the agricultural sector is the mainstay of its economy which provides a source of employment and income generation, it accounts for approximately 30 percent of its gross domestic product, 75 % of employment and 65 % of raw materials for the manufacturing sector (Eriksen et al., 2016). However, climate change has been reported to trigger a decline in agricultural production globally, including tobacco production. Hidayat et al. (2016) observed that rainfall variability caused by climate change leads to devastating droughts leading to a significant drop in crop production. In Indonesia, climate variabilities have significantly affected the rainfall pattern leading to increased chances of tobacco crop failure (Muttaqin *et al.*, 2019). According to Herlina et al. (2020), tobacco belongs to the commodities that are very sensitive to climate change. Therefore, farmers need to institute some protection measures along with an adaptation to secure their tobacco production stability, to avoid crop failure. One of the strategies that farmers are advised to employ to offset the effects of climate change on agricultural production is the application of appropriate inputs (Kidane et al., 2013).

However, there is still insufficient accessibility to agricultural inputs such as fertilisers, pesticides, farm machinery, and improved seeds, mostly in African countries, according to the global trade in agricultural inputs. Moreover, the impact of Covid-19 affected tobacco farming, which detrimentally affected the access to and availability of inputs, including seeds, fertilisers, and pesticides, as well as labour (Kayiira, 2020; Neef, 2020; Iese et al., 2021; Abel et al., 2023). Inputs have a great effect and significance on tobacco production, like the amount of tobacco produced, the quality of tobacco produced and the marketability of the product, etc. (World Bank, 2019).

The increased use of inorganic fertiliser, improved seed, and other agricultural inputs are critical components of strategies aimed at raising farm productivity, resilience to pests and diseases, and the quality of tobacco produced which later increase the marketability and price of the tobacco produced and living standards in sub-Saharan Africa (SSA) (Michler et al., 2019). The dominant model of input supply as pursued by national governments and development partners is one in which small-scale, locally based input distributors, commonly known as agro-dealers, provide the point of access for smallholders (Makinde and Muhhuku, 2017). Agro-dealers play a pivotal role in providing agricultural inputs to farmers with affordable and convenient access to yield-enhancing technologies, and technical advice on how to use these technologies for maximal economic returns (Mabaya et al., 2017; Allgood, 2011).

Agriculture dominates the livelihood and economic performance of Kahama district. The sector contributes more than 50 percent of the district's economy (Bishagazi, 2021) and employs about 75 percent of the working population, thus representing an important local economic growth potential (URT, 2023). Tobacco is among the major cash crops grown in the district.

In Kahama district, there is a problem with the accessibility of agricultural inputs by smallholder farmers due to high costs coupled with a wide proliferation of the supply of fake/substandard agro-inputs (Bishagazi, 2021). This leads to tobacco smallholder farmers having considerably very low agricultural output and some of them produce low quality tobacco leaves due to inadequate input use, which leads to low profitability. Therefore, this study was conducted to assess the factors affecting access to input among smallholder tobacco farmers in Kahama District.

2.0. Methodology

2.1. The Study Area and Research Design

This study was conducted in Kahama district. The district was selected because it is one Tanzania's leading tobacco production districts. Also, tobacco is among the major crops grown in the district and is dominated by smallholder farmers. This study employed a cross-sectional research design. The main reason for selecting this design is that it is less time-consuming than other types of research, and it allows for the collection of data from many sources at a single point in time. Because of the absence of prior knowledge of the total number of small farmers engaged in tobacco production in the study area, the unknown formula (Kothari, 2006) was used to determine the sample size. A total of 180 farmers were involved in this study.

The study employed both probability and non-probability sampling procedures to select samples from the farmers who accessed and those who did not access the agricultural inputs for tobacco production. Through probability sampling, a simple random technique was used to select farmers while non-probability was employed through the use of a purposive technique to select extension officers.

Both qualitative and quantitative data were collected from primary and secondary sources through structured interviews, observation and documentary review. Primary data were collected directly from the small farmers concerning the extent to which agricultural inputs are accessed and used in tobacco production. Secondary data was obtained from secondary sources like documents and records from different reports, websites and journals which were relevant to the study.

2.2. Data analysis

A substantial part of the analysis in this study was based on descriptive and inferential statistics. The binary logistic regression analysis was used to measure and analyse the factors that influence the smallholder farmer's access to agricultural inputs for tobacco production among those who access the inputs, as shown in the regression model (Equation i).

$$\text{Log}\,(p/1\text{-}p) = \alpha + \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots + \beta_{11} X_{11} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(i)}$$

Where:

Log (p/1-p) = log-odds ratio

p: Probability that farmers access input given X (Y:1= access, 0 = not accessed)

Y: Dependent variable

α = Constant

$X_1, X_2, \ldots, X_{11}$: Independent variables

$\beta_0, \beta_1, \ldots, \beta_{11}$: Parameters of model

The independent variables used in the analysis were:

X_1 = Age, X_2 = Sex, X_3 = Education level, X_4 = Marital status, X_5 = Price, X_6 = AMCOS membership, X_7 = Farm size, X_8 = Access to credit, X_9 = Frequency of usage, X_{10} = Distance X_{11} = Awareness

Testing of multicollinearity was done through Variance Inflation Factor (VIF) as one of the most and useful diagnostic tests for correlation of variables and it has been regarded as a problem if the VIF exceed 10 and the tolerance is greater than 0.1.

To determine the effects of inputs on tobacco production among smallholder farmers, descriptive analysis, particularly frequencies and percentages, was used. Also, a chi-square (χ^2) test was used to analyse differences between genders in association with access to inputs.

3.0. Results and Discussion

3.1. Demographic Characteristics of Respondents

The findings in Table 1 indicate that the minimum age of respondents was 22 years and the maximum age of respondents was 76 years, with a mean age of 38.2 years. Furthermore, the findings in Table 1 revealed that the majority (82.3 %) of farmers were aged between 26–55 years. The findings imply that most farmers are in the age category that is energetic enough to undertake tobacco farming activities which need strong people and the age group has more commitment and is eager to satisfy their life aspirations and their family demands, hence involving themselves in farming activities, particularly tobacco production, which is the main cash crop produced in the area for their economic wellbeing. The findings concur with Lukanu and Green (2017), who reported that young people are highly engaged in tobacco production compared to older people because tobacco farming is a more labour-intensive crop which requires energetic labour due to its associated activities. Also, Udry (2020) identified that the age of the household head has also been shown to be associated with a farmer's decision to engage in tobacco farming.

Also, results in Table 1 indicate that the majority (80.0 %) of the respondents were men and few (20.0%) women were included in the study, largely because the tobacco production activities are labour-intensive and characterised by male dominance. The findings comply with Udry (2020) and Chikowo (2020), who reported that farm plots controlled by women are farmed less intensively. Doss (2002) revealed that there are some gendered patterns of cropping in Ghana where, at the district level, some crops were disproportionately grown by a certain gender. For example, he found that all the sampled households that farmed tobacco were male-headed households.

The results in Table 1 show that the majority (89.4 %) of the respondents were married, revealing the typical characteristics of many rural areas in Tanzania. This implies that most tobacco farmers were married compared to the other groups as a way of finding means of solving financial problems facing their families, to increase household income through farming activities, specifically tobacco production. Also, this provides assurance of a source of labour with low cost for the farming activities among the family members since the nature of tobacco production requires numerous personnel and most smallholder tobacco farmers have low capital to pay for labour. The findings concurred with those provided by Kuboja et al. (2017). They reported that marriage provides additional farm labour among the family

members for the farmers, which could make them, engage in agriculture and facilitate production activities.

Findings in Table 1 indicated that 70.5 % of respondents attained primary education, 17.8 % did not attain formal education and only 11.7 % had attained secondary education. On the one hand, the findings revealed that there was no smallholder tobacco farmer who attained college or university education. The result suggested that having respondents with formal education is important and may enable farmers to be aware of and understand the importance of accessing agricultural inputs for higher yields and high income for improving their livelihood. This concurs with studies by Asfaw et al. (2012), Gichangi *et al*. (2019), Paltasingh, and Goyari (2018) who reported that increased education level is associated with increased chances of being a modern agriculturalist by being in a good position to acquire knowledge and skills provided by extension compared to those with no formal education. This suggests that meeting the minimum educational requirements for farmers can help them improve their capacity to gather, process, and apply information in the field.

Table 1: Demographic characteristics of respondents (n=180)

Detail	Categories	Frequency	Percent (%)	Mean age (years)
Sex of respondent	Female	36	20.0	
	Male	144	80.0	
Education level	No formal education	32	17.8	
	Primary education	127	70.5	
	Secondary education	21	11.7	
Marital status	Single	17	9.4	
	Married	161	89.4	
	Widow/widower	2	1.1	
Age of respondents	25 years and below	13	7.2	
	26-35 Years	57	31.7	
	36-55 years	91	50.6	38.2
	56 years and above	19	10.5	

3.2. Farm size of respondents

The findings in Figure 1 revealed that the mean farm size was 4.2 acres. The majority (53.9 %) of farmers in the study area cultivated 2 to 3 acres. This was probably influenced by the fact that tobacco production is cost intensive in terms of human and financial capital. A number of activities involved in tobacco production require enough human and financial resources. Some of the tobacco production activities include the preparation of seedbeds, the application of fertilisers, pruning, the application of pesticides, and harvesting requiring a sufficient workforce and funds for accessing inputs, constructing burns for drying tobacco and paying workers. The mean farm size in the current study is higher and lower than those reported by Hassan et al. (2015) in Bangladesh and Chongosho et al. (2020) in Zimbabwe, which were 1.83 acres and 11.1 acres, respectively.

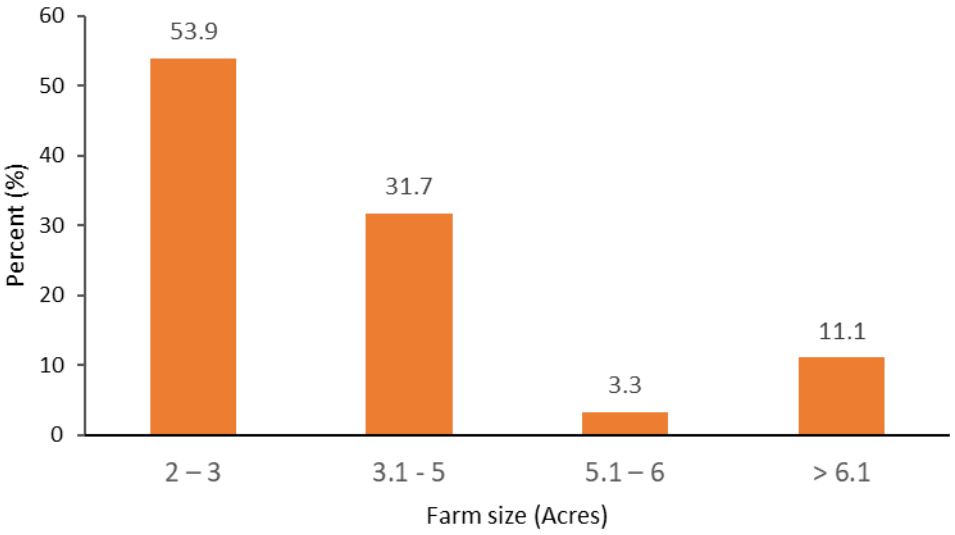

Figure 1: Farm size of respondents in acres

3.3. Accessibility to inputs

The findings revealed that 77.2% of the respondents accessed inputs for tobacco production while 22.8% did not. Also, Table 2 indicates that the majority (81.3%) of males' accessed inputs compared to the females (18.7%). This might be because of male dominance in means of production, including farming activities. The finding concurs with Udry (2020). The result in Table 4 shows that differences between men and women on accessing inputs for tobacco production was statistically insignificant at p>0.005. The implication of the gender disparity was that there is no significant association between the gender of the respondent and access to agricultural inputs for tobacco production in the study area. According to Gichangi et al. (2019), inputs play a fundamental role in agricultural production and productivity all over the world, as they constitute the basic segment of the agricultural value chain. Thus, findings from a current study imply that a large proportion of farmers in the study area do access inputs and coupling them with their better utilisation may lead to higher tobacco yields. This is in line with findings by Kidane et al. (2013) and Pangapanga-Phiri et al. (2024).

Table 2: Inputs accessibility among tobacco farmers by gender

Variable	**Category**	**Farmers access to inputs (n=180)**		
Gender		**Accessing (n=139)**	**Not accessing (n=41)**	**Total (n=180)**
	Men	113(81.3 %)	31 (21.5 %)	144 (80.0 %)
	Women	26 (18.7 %)	10 (31.2 %)	36 (20.0 %)
Chi –value =	**0.625**	**df = 3**		**p =0.814**

Results from Table 3 show that all (100%) respondents accessed inputs for tobacco production from the Agricultural Marketing Cooperative Society (AMCOS) which is in bond with tobacco buyers' companies, followed by those accessed from their fellow smallholder farmers (68%) and 48% said to access those inputs from the agro-input dealers. The implication is that companies are the chief providers of agricultural inputs for tobacco production among the

smallholder farmers in the study area. This is manifested for various reasons, but mainly includes the inadequacy of funds for the smallholder farmers to access those inputs during the farming period which compels them to use the inputs provided by the companies through the AMCOS on credit and then to pay after harvesting. These findings agree with Magati et al. (2019) who reported that most tobacco smallholder farmers depended greatly on contract farming.

Table 3: Sources of agricultural inputs

Source	Frequency	Percent*
AMCOS	139	100.0
Fellow farmers	95	68.3
Agro-input dealers	67	48.2

NB: * Multiple response

3.4. Factors Influencing Smallholder Tobacco Farmers to Access Agricultural Input

The binary logistic regression model was used to examine the factors influencing farmers access to agricultural inputs for tobacco production. As it can be seen from Table 4, the logistics model fits the data well as measured by Pseudo- R^2 (Cox and Snell R square = 0.543 and Nagelkerke R square = 0.723). Therefore, by considering Negelkerke R^2, it means that the independent variables in the model explain 72.3% of the variance in the dependent variable. Based on the analysis, six variables (price, AMCOS membership, awareness, frequency of usage, credit accessibility and farm size) had a statistically significant ($p>0.05$) influence on accessing inputs for tobacco farming among the farmers (Table 4).

The collinearity diagnostic test was carried out to analyse the effect of multicollinearity. If there was multicollinearity between independent variables, it was impossible to separate the effect of each parameter estimate on the dependent variables. It was important to test multicollinearity between explanatory variables. As indicated in Table 5, there was no serious multicollinearity problem among the explanatory variables included in the model because all VIF values were less than 10 and values of tolerance were greater than 0.1.

AMCOS Membership

The findings in Table 4 indicated that the coefficient of Agricultural Marketing Cooperatives (AMCOS) membership was positive ($\beta=1.050$) in relation to input accessibility for tobacco production. This result implies that tobacco producers who are in cooperatives were nearly three times more likely to access inputs compared to those who are non-members (OR=2.86, p=0.00). On the other hand, an increased probability of a farmer accessing inputs for tobacco farming was associated with the membership status of farmers. These findings concur with Mbow et al. (2014) who found that farmer groups are usually formed to facilitate access to better agricultural technologies like agricultural product value addition and to improve access to better earning markets for produce. Also, Mojo et al. (2017) reported that cooperative members in Ethiopia economically performed significantly better than non-members. Similarly, Gurung et al. (2023) found that membership has a positive and significant impact on net returns on investment and profit margin. Moreover, Blekking et al. (2021) reported that cooperative membership among smallholder farmers in Zambia was associated with high access to agricultural inputs, more assets, more land, and higher maize yields.

Awareness

Results in Table 4 show that the coefficient of awareness was positive

(β=2.174) in relation to input accessibility. Findings also, show that tobacco farmers who obtained knowledge from the extension officers were nearly nine times more likely to access inputs useful for tobacco farming compared to the other farmers who were not aware of the importance of applying inputs in tobacco farming (OR=8.79, p=0.045). Awareness among the smallholder farmers is important as a means of transferring modern technology among tobacco farmers in order to improve the standard of living and enhance their livelihoods among the households. This finding concurs with Mulashani et al. (2022). Similarly, Ikwuakam et al. (2016) stated that the provision of the right type of information that revolves around modern agricultural technology, credit, erosion control, soil fertility, improved seed varieties and seedlings, plant protection chemicals, water, markets, machinery, and equipment are essential for maintaining and enhancing production levels of growth and benefits. Accordingly, Yusuf (2015) pointed out that farmers continuously need agricultural information to improve the land's efficient and effective use, manage the soil and water, keep pests and diseases under control, and assist in resolving other farming issues.

Price

Moreover, the coefficient of price (Table 4) was positive (β=1.479) related to input accessibility. This suggests that the price of inputs is likely to influence input accessibility among smallholder farmers (OR=0.679, p=0.029). This means that the higher the price of inputs the lower the probability that smallholder tobacco farmers have access to inputs. This implies that the price of inputs is very important for tobacco producers due to the fact that it helps to determine the costs that a farmer may incur and make decisions about whether to access them. Therefore, these inputs with low prices tend to be highly accessed by farmers compared to those with high prices. Similarly, Sajjad et al. (2022) found that tobacco production was negatively affected by the increasing input prices in Pakistan.

Frequency of usage

Findings in Table 4 show that the coefficient of frequency of usage for input was positively (β=3.254) related to input accessibility among the smallholder tobacco farmers. These findings imply that the inputs with low usage frequencies were nearly 26 times more likely to be accessed by farmers compared to other inputs with high usage frequencies (OR=25.9, p=0.000). This means that an increased probability of farmers accessing inputs was associated with the frequency with which those inputs were used. These findings concur with Mathenge et al. (2014) who found that the determinant of input accessibility among smallholder farmers in rural agricultural societies includes the times to which those particular inputs were applied.

Credit accessibility

Results in Table 4 indicated that the coefficient of credit accessibility was positively (β=1.578) related to access to agricultural inputs for tobacco farming. The results show that tobacco smallholder farmers with access to credit were nearly five times more likely to access inputs compared with those who have limited access to credit (OR=4.85, p=0.012). The positive sign of credit accessibility among smallholder farmers for tobacco production could be attributed to the fact that most of them have limited resources, so they have been looking for access to credit which enables them to procure more inputs when those inputs provided at the Agricultural Marketing Cooperatives

(AMCOS) are delayed or inadequately provided. Therefore, credit has an enormous ability to unlock and encourage tobacco farmers to a great extent to have access to inputs for tobacco production. These findings agree with Obuobisa-Darko (2015) who found that the availability of credit also helps farmers finance the acquisition of equipment that could enhance farming activities and the continued use of improved technologies and enhanced inputs. Similarly, Milkias (2020) reported that in Ethiopia, the possibility of embracing high-yielding teff varieties was positively and significantly impacted by financing accessibility. Therefore, credit accessibility is seen as a crucial component in the uptake of new technology. Additionally, Nasereldin et al. (2023) found a strong correlation between credit accessibility from banks and the possibility of using inputs in Sudan.

Farm Size

Results in Table 4 indicated that the coefficient of farm size was negatively (β=-1.096) related to input accessibility among tobacco farmers. The results show that the farm size determines the extent to which the inputs can be accessed (OR=0.351, p>0.048). This implies that an increase in farm size is associated with decrease chances of accessing inputs. This signifies that the size of the farming area plays a significant role in determining a farmer's decision to access inputs or not. The negative coefficient of farm size in the accessibility of inputs among smallholder tobacco farmers comes due to the fact that if the farm size is small, it becomes easier to access the amount of inputs required by standards compared to those with large farms, which require large amounts of inputs to meet the demand. The findings are in line with Kihoma et al. (2021). Also, Noack and Larsen (2019) found that larger farms in their study did not have better access to input markets since better market access would imply smaller impacts of farm size on production.

Table 4: Factors influencing smallholder farmers to access agricultural inputs

Variable	β	S.E	Wald	Sig (p)	Exp β	Tolerance	VIF
Age	-0.560	0.362	2.396	0.122	0.571	.279	1.179
Farm Size	-1.196	0.530	3.912	0.048*	0.351	.343	1.117
Level of education	0.061	0.343	0.031	0.859	1.063	.147	1.426
AMCOS Membership	1.050	0.524	4.013	0.000*	2.858	.500	1.167
distance	-0.740	0.553	1.795	0.108	0.477	.273	1.705
Awareness	2.174	0.581	13.998	0.045*	8.791	.041	1.269
Frequency of usage	3.254	0.593	30.089	0.000*	25.892	.550	1.131
Marital status	0.214	0.310	1.969	0.161	1.601	.269	1.173
Credit accessibility	1.578	0.626	6.361	0.012*	4.846	.206	1.327
Sex	-1.047	0.656	3.325	0.068	0.302	.267	1.265
Price	1.479	0.679	4.750	0.029*	4.389	.352	1.146
Constant	-7.579	3.172	5.710	0.017	0.001		

3.5. Perceived Effects associated with Inputs use on Tobacco Production among smallholder farmers

Size of the leaf

The findings in Table 5 show that all respondents revealed that the use of inputs in tobacco production affects the size of the tobacco leaf. This means that the extent to which inputs are accessed for tobacco production both fertilizers, including NPK10:18:24 and CAN27%, pesticides like Confidor, Bamethrin, Flumetrain12% and with other extended services being applied to tobacco help to boost the size of tobacco leaves. This is very important since the size of a tobacco leaf helps to determine the grade of that tobacco. This finding is in line with Harjoko et al. (2019) and Odabas et al. (2022).

Resilience to pests and diseases

Findings show that 97.3% of respondents selected resilience to pests and diseases as the second-biggest effect of input usage for tobacco production (Table 5). The findings imply that when a farmer has access to agricultural inputs, he has a chance to increase resistance to pests and diseases which leads to higher yields. The findings concur with Dimock et al. (2015), who reported that tobacco production requires high amounts of pesticides to increase resistance to stubborn diseases. Through the use of agro-chemicals, it helps to suppress and increase the resistance of a tobacco plant to diseases like damping-off, which is the most severe disease in nurseries, leaf blight and black shank, which are the major fungal diseases caused by different inoculum propagules of soil borne fungal pathogens (Jahagirdar and Hundekar, 2014). Dimock et al. (2015) also reported that insects can cause serious problems with transplants produced in plant beds. These include cutworms, aphids, vegetable weevils and flea beetles, which were the most common insect problems in tobacco plant beds.

Quality of tobacco

Findings in Table 5 show that 91.3% of respondents revealed that the usage of inputs has effects on the quality of tobacco. The implication is that when the inputs are available and well accessible among the smallholder farmers, it improves the quality of the tobacco produced among the smallholder farmers. The findings concur with Huabo (2017), who reported that the quality of tobacco is largely a function of input usage and management both (on-farm and off-farm) and those qualities include maturity, leaf structure, weight, oil content, colour intensity, width, length, uniformity, injury, and waste tolerances which depend much on the quantity and timing of the inputs used. These quality criteria are also dependent on the group and colour of the leaf. Leaves of different groups or colours may have different scales on some of the quality criteria. The implication is that the price of tobacco depends on its grade and weight. According to Song et al. (2016), despite the great variability of soil and climatic conditions, time selection for leaf harvest, which is defined by the mature period, is important for the yield and quality of tobacco leaves. Tabaxi et al. (2021) reported that soil characteristics were significantly affected by fertilisation which led to a significant improvement in the quality and yields of tobacco varieties.

Amount of produce and marketability

Findings revealed that 80.6 % and 49.3 % of farmers said inputs affect the amount of tobacco produced and its marketability, respectively (Table 5). This implies that the amount and timing of input usage determine tobacco yields. Adequate amounts of input at the proper time will definitely lead to higher yields and vice versa. Also, this is reflected in

the quality of the leaves, which in turn affects the marketability of tobacco. These findings concur with Hussain et al. (2020).

Table 51: Perceived Effects associated with Inputs use on Tobacco Production

Effects	Responses*	
	N	Percent
Size of tobacco leaf	150	100.0
Resilience to pests and diseases	146	97.3
Quality of tobacco produced	137	91.3
Amount of produce	121	80.6
Marketability of produce	74	49.3

NB: *Multiple Response

4.0. Conclusion and Recommendations

4.1. Conclusion

This study evaluated the factors affecting smallholder tobacco farmers' access to inputs in Kahama District, Tanzania. The results indicated that a significant number of farmers have successfully accessed inputs, primarily sourced from Agricultural Marketing Cooperative Societies (AMCOS), fellow farmers, and agro-input dealers. The most influential factors in determining input access were awareness, price, AMCOS membership, credit accessibility, farm size, and frequency of input usage. Comparing these findings with previous studies conducted in other regions reveals that the determinants of input access for smallholder farmers vary significantly across different locations. Additionally, the study highlights that input usage positively impacts tobacco farming, including the size and quality of tobacco leaves, resilience to pests and diseases, overall production volume, and marketability. These insights underscore the importance of tailored strategies to enhance input access and utilization for smallholder farmers in diverse contexts.

4.2. Recommendations

The study recommends that more farmers should be encouraged to join AMCOS which might make it easier for them to access inputs during the proper farming season. Also, smallholder financial institutions should facilitate the easiness of smallholder farmers in accessing credit for inputs acquisitions and other farm operations.

References

Abel, S., Mupaso, N and Mukarati, J and Le Roux, P. (2023). Effects of COVID-19 on Smallholder Tobacco Farmers in Zimbabwe *African Journal of Food, Agriculture, Nutrition and Development,* 23(5): 23547-23557 https://doi.org/10.18697/ajfand.120.22595

Allgood, J. (2011). Agro-dealer Development in Developing and Emerging Markets. Paper presented at the AIARD Annual Conference 2011, Washington, DC

Ananda, C. F., Dalilah, I. E and Soewardi, T. J. (2019). The Influence of Tobacco Regulation to Tobacco Industry Sustainability. In: Proceedings of 52 IISES International Academic Conference, Barcelona. https://www.iises.net/proceedings/international-academic-conference-barcelona/table-of-content?cid=99andiid=003andrid=12231 (accessed on May, 2024).

Andrianov, V., Borisjuk, N., Pogrebnyak, N., Brinker, A., Dixon, J., Spitsin, S., Flynn, J., Matyszczuk, P., Andryszak, K., and Laurelli, M. (2010). Tobacco as a production platform for biofuel: overexpression of Arabidopsis DGAT and LEC2 genes increases accumulation and shifts the composition of lipids in green biomass. *Plant Biotechnology Journal*, 8(3), 277–287. https://doi.org/10.1111/j.1467-7652.2009.00458.x

Asfaw, S., Shiferaw, B., Simtowe, F and Lipper, L. (2012) Impact of modern agricultural technologies on smallholder welfare: evidence from Tanzania and Ethiopia. *Food Policy,* 37(3):283–295.

Barla, F. G., and Kumar, S. (2019). Tobacco biomass as a source of advanced biofuels. *Biofuels*, 10(3), 335–346.

Bishagazi, K. P. (2021). Sustainable Local Economic Development in Tanzania: Exploring Economic Challenges in Growing the Economy. *Journal of Public Administration and Governance*, 11(2), 210-228. doi:10.5296/jpag.v11i2.15695.

Blekking, J., Gatti, N., Waldman, K., Evans, T., and Baylis, K. (2021). The benefits and limitations of agricultural input cooperatives in Zambia. World Development, 146, 105616. https://doi.org/10.1016/j.worlddev.2021.105616

Chikowo, R. (2019). Description of Cropping Systems, Climate, and Soils in Zambia. Harare, Zimbabwe: Global Yield Cap Atlas. http://www.yieldgap.org/zambia. Accessed April 7, 2024.

Chingosho, R., Dare, C., and van Walbeek, C. (2021). Tobacco farming and current debt status among smallholder farmers in Manicaland province in Zimbabwe. *Tobacco Control*, 30(6), 610-615.

Dimock, W. J., Charles, S., Johnson, T., David, R., Semtner, P. J., Robert,I., Jones, R. L., Michael, J. and Weaver, M.J. (2015). Crop profile for tobacco in Virginia. [http://www.ipmcenters.org/croppprofiles/docs/vatobacco.pdf] Retrieved on 15th September, 2023.

Doss, C. R. (2002). Men's crops? Women's crops? The gender patterns of cropping in Ghana. *World Development*, *30*(11), 1987-2000. https://doi.org/10.1016/S0305-750X(02)00109-2.

Eriksen, M., Mackay J. and Ross H. (2016). The American Cancer Society. Tobacco Atlas Fourth Edition. World Lung Foundation; 2016. Atlanta, USA. www:TobaccoAtlas.org; http://www.tobaccoatlas.org/

Food and Agriculture Organization of the United Nations. (2022). Food and agriculture data. https://www.fao.org/faostat/ en/. Accessed March 8 2024.

Gichangi A., Birachi E., Wambua S., Kavoi J., Karanja D., Muriithi F and Mutua M. (2019). Factors Influencing Smallholder Farmers' Inputs Use in Major Bean Production Corridors in Kenya. *Journal of Agriculture and Food Sciences*, 17(1), 136 – 147.

Gurung, R., Choubey, M. and Rai, R. (2023), "Economic impact of farmer producer organisation (FPO) membership: empirical evidence from India. *International Journal of Social Economics*, https://doi.org/10.1108/IJSE-06-2023-0451

Harjoko, A., Prahara, A., Supardi, T.W., Candradewi, I., Pulungan, R., and Hartati, S. (2019). Image processing approach for grading tobacco leaf based on color and quality. *International Journal on Smart Sensing and Intelligent Systems,* 12, 1 - 10.

Hassan, M. M., Parvin, M. M and Resmi, S. I. (2015). Farmer's Profitability of Tobacco Cultivation at Rangpur District in the Socio-Economic Context of Bangladesh: An Empirical Analysis. *International Journal of Economics Finance and Management Sciences,* 3(3 2):91-98

Herlina, N., Azizah, N., andPradiga, E. P. (2020). The influence of temperature and rainfall to tobacco productivity (Nicotiana tabacum L) on Malang District. *Plantropica*

Journal of Agricultural Science, 5(1), 52-63.

Hidayat, R. K., Ando, Y., Masumoto, and Luo. J. (2016). Interannual variability of rainfall over indonesia: impacts of enso and iod and their predictability. IOP Conference Series: Earth and Environmental Science. doi:10.1088/1755-1315/31/1/012043.

Huabo, L. (2017). Image recognition for abnormal groups of tobacco leaves at Xiaogan. In: Proceedings of conference on agricultural and Biosystems. 38-40 pp.

Hussain, A.G.; Rouf, A.S.S.; Shimul, S.N.; Nargis, N.; Kessaram, T.M.; Huq, S.M.; Kaur, J.; Shiekh, M.K.A.; Drope, J. (2020). The Economic Cost of Tobacco Farming in Bangladesh. *International Journal of Environmental Research and Public Health*.; 17(24):9447. https://doi.org/10.3390/ijerph17249447.

Iese, V., Wairiu, M., Hickey, G. M., Ugalde, D., Salili, D. H., Walenenea, Jr. J and Ward, A. C. (2021). Impacts of COVID-19 on agriculture and food systems in Pacific Island countries (PICs): Evidence from communities in Fiji and Solomon Islands. *Agricultural Systems*. 2021. 190.

Ikwuakam, O. T., Iyela, A and Olutegbe, N. S. (2016). Information Needs of Sesame Farming Households in Selected Agricultural Zones of Katsina State, Nigeria. Mediterranean Journal of Social Sciences, Vol 7 No 1 S1

Jahagirdar, S. and Hundekar, A. R. (2014). Major diseases of tobacco and their management in Karnataka. Agric. Rev., 30 (3): 206-212.

Kayiira, D. (2022). Impact of COVID-19 on Agriculture and Food Security in the East African Community. 2021. Available online: http://publication.aercafricalibrary.org/handle/123456789/2882 (Accessed January 2024).

Kidane, A., Hepelwa, A., Tingum, E., and Hu, T. W. (2013). Agricultural inputs and efficiency in Tanzania small scale agriculture: A comparative analysis of tobacco and selected food crops. *Tanzanian economic review*, 3(1-2), 1–13.

Kihoma, L., Churi, A. J., Sanga, C. A and Tisselli, E. (2021). Factors influencing smallholder farmers to participate in farmer-led research of agro-ecological practices in selected areas, Tanzania, *Journal of Agricultural Extension and Rural Development,* 13(4): 232-242.

Kothari, C.R. (2006). Research Methodology: Methods and Techniques. New Age International (P) Limited. (2nd revised ed). Rajasthan University-India.

Kuboja,, N. M., Isinika, A. C., andKilima, F. T. M. (2017). Determinants of economic efficiency among small-scale beekeepers in Tabora and Katavi regions, Tanzania: a stochastic profit frontier approach. Development Studies Research, 4(1), 1–8. https://doi.org/10.1080/21665095.2017.1355738

Lukanu, G, and Green M, (2017). The influence of smallholder labour demand on cultivation of cash crops in northern Mozambique. Dev South Afr. 2017;24(4):553–573.

Mabaya, E., Mzee, F., Temu, A., and Mugoya, M. (2017). Tanzania Brief 2017 - The African Seed Access Index. TASAI.

Magati, P., Lencucha, R., Li, Q., Drope, J., Labonte, R., Appau, A. B., Makoka, D., Goma, F and Zulu, R. (2019). Costs, contracts and the narrative of prosperity: an economic analysis of smallholder tobacco farming livelihoods in Kenya, *Tobacco Control:*28:268-273

Makinde, K., and Muhhuku, F. (2017). Getting improved seeds to smallholder farmers through agro-dealer networks. *Seeding an African green revolution: The PASS journey*, 89-107.

Mathenge, M. K., Smale, M and Olwande, J. (2014). The impacts of hybrid maize seed on the welfare of farming households in Kenya. *Food Policy*, 44:262-271

Mbow, C., P. Smith, D. Skole, L. Duguma, and M. Bustamante. (2014). Achieving mitigation and adaptation to climate change through sustainable agroforestry practices in Africa. *Current Opinion in Environmental Sustainability* 6:8-14.

Michler, J. D., Tjernström, E., Verkaart, S., and Mausch, K. (2019). Money Matters: The Role of Yields and Profits in Agricultural Technology Adoption. *American Journal of Agricultural Economics*, 101(3), 710–731. https://doi.org/10.1093/ajae/aay050.

Milkias, D. (2020). Factors affecting high yielding teff varieties adoption intensity by small holder farmers in west showa zone, Ethiopia. *International Journal of Economy, Energy and Environment*, *5*(1), 6-13.

Mojo, D., Fischer, C and Degefa, T. (2017). The determinants and economic impacts of membership in coffee farmer cooperatives: recent evidence from rural Ethiopia, *Journal of Rural Studies*, 50:84-94.

Mulashani, B. E; Xuewen, G; and Makawia, P. J. (2022). Assessment of awareness of Farmers on agricultural information services in Mara Region, Tanzania. *Library Philosophy and Practice (e-journal)*. 7126.

Muttaqin, A. S., Suarma, U., Nurjani, E., Kurniadhini, F., Prabaningrum R., and Wulandari, R. (2019). The impact of climate variability on tobacco productivity over Temanggung Regency, Indonesia. E3S Web of Conferences, 76. doi:10.1051/e3sconf/20197604003.

Nasereldin, Y.A.; Chandio, A.A.; Osewe, M.; Abdullah, M.; Ji, Y. (2023). The Credit Accessibility and Adoption of New Agricultural Inputs Nexus: Assessing the Role of Financial Institutions in Sudan. *Sustainability*, 15*:*1297. https://doi.org/10.3390/su15021297

Neef, A. (2020). Legal and social protection for migrant farm workers: lessons from COVID-19. *Agriculture and Human Values*: 37(3): 641-642.

Noack, F., and Larsen, A. (2019). The contrasting effects of farm size on farm incomes and food production.*Environmental Research Letters*, 14(8), 084024. DOI:10.1088/1748-9326/ab2dbf.

Obuobisa-Darko, E. (2015). Credit access and adoption of cocoa research innovations in Ghana. *Research on Humanities and Social Sciences*, 5(12), 16-29.

Odabas, M.S., Senyer, N., Kurt, D., (2022). Determination of quality grade of tobacco leaf by image processing on correlated color temperature. *Concurrency and Computation Practice and Experience*, 35(2): e7506.

Paltasingh, K. R., and Goyari, P. (2018). Impact of farmer education on farm productivity under varying technologies: case of paddy growers in India. *Agricultural and Food Economics*, *6*(1), 1-19.

Pangapanga-Phiri, I., Mungatana, E., and Mhondoro, G. (2024). Does contract farming arrangement improve smallholder tobacco productivity?

Evidence from Zimbabwe. *Heliyon,* 10(1), e23862. https://doi.org/10.1016/j.heliyon.2023.e23862

Sajjad; Haq, Z.u.; Iqbal, J., and Shahzad, M.F. (2022). Understanding the Profitability, Supply, and Input Demand of Tobacco Farms in Khyber Pakhtunkhwa, Pakistan. *Economies*, 10(3), 59. https://doi.org/10.3390/economies10030059

Song, Z., Wang, J., Sun. M., Wu, J., Gong, C and Liu, G. (2016). Effects of organic fertilizer applications on starch changes in tobacco (Nicotiana tabacum L.) leaves during maturation. *Soil Science and Plant Nutrition*, 62(2): 173-179. DOI: 10.1080/00380768.2016.1162110

Tabaxi, I., Zisi, C., Karydogianni, S., Folina, A., Kakabouki, I., Kalivas, A and Bilalis, D. (2021). Effect of organic fertilization on quality and yield of oriental tobacco (Nicotiana tabacum L.) under Mediterranean conditions. *Asian Journal of Agriculture and Biology*. 2021(1). DOI: https://doi.org/10.35495/ajab.2020.05.274.

Udry, C. (2020). Gender, agricultural production, and the theory of the household. *Journal of Political Economy*;104(5):1010–4106.

URT. (2023). United Republic of Tanzania. Kahama Municipal Council Socio-economic Profile. 159 pp

World Bank (2017). Tanzania Public Expenditure Review: National Agricultural Input Voucher Scheme. World Bank.

World Bank (2020). World Development Report 2020. Agriculture for Development. Regional strategy for utilization of global Children tobacco survey data. New York, America

Yusuf, M. (2015). Information Dissemination Mechanisms in Promoting Kilimo Kwanza Policy: A Case of Rice Growing in Mbarali District, Mbeya. Unpublished M.A Thesis .University of Dar es Salaam.