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DRIVERS OF QUALITY DECLARED SEED USE IN TANZANIA: EVIDENCE FROM KILOMBERO DISTRICT

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ABSTRACT: *This paper examines the drivers of rice Quality Declared Seed (QDS) use in Tanzania using data gathered through farmers survey from randomly selected villages in Kilombero District, Tanzania. A cross-sectional research design was used to collect information from 100 randomly selected rice farmers. In addition, focus group discussions and key informant interviews were also conducted to complement and allow triangulation of data. Qualitative data was analyzed using content analysis. The results showed that farmers had access to rice QDS but were faced with some challenges such as lack of awareness on rice QDS and lack of capital to purchase rice QDS. Moreover, the number of farmers presently using rice QDS seeds in the study area was still below half of the farmers' population. The study therefore concludes that there is a viable opportunity to enhance more farmers to adopt and use rice QDS in the study area through proper information dissemination and provision of support and training needed by the farmers to maximize their use of rice QDS.*

KEYWORDS: quality declared seed, recycled seed, rice, adoptions, drivers, technology, kilombero

INTRODUCTION

It has been widely acknowledged that improved agricultural productivity and production in African smallholder farmers is a positive measure in economic development and poverty reduction (Ayenew *et al*., 2020). Moreover, agriculture is a key feature in various policy documents of Tanzania including the Agricultural Sector Development Programme (ASDP), the National Agricultural Policy (Massawe *et al*., 2020; URT, 2013). An increased crop productivity (especially staple crops) could spur improved farmers welfare and food security especially in Tanzania where food crops accounts for about 65% of the agriculture gross domestic product (AGDP) (URT, 2013). According to FAO (2006) Quality Declared Seed (QDS) is a good strategy to increase food production and productivity in Africa. This system would increase food production for farmers who are not use improved seeds. In Africa, as pointed out by AFSA (2018), 90 – 95 % farmer use saved seed for their crop production.

Agricultural productivity could also be increased through easing access of agricultural inputs. Adoption and use of farm technologies will enhance farm productivity (Simtowe *et al.*, 2011). However, in Tanzania, there is limited access to QDS thereby, limiting the potential of the farmers (Mutanyagwa *et al.*, 2018). According to TOAM (2015), use of QDS in Tanzania is also still very

low. Analysis of the amount of seed planted in 2016/2017 season revealed that the contribution of QDS to overall seed basket in the country was very low. Thus, in order to improve production of staple crops in Tanzania, QDS has to be promoted vigorously.

Research Justification

Rice is among the few crops with long list of improved varieties developed and released by the Agricultural Research Institutes (ARIs) in Tanzania, which are strategically, located in the major rice production zones of the country. Nevertheless, only few of them have entered into the seed chain and overwhelming majority farmers still rely on recycled seeds (Sekiya, 2020; Kangile, *et al*., 2017). It was expected that the introduction of rice QDS production system would greatly increase availability and use of rice QDS so as to supplement the formal seed system. However, the availability and use of quality seed has remained low despite of the system being in operation in Tanzania. (TOAM 2015). To the best of my knowledge, there is still inadequate understanding of the reasons for such poor performance.

This research therefore examines the drivers of rice QDS use in Tanzania. Thus, most of the bottlenecks to rice QDS adoption in Tanzania will be explained. The findings of this study are therefore expected to increase awareness of the entire system of rice QDS production. Moreover, the findings are expected to be used by planners, policy makers and implementers towards the joint goal of improving small holder farmers' lives through emphasizing on rice QDS production.

THEORETICAL FRAMEWORK

This paper is guided by the theoretical framework of technology adoption. Following Vabi *et al.*, (2019), the determinants of adoption of agricultural technologies can be explained through three basic models amidst others; (i) innovation-diffusion model (ii) economic constraints model and (iii) end-user's context model. The innovation diffusion assumes that improved innovations are needed to improve crop yields and rural livelihoods, meaning that access to information about innovations play an important role in farmers' decision to adopt and use agricultural technologies. The basic assumption of the economic constraint model is that resources such as credit and land that are important factors influencing decisions to either adopt or dis-adopt farm technologies while the user's context model assumes that the adoption of technologies is influenced by socioeconomic, institutional contexts of potential users, as well as agro-ecological factors. However, Nordin *et al.*, (2017) on the other hand claimed that the adoption process is best understood through a combination of adoption models as technologies can be more complex and requires more than just diffusion. In the current study, these models have been applied either in combination or singly.

METHODOLOGY

This study was conducted in Kilombero District, which is one of the seven District of Morogoro Region in Tanzania. A cross sectional design was employed to conduct this study in Kilombero district. Kilombero district was purposively selected because of the high rice production in the area. This study used a multi-stage simple random sampling technique to select the four research

villages. Four villages were then selected at random basing on their rice productivity. The selected villages were Ligongole, Lipangalala, Nkula and Kiberenge. Then the study randomly selected 100 rice growers from the selected village. Here, the proportionate stratified sampling approach based on the villages register, were used to select the 100 farmers. These were the ones whom questionnaires were administered to. The questionnaires were supplemented with 12 key informant interviews and four focus group discussions. The number of participants in these focus group were 11, 10, 12 and 9.

RESULTS AND DISCUSSION

Social-demographic characteristics of the rice farmers

Table 1 presents summary statistics of some socio-demographic characteristics of the interviewed farmers. Of these 52% were male and 48% were female. The socio-demographic characteristics are hereby discussed in the subsections below:

Age of the respondents

Results indicated that majority of the interviewed farmers had ages ranging from 25 - 54 (i.e. 75%) as seen in Table 1. This implies that most of the interviewees belonged to economically active group. Hence these are capable of doing farm practices and contribute positively to the improvement of their household's economic status.

Education level

The findings showed that 86% of the respondents were found to be literate with qualifications ranging from primary school to College/Tertiary level. Education level is used to measure the ability of a person to utilize available information. More educated people tend to comprehend and utilize available information to increase production. This capability may make more educated people likely to participate in production. (Thabit, 2015).

Marital status

Out of the 100 interviewed farmers, 64% were married. This is probably a reflection of the custom and tradition in most of rural Tanzania where marriages are accepted as satisfying the function of reproduction, maintenance and expansion of the kinship. Apart from this, it should be noted here that the married people are expected to take good care of their families, produce food for their families and hence contribute in improving their household lives in general.

Table 1: Socio-demographic characteristics of the rice growing farmers

Variable	Frequency	Percentage
Age of respondents		
18-24	8	8.0
25-34	22	22.0
35-44	25	25.0
45-54	28	28.0
55-60	13	13.0
61 and above	4	4.0
Gender of Respondents		
Female	48	48.0
Male	52	52.0
Education level of Respondent		
No formal education	14	14.0
Primary education	68	68.0
Secondary education	17	17.0
College education	1	1.0
Marital Status of Respondent		
Married	64	64.0
Single	19	19.0
Widow/Widower	12	12.0
Separated	5	5.0
Household size		
1-5	46	46.0
6-10	54	54.0

Source: Field Data, 2019

Farm land ownership

Analysis of the farm land ownership structure was carried out in this study and results are as presented in Table 2. From the results it is noted that 35% of the respondents purchased their farm lands, 32% rented, while 33% inherited their parents. The results indicated further that 95% of these farmers, owned farm lands of less than 11 acres. This implies that almost all farmers belonged to smallholder's category. Farm size in this case is the total area of the cultivated land, measured in units like acre. It was pointed out by Sikira and Kashaigili (2016), there is a positive relationship between farm size and increase in food production. Thus, the larger the farm size, the higher the expected level of food production. It is also expected that farmers with large farm land would cultivate QDS since QDS requires enough land for isolation. Nevertheless, according to Msangya and Yihuan (2016), rice QDS production in Tanzania has provided income to small-scale farmers.

Table 2: Farm ownership

Variable	Frequency	Percentage
How farm was obtained		
Bought	35	35.0
Rented	32	32.0
Inherited	33	33.0
Farm sizes (acre)		
Less than 0.5	5	5.0
0.5-1.9	53	53.0
2-3.9	23	23.0
4-5.9	10	10.0
6-10.9	4	4.0
11 and above	5	5.0

Source: Field Data, 2019

Sources of farm inputs

Table 3 gives the sources of farm inputs like fertilizers, QDS and pesticides. From the table it is noted that majority (72%) obtained their farm inputs from the research institutes and Agrovet. The rest (28%) acquired their farm inputs from the village, neighbors or farmer's group. These results underscore the importance of farmers association on the aspect of choosing and adopting agricultural technologies (Mutanyagwa *et al.*, 2018). The results further contradicted Awotide *et al.*, (2016) view which identified membership of farmer-based organization as one of the factors influencing adoption of improved rice varieties in rural Nigeria.

Table 3 Sources of QDS

Sources	Frequency	%
Agrovet	48	48.0
Dakawa research institute	6	6.0
Katrin research institute	18	18.0
Farmers group	21	21.0
Neighbours	3	3.0
Village	4	4.0

Source: Field Survey, 2019

Challenges faced by farmers in accessing improved seeds

The farmers were faced with some challenges in accessing improved seeds. These challenges were presented in Table 4. About 46.5% of the respondents identified lack of capital as a major challenge, 16.9% of the respondents identified lack of awareness on QDS as a challenge they are faced with.

Table 4 Challenges faced by farmers in accessing improved seeds

Challenges	Frequency	%
Delay	9	12.7
Available far from our village	12	16.9
Cost	5	7.0
Lack of awareness	12	16.9
Lack of capital	33	46.5

Source: Field Survey, 2019

Distance from the farm village were mentioned by 16.9% of the respondents they encounter in accessing QDS. These findings concurred with findings in empirical works of Sime and Aune (2018), which reported that farm production is constrained by challenges such as limited access to improved varieties and lack of capital. This finding is similar to Monela, (2014) which found that the major constraints facing farmers in accessing information were lack of capital and lack of awareness of information sources available among farmers and untimely provision of information. Further, farmers still lack awareness about improved seed and their higher yields. Other studies suggest that most of the rice farmers lack awareness on the improved seeds; hence they stick to traditionally preferred varieties which are not economically efficient, but have prominent aromatic and palatability characteristics (Sekiya 2020). This resulted in low adoption of improved seeds and hence low productivity.

Distance to getting improved seeds

Results of the analysis as presented in Table 5 shows that farmers have access to QDS within a distance of 0.5km to 12km. This suggest that farmers were not exposed to high transaction cost in accessing QDS. This is important information that QDS are available by in 0.5km to 12 km as observed by a male key informant

when it comes to start of the growing season QDS are available in the neighborhood, the problem is that, farmers do not like to detach themselves from recycled seed because of the cost accompany in it (A male key informant key informants, Ligongole village, Kilombero District, November 2019).

As per this quotation distance is not a barrier for accessing QDS, but farmers are not normally well prepared to incur input cost for the coming season. Rice QDS production need intensive care and farmers need be well prepared, i.e timely planting, timely weeding, timely harvesting, winnowing, drying, processing, storage etc. That's why many of them are not ready for it, although harvest of rice QDS is almost four times of the recycled seed.

Table 5 Distance to getting QDS

Distance	Frequency	%
0.50	2	3.1
1.00	8	12.3
2.00	22	33.8
3.00	12	18.5
4.00	6	9.2
5.00	5	7.7
6.00	7	10.8
8.00	1	1.5
12.00	2	3.1

Source: Field Survey, 2019

Farmers growing rice QDS

Not all the farmers interviewed were producing QDS. Figure 1 shows that 43% of the farmers interviewed grew QDS while 57% did not grow QDS. The reasons why some of the farmers did not grow QDS was investigated further and presented in figure 2.

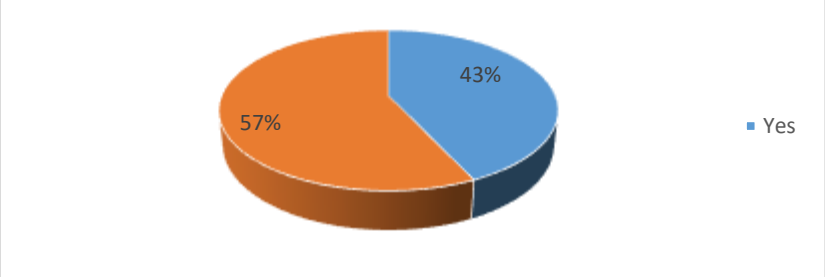

Figure 1: Growing rice QDS

The farmers that were not using QDS gave different reasons as presented in Figure 2. A good proportional of farmers (43%) cited climate change as a major reason for not growing QDS. There was a shortage of rain this season which allow insect and diseases outbreak in the study area. Another major factor in the study area was limited access to land as indicated by 23% of the farmers who contend that they do not have enough land to grow QDS and enough capital. These results reflect the challenges of access to land for agriculture by farmers in the study area and capital. During key informant interviews the study learned that climate change brought disaster in the season of an outbreak of fungal disease (kimiyanga in the local language) which decreased production of rice in the study area. This is a new disease to an area and there is no cure at the moment. Scarcity of land again become a problem in the study area many people are competing for the agriculture land and capital as observed by a female key informant:

Rice QDS production need large area of land and with isolation distance of four meter not surrounded by rice crop for 4 meter around and it need intensive care, so need to have an enough money stand by for timely planting, weeding, insecticide app and harvesting so many of us do not have such kind of money. (A female key informant interviewee, Nkula village, Kilombero District, Novermber 2019).

As per this quotation not only land become a problem but capital, farmers are not normally well prepared to incur input cost for the coming season. That's why many of them are still using recycled
seed.

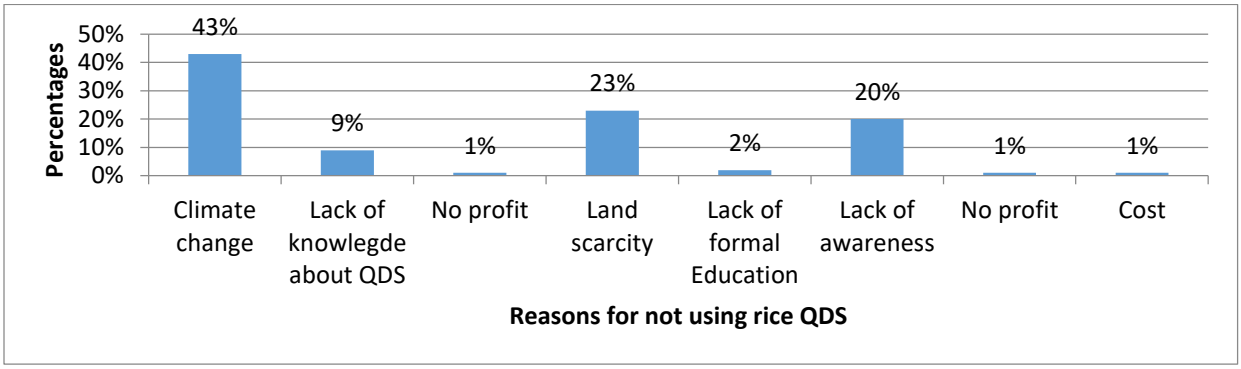

Figure 2: Reasons for not growing QDS

Moreover, 20% reported that they lack awareness of QDS (Figure 2). This suggests that not every farmer in the study area was well informed about QDS there is need for more awareness dissemination about rice QDS in the study area. In line with this finding, empirical literature such as that of Awotide *et al*., (2016) and Mutanyagwa *et al.*, (2018) argued that awareness and information exchange is key to farmer's adoption and use of improved technologies. Furthermore, lack of knowledge about QDS was also a challenge faced by 9% of the farmers there by limiting their adoption and use of QDS.

IMPLICATION TO RESEARCH AND PRACTICE

Findings in this study have indicated that farmers have access to QDS but are faced with some challenges such as lack of capital QDS. Generally, farmers are limited in their use of QDS due to severally reasons like lack of awareness, lack of knowledge on QDS production and delay in accessing QDS as revealed in the findings. Farmers may use this information to improve their access to improved technology. Researchers may use findings from this study to investigate on the difference between farmers who uses QDS and those who do not use QDS. Because the one uses QDS will harvest more than the one who do not use QDS under normal conditions.

Likewise, those who want to breed new rice variety for QDS. This information may also be useful to breeder's aiming at convincing farmers to adopt the improved technology i.e. QDS, as they may realize that breeding QDS Rice desired quality attribute should be guided by farmers' views in relation to their prevailing local context. When designing improved rice seed technology, breeders and researchers should consider farmers' views about the technology in relation to their local context

Farmers' are limited in their use of QDS due to lack of capital as revealed in the analysis. This information will be useful to Agricultural extension officers at the district council to carry out sensitization campaign to rice QDS farmers on the importance of using QDS. This will help in increase adoption of the technology and production of rice in the study area. On the other hand, District management in collaboration with financial service providers within the district will use this information to provide trainings to rice QDS farmers on credit accessibility on institutions like VICOBA which have less demanding of collateral. This will enable rice QDS farmers, especially women to access credit.

CONCLUSION AND RECOMMENDATIONS

The study therefore concludes that there is a viable opportunity to enhance farmers to adopt and use of QDS in the study area through proper information dissemination and provision of support and training needed by the farmers to maximize their use of QDS. It is therefore recommended that all stakeholders concerned, especially the government, seed institutions and extension agents should synergize and collaborate more effectively in promoting adoption and use of rice QDS in Kilombero District and across the nation. This will help to increase adoption of rice QDS, increase production and productivity of rice QDS, hence increases the farmers' income.

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