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ADOPTION OF IMPROVED TECHNOLOGIES AMONG RICE FARMERS

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ABSTRACT

The study aims at determining the adoption of improved technologies by rice farmers specifically examined the level of adoption of recommended technologies by rice farmers specifically examined the level of adoption of recommended technologies in rice production. Related the adoption of rice technologies by farmers were reviewed. It was revealed that the farmers, adopt mostly improved technologies in the production of rice such as pre-planting, planting operations and the use of fertilizers but have low adoption of improved technologies in the processing of rice such as threshing, winnowing, and preservation of the rice products. The adoption of technologies by rice farmers is determined to be influenced by the farmers' social and economic power such as level of education, financial status and general exposure/interaction with other farmers. The study recommends adequate orientation to the farmers on the value of adoption of improved technologies, proper supervision, monitoring and periodic evaluation of the rice, farmers by the ministry of agriculture and other relevant agro-agencies to ensure farmers compliance.

Keywords: Adoption; Technologies; Rice Farmers.

Introduction

Rice is the seed of the grass species *Oryza sativa* (Asian rice) or Oryza glaberrima (African rice). As a cereal grain, it is the most widely consumed staple food for a large part of the world's human population (Fukagawa and Ziska, 2019). In 2014, it was the agricultural commodity with the third-highest worldwide production (741.5 million tonnes), after sugarcane (1.9 billion tonnes) and maize (1.0 billion tonnes) (Food and Agriculture Organization Statistical Database (FAOSTAT), 2014). To an average Nigerian, it needs no introduction because it has become One of the most important foods in the country, consumed by both wealthy and the poor (Dayo, Olumuyiwa, Yarma and Fatunbi, 2018). This position was attained largely on the account of its steady demand by the
Nigerian populace for both domestic and commercial consumption.

Remarkably, Nigeria, which is the principal producer of rice in West Africa and the third in Africa after Egypt and Madagascar producing about 3 million metric tonnes on the average annually, falls short of meeting

its local demand which is placed at about S million tonnes (Oladimeji, 2017) had to resort to massive importation over the years. This particular statistics makes Nigeria the highest consumer of rice in the West African sub region and the second largest importer in the world, buying at least 2 million tons annually.

International Trade Administration (2020) notes that Nigerian government had announced that the country would be self-sufficient in rice production by 2018. However, the high cost of paddy rice, as well as high operational costs has continue to hamper large-scale/integrated rice mills from producing at competitive prices; imports continue to half of the country's rice demand. On the average, Nigeria spends 1 billion Naira on rice importation daily (accruing 365 billion Naira annually) (Olaoluwa, 2019; Akinwumi, 2011). Rice has become a very expensive commodity in Nigeria owing to new government policies on importation of food. However, in an attempt to boost local rice production and reduce the market prices, Nigerian government has in the past initiated and implemented series of programmes, projects and policies such as the Presidential Initiative on rice production of 2000, Growth Enhancement Support Scheme of 2010, Fadama III – Additional Financing of 2011, Value Chain Development Programme (VCDP) of 2009 and the recently launched Anchor Borrowers Programme (ABP) of 2016, agricultural development projects, Cereal crops research institutes, agricultural extension and education programmes. These programmes are to develop strategies for improving agricultural production and also extend agricultural knowledge and information to farmers. In addition, information on improved farming technologies are also availed to the farmers for adoption. This study rests on the determination of the level of adoption of improved technologies among rice farmers.

Farmers' Level of Adoption of Improved Rice Production and Processing Technologies

Adisa, Ahmed, Ebenchi and Oyibo (2019) in a study "Perceived benefits of adoption of improved rice production technologies among small-scale farmers in Kogi State" reported that improved technologies disseminated: rice production facilities, rice farming inputs, field preparation were adopted with adoption index of 0.70, 0.71 and 0.77 respectively which indicates high adoption level while processing technologies had low adoption level with adoption index of 0.37. The study further reported that harvesting and processing facilities had an adoption index value of 0.37; this indicates that only harvesting and processing facilities were adopted below average. It shows the low rate of adoption and processing facilities by the farmers. This could be as a result of the high cost of these facilities, beyond what small scale rice farmers can afford. This is in line with Onu (20I8) who asserted that the majority of rice production and processing in Nigeria is in to the hands of resource poor subsistent farmers who lack the economic and social power to fully adopt technologies. According to *Rashid, et al* (2019), on "Adoption of improved production practices in low-land rice through community training" reported that the adoption of different rice production technologies was greater by the adopters of Satkhira district compared to Khulna except skipped raw transplanting.

Okeke, et al (2019), indicated in a study "Adoption level of improved rice technologies among women rice producers in Ayamelum Local Government Area of Anambra State of Nigeria" that the rural women rice farmers adopted fertilizer application, land preparations, herbicide application, use of improved varieties, pesticide application, seed selection, planting space and planting depth in the study area.

A recent study on "Adoption of new rice for African technologies In Ekiti State" the adoption of new rice for Africa technologies in Ekiti State, Nigeria by Ojo, Dimelu and Okeke (2018), was reported that the NERICA improved rice technologies were water efficient in rice production, improved rice varieties, planting method, agronomic practices, fertilizer and herbicide. The result indicate that water pumps had higher adoption mean score value of 1.45, while channelization had adoption mean score value of 1.14. Their grand mean was 1.29, with adoption index of 0.26. The new rice for Africa (NERICA) 1 had the highest adoption mean score value of 3.12. This was followed by NERICA 8 that had adoption mean score value of 2.98, and NERICA 7 with mean adoption score of 2.25. FARROW 44 had adoption mean score value of 1.94 and FARROW 52 had 1.63. The grand mean was 2.38, with adoption index value of 0.48. This implies that majority of the NERICA beneficiaries were still at interest level of the adoption process in the use of improved rice varieties disseminated by the MNRDP.

In adoption level of improved rice production practices, processing and marketing technologies introduced by USAID MARKETS project l by Nwalieji, Madukwe, Agwu and Umerah (2014), the study reported shows that the selection of imprOved rice varieties, FARO 44 (Sipi 692033) bad highest mean adoption score of 5.00, FARO 52 (WITA 4) had 2.02, FARO 46 (ITA 150) had 1.14 and FARO 55 (Nerica 1) had mean adoption score of 1.16. Their grand mean adoption score was 2.33, with adoption index of 0.4. Also, the study revealed that the mean adoption score of PFs in carrying out a seed germination test before planting was 4.52, while seed treatment with acceptable insecticide before sowing had mean adoption score of 4.20. The grand mean score was 4.36 and the adoption index was 0.87 which means that 87% of the farmers were involved in the adoption processes of preparation of seed innovations disseminated to them. On land preparation, the study shows that the mean adoption score value of PFs in carrying out good land I preparation using either manual or machinery was 5.00, while zero tillage - use of systemic herbicide such as Glyphosate had mean adoption store 3.50. The grand mean score of the two innovations under land preparation was 4.25, while the adoption index was 0.85. This means that 85% of them were involved in these various adoption processes.

Onumadu and Osahon (2014) in determinants of adoption of improved rice production technology by farmers in Ayamelum Local Government Area of Anambra State highlighted that the respondents could be classified into two categories of high and low. Thus, MASS 240 had mean score of 3.13, FARO 7 had 2.95 mean, FARO 11 scored mean of 2.75, FARO 8 scored 2.70 while FARO 48 had a mean score of 2.68. These fell under high level adoption. However, low level adoption included IR 20,

OFODA, OSo, OSODI and IR 22, AGBEDE, GEB and GUYANA 79. The reason for these results might be that majority of low level adopters recorded had not exploited the advantages of other improved rice species appropriately. On the other hand, Saliu, Ibrahim, and Eniojukan (2016) in socio-economic determinants of improved rice technologies' adoption among farmers in Kogi State, Nigeria, revealed that all the farmers in the study adopted the use of agrochemicals, whereas, Onyeneke (2017), who investigated determinants of adoption of improved technologies in rice production in Imo State, Nigeria reported that 73, 78 and 86% of the respondents adopted improved rice varieties, fertilizer application and optimum seed rate during planting respectively while 67% adopted agrochemicals in rice production in the study area.

The quality of produced rice has become an important challenge among Nigerian consumers who clearly show strong concern for imported rice, because of its quality (WARDA, 2015).

This has brought about competition of imported rice and locally processed rice. The low quality of locally processed rice reflects low level of improved processing technologies and this in tum, reduce the efforts in achieving progress of raising output to meet up with consumer s demand. According to Anang (2019), technology adoption is important in ensuring agricultural production efficiency of smallholder farmers in developing countries where productivity and efficiency gaps remain high. Similarly, adoption of improved rice production and processing technologies leads to increase in productivity, product quality and higher production returns to rice farmers. This could in turn lower the market price of the product, generate greater efficiency and national economic growth (Adejoh, Madugu and Shaibu, 2017). Unfortunately Onu (2018) in his study, asserted that majority of rice production and processing in Nigeria is in the hands of resource poor subsistent farmers who lack economic and social power to fully adopt technologies. The difficulty of rice processors in Nigeria to adopt modern processing technologies can be attributed to inadequate resources (Tondo 2017).

The transformation of traditional farming system for increased food production and product quality entails adoption of improved practices. According to Adejoh, et al (2017), adoption of improved rice processing techniques is imperative towards obtaining quality rice that would meet demand and stimulate increased cultivation. In other words, non-adoption of rice processing techniques by farmers invariably means poor quality product with corresponding low consumer appeal. A study on adoption of on-farm and post-harvest rice quality enhancing technologies in Nigeria, Tiamiyu, Usman and Ugalahi (2014) revealed that the adoption of quality enhancing technologies was low among the selected sample of these rice value chain actors. On the contrary, Rashid, et al (2019) on adoption of improved production practices lowland rice through community training reported that the adoption of different rice production technologies was greater by the adopters of Satkhira district compared to Khulna that resulted in significant rice yield difference.

In the analysis of FARO 44 rice technologies adoption among farmers in Nigeria,

Mohammed (2019) reported that processing technologies adopted by the male were only threshing and bagging. Whereas, Umeh and Chukwu (2015), opined that improved processing (M-2.1l) and use of modern rice milling (M=2.0) were the least: adopted rice processing technologies adopted by the farmers. On the other hand, Adisa, et al. (2010) reported that harvesting and processing facilities had an adoption index of 0.37 which indicates that only harvesting and processing facilities were adopted below average. This could be as a result of the high cost of these facilities, which are beyond what small-scale rice farmers can afford. Also, Onumadu, el al., (2014) realized from their investigation on the socio-economic determinants of adoption of improved rice technologies by farmers in Ayamelum Local Government Area of Anambra state, Nigeria, using multiple regression analysis, that age, gender, education, farm size, farming experience and membership of farmers' association are significant in the adoption of improved rice farming technologies while, Mohammed, Olaleye, Umar, Ndanitsa and Jibrin (2015), reported a high level of adoption of Special Rice Project (SRP) technology package among participants.

The use of rice processing technologies is still low, as Okeke and Oluka (2017) reported that 69% of the farmers harvest their rice manually while 31% use mechanical means. More so, average of 49-60% of the farmers thresh their harvested rice manually while 50.4% of them use mechanized means, 93% of the farmers use both steam heating and total drenching method in parboiling the paddy rice while 3.4% and 3.6 use steam heating and total drenching respectively in parboiling the paddy rice. The milling method applicable in the study area was mainly by mechanical means with 73.6% of the respondents who use the method while 10.49% of the farmers use manual method. The farmers generally use sacks in bagging and /or storing both the paddy and milled rice. Finally, result show that mechanization of rice production and processing has not received much attention as most of the famers still use manual labour and traditional approach in the production and processing of rice (Okeke, et al., 2017). Similarly, Adisa, et. Al., (2019), reported that processing technologies had low adoption level with adoption index value of 0.37.

Obiora, (2023) reveals that the overall grand mean adoption of the farmers was 4.10 with adoption index of 0.82. The paddy rice farmers adopted the majority of the improved pre-planting technologies with a mean adoption score of 4.17. These include land selection ($\dot{X}$ = 4.52), land preparation ($\dot{X}$ = 3.90), seed selection from a certified agro-dealer ($\dot{X}$ = 4.08), seed germination rest ($\dot{X}$ = 4.65) and treatment of seeds with insecticide ($\dot{X}$ = 3.71). Their grand mean adoption score for planting depth and spacing, and bird scaring equipment were at the adoption stage of the adoption process with adoption mean score value of 5.00 while transplanting was at the trial stage $\dot{X}$ 0. whereas, nursery establishment, weed and pest control, timely planting, use of smart weather reader and water management were at the evaluation stages with mean adoption scores of 3.12, 3.00, 3.21, 3.95, 3.88, respectively. The grand mean score was 3.90 while the adoption index was 0.78.

The mean adoption score value of the beneficiaries on pre and post emergency

spraying was 4.75, foliar fertilizer mix application (2 liters) was 4.70, followed by the fertilizer application of 4 bags of NPK 15:15:!5 and 2 bags of urea (4.10), and spot fertilizer application was 4.10. The study further revealed that the programmer beneficiaries had adoption mean score value of 5.00 in mechanical threshing using thresher that can thresh and win now at the same time, and storage which involves packing bagged paddy rice in a cool dry place. Meanwhile, the adoption mean score for timely harvest and bagging in jute bag was 4.00 while manual threshing and packing panicles in bag and beating with stick was 3.81. The findings further reveal that the grand mean score was 4.40, while the adoption index of the farmers was 0.88.

Suggestions

1. It is however, suggested that farmers should be provided with proper orientation on improved technology. The orientation should be through the mass media, village centres, religious contact centres, agricultural extension contact point.

2. Farmers should be assisted by the government banks and other relevant agro agencies in providing financial support to farmers so as to enable them fund any recommended improved technology.

3. Adequate monitoring, supervision and periodic evaluation of farmers adoption of any recommended technology by the extension agents and the ministry of agriculture of the state to ensure proper compliance, adaptation and to also ascertain if the new technology is meeting the desired purposed and the implications on the farmers.

Conclusion

The study shows that the adoption of improved rice technologies vary from individual farmers and the aspect of production. The rice farmers mostly adopt improved technologies in the aspects of farming inputs, field preparation and low adoption in the areas of harvesting and processing.

However, the adoption of improved technologies by rice farmers is influenced by their social and economic powers such as level of education, and financial wealth status of the farmers. Social interaction with other rice farmers, exposure to mass media.

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