African Journal of Agricultural Research Vol. 6(6), pp. 1519-1524, 18 March, 2011
Available online at http://www.academicjournals.org/AJAR
ISSN 1991-637X ©2011 Academic Journals

Full Length Research Paper

Land tenure, investment and adoption of Sawah rice production technology in Nigeria and Ghana: A qualitative approach

Oladele O. I.[1]*, Kolawole A.[2] and T. Wakatsuki[3]

[1]Department of Agricultural Economics and Extension, North –West University Mafikeng Campus, South Africa.
[2]C/O Hirose Project International Institute of Tropical Agriculture Ibadan, Nigeria.
[3]Faculty of Agriculture, Kinki University, Nara 332-7204, Japan.

Accepted 31 January, 2011

This paper explores the linkages among land tenure, investment and adoption of Sawah rice production technology in Nigeria and Ghana. Focus group discussion was held with farmers adopting Sawah technology; in all the villages where Sawah rice technology had been introduced. The study found that in Nigeria, land tenure system was predominantly through inheritance, while those on hired land had an average period of about 3 years as the tenancy period, while in Ghana land tenure system was based on lease and sharecropping. Farmers reported that the use of secured renting is a coping strategy with the land tenure problem in order to ensure the sustainability of Sawah technology. The farmers were also of the opinion that, investment in Sawah technology is worthy and with higher returns on the long run. The study recommends that issues of land tenure rights must be properly ascertained by farmers, in order to enhance continuous adoption and sustained profit from Sawah technology.

Key words: Sawah technology, land tenure, investment, adoption, secured rent.

INTRODUCTION

Land-use patterns in Africa have developed in close relationship with land tenure patterns and conversely, land-use change can alter land tenure relations. Land tenure system refers to the relationship between a tenant and landowner in the acquisition, occupancy and use of a piece of land. In more specific terms, land tenure systems are the customary, legal or otherwise institutionalized relations between government, society, groups and individuals regulating the ownership and control of land and rights and duties accompanying such relations (Gyasi, 2005). Many steps to improve the management of natural resources require long term investments (IFPRI, 1999). Farmers will however, make these investments only if they have sufficiently secure and long term rights to their land to ensure that, they will reap the benefits of their investments. Access and security of land is an important requirement for the smooth development of an economy, particularly in an agricultural based economy like Ghana. It has been noted that, it is through the working of the tenure system that people engaged in agriculture try to establish their initial (income) routes and the security of such routes into the national income flow (Augustinus and Deininger, 2006).

Baland and Platteau (1996) and Gyasi (2005) suggest that, the factors that influence access to farmland may be summarized as: unavailability of land/shortage of land, lack of funds for purchase or rent of land/lack of purchasing power, right of inheritance, presence of conflicts and disputes, the type of land use existence of efficient land rental and sales markets, the custom and tenure system of a locality, gender, residence status, among others. Irrespective of how land is acquired, what is important to induce investment is, according to Deininger (2003), that security of access should be credible. The factors that may influence security of farmland would include: title to land, right to bequeath, right to cultivate the land as long as desired/right to use the land for investment options, income/initial wealth

*Corresponding author. E-mail: oladele20002001@yahoo.com.

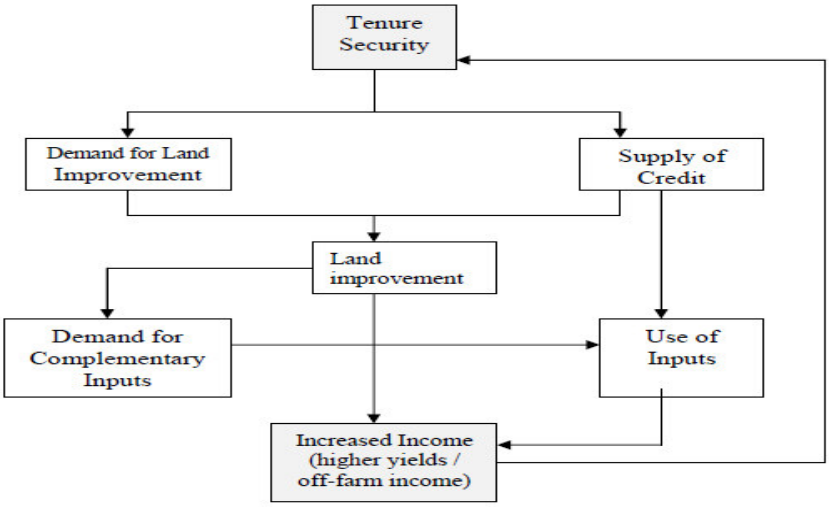

Figure 1. Conceptual framework showing the relationship between tenure security and investment.

endowment, educational attainment (Deininger, 2003; Smith, 2001; Place et al., 1994). The factors that influence security of farmland may also include or link to those that influence access to farmland.

The relationships between land tenure, agricultural investment and production have been thoroughly studied in Africa and there is ample evidence as a basis for the development of improved land policies in support of food security. The land tenure issues that affect food security include manifestations of unequal distribution of land, sub-optimal utilization of land and insecure tenure. The stability of tenure, rather than ownership, may be more important in encouraging farmers to invest in soil productivity and adopt sustainable land-use practices. Migot-Adholla et al. (1990) revealed that, the investment behavior of farmers depends on the security of land tenure. Thus, farmers are considerably more likely to improve lands they own, or for which they have long-term use rights, than lands they operate under short-term use rights. Farmers' ability to recover investments in soil productivity do tend to be less certain when they collectively own the land or operate it under a lease agreement (de Janvry and Sadoulet, 2005).

To explore relationship between property rights and technology adoption in small holder agriculture, the literature suggests that the three important dimensions of property rights are exclusivity, security and transferability (Kagwanja, 2006; Kameri-Mbote, 2006). The exclusivity dimension refers to the way that relationships among potential right holders are defined. It is generally hypothesized that, the degree of exclusivity has a positive effect on the incentive to produce, invest and adopt technology. The greater the exclusivity, the greater is the incentive to adopt technologies that are fixed to the land. Also, Baland and Platteau (1996) suggest that, there may be circumstances in which less exclusive land rights may help people to pool the risks associated with new innovations or technologies. Feder and Feeny (1993) distinguish different possible effects of insecure property rights on technology adoption and noted that, rights of short duration provide a direct disincentive for farmers' to undertake investments in land. Similarly, when the breadth or assurance of rights is inadequate, local rules may not protect an individual's claim to benefits from investments. Whether breadth or assurance is hypothesized to be linked to technology adoption depends upon the specific technology/property rights context such as the payback period of the technology. The transferability of land rights, including rental, bequest, temporary and permanent gift, and sale, may affect technology adoption in three ways. First, restrictions on transferability may reduce the incentives of current residents to adopt technologies likely to generate benefits beyond their likely tenure. Place et al. (1994) described key components of tenure security to be freedom from interference from outside sources, continuous use, and ability to reap the benefits of labor and capital invested in the resource. Figure 1 illustrates the relationships between the tenure security and land investment.

It is generally accepted that, at least in sub-Saharan Africa, there are both direct and feedback relationships between property rights and technology adoption. The property rights that govern the use of a particular plot of land will affect farmers' adoption and use of technology on that land. Also, the adoption and use of technology has feedback effects on property rights. Otsuka and Kalirajan (2006) found that, customary land institutions have evolved toward individualized systems in order to provide appropriate incentives to invest in tree planting. This is may be related to the changes occurring along a continuum from communal to individual to rented/shared

Figure 2. Sawah rice production system in the inland valleys in Nigeria and Ghana.

land. Customary land tenure systems, under which often farmers do not hold title to the land they cultivate, have been charged with failing to provide farmers with adequate incentives to adopt new technologies that could enhance production.

However, theories and empirical evidence on the role of land tenure are mixed. Smucker et al. (2000) indicated that, there is no definitive relationship between tenure and technology adoption by peasants in Haiti; peasants are preoccupied more by political and economic insecurity than insecure tenure, and rather than tinkering with formalizing tenure, policy makers should prioritize other more fundamental rural sector reforms. Majority of Haitian peasants claim land ownership through formal and informal procedures, but the question of whether peasants feel secure enough to adopt agricultural technologies and invest in their land is yet unanswered. Zhang and Owiredu (2007) reported that, the total amount of land owned and/or cultivated by farmers, and use of government extension services by the farmers have a significant positive influence on the adoption of plantation establishment in Ghana. Manyong and Houndékon (2000) noted that, security over land was among the factors that significantly affect the adoption of technology, with a high marginal effect on the probability of adoption. The predominance of land tenure systems that provide secure property rights, namely the traditional acquisition of land through inheritance or gift mode and the gradual development of a land market, facilitated a quick spread of the Mucuna planted fallows in the southern part of Benin Republic (Manyong and Houndékon, 2000).

Introduction of Sawah rice production technology in Nigeria and Ghana

Sawah rice production technology refers to improved man-made rice-growing environment through eco-technology with leveled rice field surrounded by bund with inlet and outlet connecting irrigation and drainage. Figure 2 shows the pattern of Sawah in the inland valleys in Nigeria and Ghana. Sawah fields are the system adaptable to a lowland ecosystem but require eco-technological skills, including those for minimum changing of topographical and ecological features, such as both land leveling, bunding and irrigation/drainage systems. Wakatsuki et al. (2001) reported that, the potential of Sawah based rice farming is enormous in West Africa in order to stimulate the long awaited green revolution. This is predicated on the fact that, the agro-ecological conditions of the core region of West Africa are quite similar to those of northeastern Thailand, which is one of the rice centers in that country.

Ten to twenty million ha of Sawah can produce additional food for more than 300 million people in future. The Sawah based rice farming can overcome soil fertility problems through the enhancement of the geological fertilization process, conserving water resources, and the high performance multi-functionality of the Sawah type wetlands. The term Sawah refers to leveled and bunded rice fields with inlet and outlet connecting irrigation and drainage (Wakatsuki et al., 2001). The main goal of Sawah projects in West Africa by Japanese institutions is the development of sustainable production systems of the whole watershed, which allows intensification and

diversification of the lowland production system and stabilizing improved production systems on the upland (Wakatsuki et al., 2009). Fashola et al. (2006) noted that, the Sawah system offers the best option for overcoming rice production constraints in Nigeria because of the utilization of the inland valleys which are reported to be high in fertility and enhances water management for rice production through pudding and the inlet and outlet canals for irrigation and drainage. Becker (2001) reported that, Sawah technique leads to high yields and sustainable production irrespective of fertilizer use (Asbonteng, 2001).

In Nigeria, Sawah based rice production started after preliminary basic research work on the suitability of inland valleys by Japanese researchers. A 1.5 ha field at Ejeti village was cultivated in 2001. In 2002 three farmers participated in Sawah Package program and farmers increased to 14 and 18 in 2003 and 2004 respectively. In 2010, farmers have increased to 1500. Similarly, there has been tremendous increase in the yield of farmers adopting Sawah package on their rice farms (Fashola et al., 2006). The 3 phases of the Sawah development process in Ghana from 1997 till date are: Integrated Watershed Management of Inland Valleys by JICA - CRI (1997 to 2001); Sawah project by SRI - Shimane Univ. Kinki University Japan (2002 to 2004) and Inland Valley Rice Development Project by MOFA – ADB (2004 to 2009) with the goal of sustainable rice production (Nakashima et al., 2007). The average rice yield obtained from Sawah plots of between 4.5 to 5.2 t/ha is enhancing the transformation of the potential for rice production being transformed into actual production in Nigeria and Ghana.

Wakatsuki et al. (2009) classified in decreasing order of importance Sawah typologies as spring irrigable, typical irrigable lowland, flood prone lowland, water harvestable lowland and lowland but upland ecology. Kolawole et al. (2011) reported that, the cost of land investment for Sawah rice production technology for different Sawah models is 1275 USD for spring based with 1.55 slope, 1300 USD for floodplain with 0.5% slope, 1435 USD for stream dyke based having 1% slope, 1805 USD for pond based with 1% slope, 1715 USD for pump based with 1% slope and 35 USD for non Sawah plot with 2% slope. The description is very important in the case of Sawah rice production due to the fact that, Sawah rice production technology involves an eco-technology which is a man-made environment with leveled and bunded rice fields with inlet and outlet connecting irrigation and drainage. The first year of Sawah land development is always labor intensive and it is required that, in order to enhance the profitability and sustainability of rice production, the developed plot is kept for at least 10 years if not permanently. This will enable the spread of the cost of development of the plot over the years of continuous rice production.

However, the ability of farmers to invest, keep the investment and benefit from the investment of time, energy, and money on land development to be used for Sawah plots is highly dependent on the tenure rights they have over such land. Kolawole et al. (2011) stated while the returns on the Sawah plot for the first year of cultivation ranges from -245 to 535 USD, for different Sawah models; the returns by the second year of rice cultivation when the Sawah structures developed in the first year were retained ranges from 1135 to 1625 USD.

METHODOLOGY

The study was carried out in Nigeria and Ghana, and covered 12 fields in Nigeria with 80 farmers; while in Ghana 11 fields in 5 villages (Adugyama, Biemso No 1, Biemso No 2, Fediyeya and Attakrom) were covered with 70 farmers. The field locations in Ghana are in the Ahafo Ano South District. Ghana is located on West Africa's Gulf of Guinea only a few degrees north of the Equator on Latitude: 5°36'N, Longitude: 0°10'E. This area, known as the "Ashanti," produces most of the country's cocoa, minerals, and timber. The climate is tropical with two distinct rainy seasons; in the south, May to June and August to September in the north, the rainy seasons tend to merge. The choice was necessitated by the fact that, all Sawah development projects have concentrated on the Ahafo Ano South Districts. Kumasi is a major town neighboring the project sites and major watersheds in the area.

In Nigeria, most of the fields covered are in Bida area of Niger state, while a village (Pampaida) was covered in Kaduna State and Akure in Ondo State. Villages covered in Bida area include Shabamaliki, Ejeti, Ekapagi, Nasarafu, Etsuzegi and Gadza. Bida has a clayey loamy, sandy soil, under the guinea savannah ecology and is 137 m above sea level and lies on longitude 6°01'E and latitude 9°06'N in Niger State of Nigeria. A qualitative approach (Focus Group Discussion) was used to elicit information from rice farmers adopting Sawah technology in December 2009 in all the villages where Sawah rice production technology had been introduced and adopters of Sawah technology were organized into focus group discussion with 10 farmers in each group.

RESULTS

Focus group discussion was held with 16 farmers in each group in 5 villages in Nigeria and 5 villages in Ghana with 14 farmers in each group. Issues for discussion included their socio-economic characteristics, continued adoption of Sawah technology, land tenure issues, and investment on Sawah plots.

Socio-economic characteristics

The socio-economic characteristics of Sawah technology adopting farmers shows that in Nigeria, majority of the farmers were above 40 years of age having quranic form of education, belonging to at least one farmers group and had been farming for about 12 years. Majority of the farmers are Nupe, with rice as the most preferred crop for production as rooted in their culture. In Ghana, rice farmers adopting Sawah technology are predominantly above 45 years with most farmers having attended primary school, belonging to farmers groups, with an

average of 16 years in terms of farming experience. The farming system is cocoa and oil palm based and majority of farmers were Ashanti and Zongo tribes. Fu et al. (2009) reported similar socio-economic characteristics among rice farmers in the inland valley of central Nigeria.

Land tenure

In Nigeria, land tenure system was predominantly through inheritance, while those on hired land had an average period of about 3 years as the tenancy period, with a rent rate of 180 USD per year, while in Ghana land tenure system based on lease and sharecropping. The average tenancy period is 2 years with a rent rate of 136USD per year. The probability of adopting the Sawah technology increases, if the plot is acquired through inheritance, by purchasing, having long tenancy period and if the rent paid is low. Oladele and Wakatsuki (2009) findings on the pattern of land tenure among rice farmers in Nigeria and Ghana were similar.

Secured tenure rights

The short duration of tenancy as stated by farmers in different focus group discussion, necessitated the further probing into how farmers were coping with the level of investment on their land; since the technology requires high level of investment in the first year and the retention of such a plot for a longer period. Farmers reported that, the use of secured renting by farmers is a coping strategy with the land tenure problem, in order to ensure the sustainability of Sawah technology. In most rural communities in Ghana and Nigeria traditional rulers and chiefs are the custodians of land. The land is an indicator of wealth and power and is not easily marketed in rural areas. So, secured renting is as good as inheritance in that, the use of the land is guaranteed for a long period of time. Even in places where there was disagreement and eventual displacement, the Sawah structure, bunds and canals were retained and rice is cultivated by another set of farmers. In most cases farmers had prevented this through secured renting of 5 years and above. Farmers stated that the number of farms under rent decreased overtime, while those under secured rent increased. The stability of tenure is very important for farmers to invest in land development and management practices.

Investment on Sawah plots

All farmers agreed that the first year of Sawah development is labour intensive and that huge money; labour and time were required for the development. The farmers were also of the opinion that, the investment is worthy and with higher returns on the long run. They also stated that, the investment varies with the type and location of lowlands where the Sawah plot was established. Majority of the farmers stated that, it was wasteful and uneconomical to establish new Sawah sites every season and thus, they had to develop the coping strategy of securing their tenancy through formal agreement for at least a period of 5 years; although longer periods were desired. Kolawole et al. (2011) reported similar findings on investment on Sawah rice farming in Nigeria.

Continued adoption of Sawah technology

Many farmers in the discussion groups affirmed that, their continuous adoption of the Sawah technology depend on many factors out of which land tenure is critical. They also explained that, since the reward for their investment through high rice yield as demonstrated by the technology is hinged on the availability of the developed land for continuous cultivation, securing long tenancy period will be favourable to them. It has also been established in literature that, land tenure affects adoption of technology among farmers (Migot-Adholla et al., 1990; Manyong and Houndékon, 2000). Farmers based their argument on the fact that, profitability is reduced for farmers without land security. Fu et al. (2009) reported that, land tenure is one of the factors that may increase the propensity to abandoned adoption among rice farmers in the inland valley of central Nigeria.

Conclusion

Land tenure rights impacts substantially on the adoption of Sawah technology, particularly land development in the first year do not encourage opening of new lands for Sawah technology every planting season. The willingness of farmers for continuous adoption is skewed toward farmers that have land security. Farmers also reported that, power tiller availability –a component of the technology and socioeconomic variables such as knowledge of the technology, information, age, educational level and household size affect adoption. It therefore implies that, the issues of land tenure right must be properly ascertained by farmers, in order to enhance continuous adoption and sustained profit from Sawah technology.

REFERENCES

Asbonteng OK (2001). ”Characterization and Evaluation of inland valley watersheds for sustainable agricultural production: Case study of semi-deciduous forest zone in the Ashanti Region of Ghana”. Tropics, 10(4): 539-554.

Augustinus C, Deininger K (2006). Innovations in Land Tenure, Reform and Administration in Africa, in Land Rights for African Development from Knowledge to Action, CAPRi Policy Briefs, Mwangi E. (ed.),

CAPRi, UNDP, International Land Coalition, February, pp. 14-16.
Baland, JM, Jean-Phillipe P (1996). Halting Degradation of Natural Resources: Is there a role for rural communities? Oxford University Press.
Becker M, Johnson DE (2001). Cropping intensity effects on upland rice yield and sustainability in West Africa (2001). Nutr. Cycling Agro ecosyst., 9: 107-117
de Janvry, Sadoulet E (2005). Access to Land and Development, Paper Prepared as an entry for the New Palgrave Dictionary of Economics, 2nd edition, Palgrave Macmillan, August.
Deininger K (2003). Land Policies for Growth and Poverty Reduction. Washington D.C: The World Bank.
Fashola OO, Oladele OI, Aliyu J, Wakatsuki T (2006). Dissemination of Sawah Rice Technology to Farmers cultivating Inland valleys in Nigeria. Proceedings of the Asian Pacific Extension Network. 6-8th March 2006 Australia. http://www.regional.org.au/au/apen/2006/refereed/5/3223_fashola.htm#TopOfPage
Feder G, Feeny D (1993). The theory of land tenure and property rights. In The economics of rural organization: Theory, practice and policy, ed. K. Hoff, A. Braverman, and J.E. Stiglitz. Washington D.C.: World Bank.
Fu R, Hoi Y, Makoto M, Oladele O, Idowu TW (2009). Farmers adoption and propensity to abandoned adoption of Sawah-based rice farming in the inland valley of central Nigeria J. Food Agric. Environ., 7(2): 379-382 http://www.world-food.net/scientificjournal.php
Gyasi EA (2005). Pressures of Agricultural Production, Land Tenure Changes and Policy implications. In thematic papers on 'Environment-Land Tenure Nexus' ISSER, Legon.
IFPRI (1999), IFPRI1998, International Food Policy Research Institute pp. 37 – 38, NW, Washington DC, USA
Migot-Adholla SE, Hazell P, Blarel B, Place F (1991). Indigenous land rights systems in Sub-Saharan Africa: A constraint on productivity? World Bank Econ. Rev., 5: 155-175.
Kagwanj J (2006). Land tenure, Land Reform, and the Management of Land and Natural Resources in Africa, in Land Rights for African Development from Knowledge to Action, CAPRi Policy Briefs, Mwangi E. (ed.), CAPRi, UNDP, International Land Coalition, February, pp. 3-5.
Kameri-Mbote P (2006). Gender Issues in Land Tenure under Customary Law, in Land Rights for African Development from Knowledge to Action, CAPRi Policy Briefs, Mwangi E. (ed.), CAPRi, UNDP International Land Coalition, February, pp. 11-13.
Kolawole A, Oladele OI, Wakatsuki T (2011). Profitability of different Sawah rice production models within lowlands in Nigeria International J. Food, Agric. Environ., – JFAE P. p. 9.
Manyong VM, Houndékon VA (2000). Land Tenurial Systems and the Adoption of *Mucuna* Planted Fallow in the Derived Savannas of West Africa CAPRi WORKING PAPER NO. 4 CGIAR System-wide Program on Property Rights and Collective Action International Food Policy Research Institute 2033 K Street, N.W. Washington, D.C. 20006 U.S.A.
Migot-Adholla SE, Hazell P, Blarel B, Place F (1990). Indigenous land rights systems in Sub-Saharan Africa: A constraint on productivity? World Bank Econ. Rev., 5: 155-175.
Nakashima K, Oladele OI, Buri MM, Wakatsuki T (2007) Determinants Of Farmers Participation In Sawah Projects In Ashanti Region. China Agric. Econ. Rev., 5(4): 488-497.
Oladele OI, Wakatsuki T (2009). Effect of land tenure on the adoption of Sawah rice production technology in Nigeria and Ghana. J. Agric. Sci. Technol. A (2009), Volume 3, No.10 (Serial No.21) USA 47-53.
Otsuka K, Kalirajan KP (2006). Rice Green Revolution in Asia and its transferability to Africa: An introduction. Dev. Econ., 44: 107-122.
Place F, Roth M, Hazell P (1994). Land Tenure Security and Agricultural Performance in Africa: Overview of Research Methodology, in J. W. Bruce and S. Migot-Adholla (eds.), *Searching* for Land Tenure Security in Africa, Dubuque, Iowa: Kendall/Hunt Publishing, pp. 15-39.
Smith R (2001). Land Tenure, Title Deeds, and Farm Productivity in Southern Province of Zambia: Preliminary Research Findings (Outline). A Paper Presented At The University of Zambia, 19 September.
Smucker GR, Anderson WT, Michael B (2000). Land Tenure and the Adoption of Agricultural Technology in Haiti CAPRi WORKING PAPER NO. 6 CGIAR System-wide Program on Property Rights and Collective Action International Food Policy Research Institute 2033 K Street, N.W. Washington, D.C. 20006 U.S.A.
Wakatsuki T, Otto E, Andah WEI, Cobbina J, Buri MM, Kubota D (2001). Integrated Watershed Management of Inland Valley in Ghana and West Africa: Ecotechnology Approach. Final Report on JICA/CRI Joint Study Project, CRI, Kumashi, Ghana, and JICA, Tokyo, p. 337.
Wakatsuki T, Buri MM, Oladele OI (2009) West African Rice Green Revolution by Sawah Eco-technology and the Creation of SATOYAMA systems. Kyoto Working Papers on Area Studies No. 63**,** JSPS Global COE Program Series 61 In search of Sustainable Humanosphere in Asia and Africa. March 2009, p. 30.
Zhang D, Owiredu, Eric A (2007) Land tenure, market, and the establishment of forest plantations in Ghana Forest Policy and Economics, 9: 602-610.