Research Article
Determinants of Agricultural Information Access by Small Holder Tea Farmers in Bureti District, Kenya

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Abstract: The study aims at determining factors affecting the access to agricultural information by smallholder tea farmers. Tea sub-sector is Kenya's second largest foreign exchange earner after horticulture. The small holder farmers own about 80% of the land under tea but produce about 60% of made tea thus realizing less yield per unit area as compared to their large scale counterparts. Tea Research Foundation of Kenya in conjunction with the Ministry of Agriculture has developed several technologies aimed at improving both yield and quality of tea. The technologies include high yielding clones; selective application of herbicides; insect, pest and weed control; fertilizer recommendation rates and harvesting practices. Small holder farmers however continue to realize low declining crop yields. It is generally known that access to information is a potential avenue for increasing yield. A study was carried out to determine access to information by smallholder tea farmers in Bureti District, Kenya. A combination of purposive, multistage and proportionate random sampling was used to get 170 respondents. Data collected was managed using Statistical Package for Social Sciences (SPSS) version 15 and Probit Model was used to estimate the parameters that determined access to information. Off-farm income, education level, household size, marital status and time spent at tea buying center significantly influenced access to information by small holder tea farmers. The study in conclusion emphasized the need of information to small holder tea farmers so as to facilitate increased yield.

Keywords: Access, Kenya, information, smallholder

INTRODUCTION

The agricultural sector is one of the main drivers of Kenya's economic growth. It contributes directly 26% of the Gross Domestic Product (GDP) and indirectly a further 27% through linkages with manufacturing, distribution and service related sectors (TRFK, 2011). Agricultural products account for about 65% of exports with tea sub-sector being the second largest foreign exchange earner after horticulture. Tea accounts for 26% of the total export earnings and 4% of the country's GDP. The earnings accruing from tea export generally has been increasing and the country earned Ksh 47.2 billion in 2006 compared to 97 billion in 2010 (Tea Board of Kenya, 2012). Tea industry is a major source of employment in the country whereby an estimated 4 million Kenyans, about a tenth of the total population, derive their livelihoods from the tea industry (Mwaura and Muku, 2007). There is a significantly development of rural infrastructure in the tea growing zones and the crop enterprise contributes to stemming rural-urban migration. Tea also directly

contributes to environmental conservation through enhanced water infiltration, reduced surface erosion and mitigation of global warming through carbon sequestration (TRFK, 2011).

Tea, *Camellia sinensis,* was first introduced in Kenya around 1903 (Export Processing Zones Authority, 2005). Since then, the country has increased the production from about 18,000 tons to a total of about 377,000 million tons in the year 2011 (Tea Board of Kenya, 2012) which has been attributed mainly to expansion of area under the crop (Rono and Wachira, 2005). The early settlers and the colonial government first restricted the crop to large-scale farmers and multinationals until 1963 when it was opened for the local farmers (Kenya Human Rights Commission, 2008), at the Kenya's attainment of independence. Currently, the industry is divided into large estates and small holder sub-sectors (Christian Partners Development Agency, 2008). The large estates are under the control of big multinational companies and account for about 40% of total made tea (Tea Research Foundation of Kenya, 2011). The small holder growers,

with average holdings ranging from less than one hectare to 20 hectares, are managed by the Kenya Tea Development Authority (KTDA) through the individual tea processing factories (Mwaura and Muku, 2007). The small holder farmers own about 80% of the land under tea and produce over 60% of made tea in the country (Kinyili, 2003).

The KTDA renders managerial, production, transportation and marketing services to small scale sub-sector (Christian Partners Development Agency, 2008). In order to smoothly function, operations are organized under different factories which involve green leaf transportation, input supply, processing and marketing of processed tea (Export Processing Zones Authority, 2005). Kenya Tea Development Authority manages about 422,000 growers, 53 factories and markets the produce. Management involves supervising and advising farmers on good husbandry practices through its extension staff, provision of inputs, collection and transportation of harvested tea to the factories, processing and marketing of the final product (Christian Partners Development Agency, 2008). In an effort to improve efficiency, the Kenya government in 1999 liberalized the smallholder tea sub-sector by restructuring KTDA and the ownership of tea factories (Sudath, 2008). Through the process, the government withdrew from controlling services such as extension, processing and marketing and thus restructured KTDA to a private entity (Nyangito, 2001). It was anticipated that the interventions would result in lower marketing margin, higher producer prices and increased productivity (Winter-Nelson and Temu, 2002). The tea produced by the small scale farmers has four market outlets namely; Mombasa tea auction that absorbs 75% of the product, the Kenya Tea Packers limited (KETEPA) that takes 7% of the tea, direct sales (overseas and local) that takes 15% and factory door sales that takes 3% of total produced tea. It has been noted that there is an emerging parallel system where farmers sell green tea leaf directly to private factories or to middlemen for immediate payments without any contractual arrangements (Kinyili, 2003).

In an attempt to maximize yield, Tea Research Foundation of Kenya (TRFK) has the mandate to conduct research on production-based technologies (Tea Research Foundation of Kenya, 2011). The research has given rise to high yielding clones, selective application of herbicides, fertilizer recommendation rates and harvesting practices. Production related information is commonly disseminated by TRFK through various publications, agricultural shows and open days (Anon, 2002). Kenya Tea Development Agency factory extension staffs also disseminate such information during their normal day to day operations. Improved technologies, including improved clones, have increased tea yields in Kenya from an average of 1,500 to 2,600 kg of made tea per hectare per year on

the large estates and from an average of 600 to 2000 kg of made tea per hectare per year under the smallholder production system. Fertilizer application accounts for about 50% of the increases in yields (Tea Research Foundation of Kenya, 2011).

Despite the major tea research breakthroughs, transfer of improved technologies to farmers is a major challenge for both researchers and technology transfer agencies (Tea Research Foundation of Kenya, 2011). Despite the development of appropriate production technologies, small holder tea farmers experience sub-optimal declining crop yield (Owuor *et al.*, 2001) as compared to the large estates (Tea Research Foundation of Kenya, 2011). Large-scale tea growers however have largely benefited from the use of the tea production technologies (Othieno, 1994). The low levels of adoption of improved technologies in smallholder tea farms may be a factor responsible for their sub-optimal production levels. A yield gap analysis shows that the productivity on smallholder farms is lower as compared to large estates. For instance, in 2010 the average yield from smallholder producers was standing at 2000 kg of made tea per hectare while that of large estate was 2600 kg. The difference between the two sub-sectors is mainly attributed to the adoption of improved technologies, including improved tea clones (Tea Research Foundation of Kenya, 2011). Owuor *et al.* (2008) noted that the low declining crop yield among the small holder tea farmers is probably because the improved production technology and innovations are not reaching the farmers or that they are not being adopted. This is linked to limited access of information related to such innovations.

User awareness, adaptation and adoption of improved technology affect yield. Kinyili (2003) noted that access to information is a potential avenue for improving yield among the small holder tea farmers. Production and productivity of farm produce is largely dependent on the awareness and the use of appropriate technologies (Tea Research Foundation of Kenya, 2011). Farmer's access to information makes them aware of improved technologies and enhances the adoption of new innovations. It has been established that access to information influence the adoption of technologies (Daberkow and McBride, 2003). Sudath (2008) noted that agricultural innovation diffusion is largely affected by information available on the innovation. Utilization of relevant, accurate and up-to-date information would therefore ensure increased productivity (Banmeke and Ajayi, 2008). The major challenge in the tea sector is then on how to increase adoption of improved technologies so as to close the gap between research and actual farm yields (Tea Research Foundation of Kenya, 2011). It is against this background that the study aims at determining factors affecting the access to information by smallholder tea farmers in Bureti District, Kenya.

RESULTS AND DISCUSSION

The study findings indicate that majority (85%) of the households were male headed (Table 1). It has been noted that in Africa, men dominate the production of cash crops while women are primarily responsible for the supply of food to the family (Peterman *et al.*, 2011), which corroborates the findings for this study.

Most (82%) respondents were married, which implies that they may have reasonably large family size. The high numbers of defendants in most cases is translated into increased family pressure on the limited resources among farmers. On the other hand, large family size which may provide more family labour in agricultural production. Most (69%) farmers owned land with title deed. This suggests that farmers had security of tenure and could invest in farming activities. A majority (93%) of farmers spent up-to 12 years in school, suggesting that most farmers are literate. Educated farmers are expected to understand agricultural instructions, manage and adopt technologies faster than the uneducated farmers (Edriss, 2003). Majority (93%) of the households were members of group organizations. This may be attributed to the KTDA credit and savings societies that have been put in place to handle financial matters of the farmers such as loans. It has been established that group participation stimulates information exchange (Katungi, 2006). Most (55%) of the respondents didn't have other sources of income apart from the farm. Income from non-farm activities has been found to increase the farmers' probability to invest on new technologies (Habtemariam, 2004).

The respondents had a mean age of 43 years with an average household size of 6 members (Table 2) which in agreement with a study by Kenya National Bureau of Statistics (2010) that noted similar household sizes. This is expected to have a positive influence on family labor for tea production (Christian Partners Development Agency, 2008), but also could have a negative side of reducing per capita resources available. The mean land size per household was 4 hectares and that on average they devote 50% of land to the cultivation of tea. Nyangito (2001) also noted that small holder tea farmers in Kenya hold and manage less than eight hectares of tea farms. This suggests that tea is the main source of livelihood in the area. This may be attributable to tea cultivation that provides work and income throughout the year with relatively little investment and given the minimal risk associated with crop. On the other hand, they also engage in other crops in order to avoid dependence on fluctuating income from tea due to weather changes (SOMO, 2008). Farmers have about 17 years farming experience in tea. Farming experience is an advantage for improving

Table 1: Socio-economic characteristics of farmers

Characteristic	Frequency (%)
Gender:	
Male	144 (85)
Female	26 (15)
Marital Status:	
Married	140 (82)
Single	18 (10)
Widowed	12 (8)
Land tenure:	
Those with title deed	117 (69)
Those without title deed	53 (31)
No. of years of schooling:	
≤ 8 years	82 (48)
>8 & ≤12 years	76 (45)
>12 &≤16 years	12 (7)
Group Membership:	
Members of group organizations	158 (93)
Non-members of group organizations	12 (7)
Off-farm income:	
Those with off-farm income	76 (45)
Those without off-farm income	94 (55)

Table 2: Socio-economic characteristics of farmers

Characteristics	Unit	Minimum	Maximum	Mean
Age	Years	21	74	43
Household size	Number	1	23	6
Farming experience	Years	2	54	17
Size of land	Hectares	0.25	15	4
Land under tea	Hectares	0.25	8	2
Time spent to tea buying center	Minutes	200	3	10

Table 3: Probit estimation of socio-economic factors affecting access to agricultural information

Independent variable	Coefficient	Std. Err.
Off-farm income	0.475***	0.205
Gender	0.211	0.229
Age (years)	-0.011	0.009
Educ. level (years)	0.049**	-0.027
Household size	0.101***	0.035
Group membership	0.186	0.429
Land tenure	-0.000	0.000
Marital status	-0.085***	0.006
Time to tea buying center (minutes)	-0.003***	0.000

Number of observations = 170; chi2 (1) = 115.22 Wald chi2 (34) = 125.69; Prob> chi2 = 0.0000; *: sig at 10%, **: sig. at 5%, ***: sig at 1%

productivity, since it encourages rapid adoption of farm innovations (Obinne, 1991).

Farmers spent approximately 10 minutes from their farms to the buying centres. The buying centres serve as a central place where KTDA provides its services to small holder tea farmers such as extension services, inspecting and collecting green leaf (Kenya Human Rights Commission, 2008). This implies that the nearer the farmer to the buying centre, the more likely that they would receive information.

In identifying the factors influencing smallholder tea farmers in accessing information on tea production, the study used Probit Model. The Model estimates the factors that influence the probability of smallholder tea farmers to access information on tea production. The factors found significant included off-farm income, education level, household size, marital status and time to tea buying center (Table 3).

Access to off-farm income by the farmer increases the probability of access to information on tea production by about 48%. It implies that the higher the income earned the more the farmers' financial capacity which increases the probability of investing in new agricultural technologies. The most important success factors for determining motivation to seek new technologies are those relating to human capital endowments and economic status such as income (Roche, 1998). This agrees with the findings of the study by Asfew *et al*. (1997) and Habtemariam (2004) that in addition to farm income, off-farm income and non-farm activities increases the probability of investing on new technologies. Lagat *et al*. (2003) also noted that a positive change in income is needed to increase the probability of adoption. The probability of access to information similarly increases with the education of the farmer by 5% for each additional year of education. It is generally known that farmers with basic education are more likely to adopt new technology. Ofuoku *et al*. (2008) noted that increase in educational level increased with the farmers' willingness to use information on fish production. In addition, Mwabu *et al*. (2006) and Eze *et al*. (2006) noted that education level was among determinants in adoption of improved maize varieties and cassava production technologies by farmers. Education enhances the ability to derive, decode and evaluate useful information for agricultural production (Ani, 1998).

An increase by a member of household similarly increases the probability of access to information by 10%. As a household size increases, the demand for food and other needs increases and hence pressure to produce more for family consumption which could lead to agricultural information seeking and use. This is in agreement with Tawari (2006) who noted a higher adoption of technologies among fishers having the largest number of wives, children and other dependents. A higher number of family members lead to increased exposure to information (Kacharo, 2007). Geographical distance to the market is commonly used as a measure of spatial diffusion of physical technologies such as seed. The approximate time to tea buying centre had negative significance on access to information which suggests that a reduction in one minute increases the probability of access to information by 3%. Kenya Tea Development Authority provides services to small holder tea farmers such as extension services, inspecting and collecting green leaf from respective buying centers (Kenya Human Rights Commission, 2008). The explicit is that farmers who can easily get to tea buying centers are able to interact with fellow farmers, factory leaf collection staff and extension. Karanja *et al*. (1998) pointed out that fertilizer adoption and intensity of use was adversely affected by distance to fertilizer market. In addition, Katungi (2006) found that market serves as a forum for the exchange of goods

and constitute an important place where agricultural information is exchanged. Moreover, farmers located near to a market will have a chance to get information from other farmers and input suppliers.

Marital status of the farmer however negatively affects the probability of access to information. This suggests that the farmers who are not married access information more than married farmers. This could be attributed to the fact that un-married farmers participate more in social activities due to limited responsibilities, while married farmers choose to stay at home to attend to family matters and help in domestic tasks. In contrast, Opara (2008, 2010) noted that marital status was positively associated with agricultural information access and use. The closer the farmers are to the market, the more likely that they would receive information (Roy *et al*., 1999; Negash, 2007).

CONCLUSION

From the empirical results of the study, it is noted that there is a significant relationship between small holder tea farmers' access to agricultural information of tea crop and off-farm income, education level, household size, marital status and time spent to tea buying center. Ability to access other sources of income by the farmers increases the probability of accessing agricultural information. As a way to promote engagement of the tea farmers on off-farm activities, access to credit should be enhanced and improvement of management skills of the farmers should be facilitated. Access to basic education also increases the likelihood to access and utilize agricultural information. Tea buying center serves as a place where farmers exchange information with one another and extension agents. They should therefore, be built near to the farmers' location as well as improving access roads.

REFERENCES

Ani, A.O., 1998. Assessment of farmers' extension education needs in Yobe state, Nigeria. Niger. J. Agric. Educ., 1: 152-158.

Anon, 2002. Tea Board of Kenya Projections. Kenya.

Asfew, N., K. Gungal, W. Mwangi and B. Seboka, 1997. Factors affecting adoption of maize production technologies in Ethiopia. Ethiopian J. Agric. Econ., 2: 52-69.

Banmeke, T.O.A. and M.T. Ajayi, 2008. Farmers' perception of the agricultural information resource centre at ago-are, Oyo State, Nigeria. Int. J. Agric. Econ. Rural Dev., 1(1).

Christian Partners Development Agency, 2008. Report on Small-Scale Tea Sector in Kenya. CPDA, Nairobi.

Daberkow, S.G. and W.D. McBride, 2003. Farm and operator characteristics affecting the awareness and adoption of precision agriculture technologies in the US. Precis. Agric., 4: 163-177.

Edriss, A.K., 2003. The Dynamics of Groundnut Production, Efficiency, Profitability and Adoption of Technology in Sub-Saharan Africa: The Case of Malawi. International Publishers and Press, Malawi.

Export Processing Zones Authority, 2005. Tea and Coffee Industry in Kenya. Report EP2, Nairobi, Kenya.

Eze, C.C., U.C. Ibekwe and P.O. Mwajiuba, 2006. Detrminants of adoption of improved production technologies among farmer in Enugu state of Nigeria. Global Approaches Extension Pract., 2: 37-44.

Habtemariam, K., 2004. Agricultural Extension with Particular Emphasis on Ethiopia. Addis Ababa, Ethiopia.

Kacharo, D.K., 2007. Agricultural information networks of farm women and role of agricultural extension: The case of dale woreda, southern nations, nationalities and peoples' region. M.Sc. Thesis, in Rural Development and Agricultural Extension, Haramaya University, Ethiopia.

Karanja, D.D., Thomas S., Jayne and P. Strasberg, 1998. Maize Productivity and Impact of Market Liberalization in Kenya. Tegemeo Working Paper: Tegemeo Institute, Egerton University, Nairobi, Kenya.

Katungi, E., 2006. Gender, Social Capital and Information Exchange in Rural Uganda. IFPRI and Melinda Smale, IFPRI (International Food Policy Research Institute) CAPRi Working Paper No. 59, University of Pretoria, Uganda. Retrieved from: http://www.capri.cgiar.org/pdf/capriwp59.pdf, (Accessed on: March 01, 2012).

Kenya Human Rights Commission, 2008. A Comparative Study of the Tea Sector in Kenya: A Case Study of Large Scale Tea Estates. Nairobi, Kenya.

Kenya National Bureau of Statistics, 2010. Kenya Population and Housing Census Statistical Abstract. Ministry of Planning and National Development, Nairobi.

Kinyili, J.M., 2003. Diagnostic Study of the Tea Industry in Kenya. Export Promotion Council.

Lagat, J.K., G.K. Ithinji and S.K. Buigut, 2003. Determinants of the adoption of water harvesting technologies in the marginal areas of Nakuru District, Kenya: The case of trench and water pan technologies. Eastern Afr. J. Rural Dev., 19(1): 24-32.

Mwabu, G., W. Mwangi and H. Nyangito, 2006. Does adoption of improved maize varieties reduce poverty? Evidence from Kenya. Proceeding of International Association of Agricultural Economists Conference. Gold Coast, Australia.

Mwaura, F. and O. Muku, 2007. Tea farming enterprise contribution to small holders' well being in Kenya. Proceeding of African Association of Agricultural Economists (AAAE), 2nd International Conference. Accra, Ghana, August 20-22.

Negash, R., 2007. Determinants of adoption of improved haricot bean production package on alaba special woreda, Southern, Ethiopia. Unpublished Thesis, Ethiopia, Retrieved from: http://results.waterandfood.org/bitstream/handle/10568/682/Thesis_NegashDeterminants.pdf, (Accessed on: December 12, 2011).

Nyangito, H.O., 2001. Policy and Legal Framework for the Coffee Sub-Sector and the Impact of Liberalization in Kenya. KIPPRA Policy Paper No. 2. Nairobi, Kenya.

Obinne, C., 1991. Adoption of improved cassava production technologies by small scale farmers in bendel State. J. Agric. Sci. Technol., 1: 12-15.

Ofuoku, A.N., G.N. Emah and B.E. Itedjere, 2008. Information utilization among rural fish farmers in central agricultural zone of Delta State, Nigeria. World J. Agric. Sci., 4: 558-564.

Opara, U.N., 2008. Agricultural Information Sources Used by Farmers in Imo State, Nigeria Information Development. Inform. Dev., 24(4): 289-295.

Opara, U.N., 2010. Personal and socio-economic determinants of agricultural information use by farmers in the Agricultural Development Programme (ADP) zones of Imo State, Nigeria. Ph.D. Thesis, Library Philosophy and Practice.

Othieno, C.O., 1994. Agronomic practices for higher tea productivity in Kenya. Proceedings of the International Senimar on Integrated Management in Tea: Towards Higher Productivity. Colombo, Sri Lanka, April 26-27th, pp: 79-85.

Owuor, P.O., M.M. Kovoi and D.K. Siele, 2001. Assessment of technological and policy factors impending production of green leaf in smallholder tea farms of the Kenya tea industry: An assessment of farmer's awareness and adoption levels of technologies. Report Submitted to Africa Technology Policy Studies Network, Nairobi, Kenya.

Owuor, P.O., M.M. Kavoi, F.N. Wachira and S.O. Ogola, 2008. Sustainability of smallholder tea growing in Kenya. Country Report, Kenya.

Peterman, A., J. Behrman and A. Quisumbing, 2011. A Review of Empirical Evidence on Gender Differences in Non-Land Agricultural Inputs, Technology and Services in Developing Countries. ESA Working Paper No. 11-11, Food and Agriculture Organization of the United Nations, Retrieved from: http://www.fao.org/docrep/ 013/am316e/am316e00.pdf, (Accessed on: February 25, 2012).

Roche, D., 1998. France in the Enlightenment. Harvard University Press, Harvard.

Rono, W.K and F.N. Wachira, 2005. Tea research and technology development: current status, future strategies and potential institutional collaboration in Kenya. International Symposium on Innovation in Tea Science and Sustainable Development in the Tea Industry, Proceedings of a Conference at Hangzou, China, pp: 8535-8550.

Roy, B.C., T.S. Bhogal and L.R. Singn, 1999. Tenancy and adoption of new farm technology: A study in west Bengal, India. Bangladesh J. Econ., 22(1): 39-49.

SOMO, 2008. Sustainability Issues in the Tea Sector: A Comparative Analysis of Six Leading Producing Countries. Amsterdam, Netherlands.

Sudath, A., 2008. The role of information technology in disseminating innovations in agribusiness: A comparative study of Australia and Sri Lanka. Ph.D. Thesis, Victoria University.

Tawari, C.C., 2006. Effectiveness of agricultural agencies in fisheries management and production in the Niger Delta. Ph.D. Thesis, Philosophy Unpublished, Rivers State University of Science and Technology, Port Harcourt, Nigeria.

Tea Board of Kenya, 2012. Ushering in 2012 with Optimism. Nairobi, Kenya. Retrieved from: http://www.teaboard.or.ke/news/2012/21feb2012.html, (Accessed on: February 14, 2012).

Tea Research Foundation of Kenya (TRFK), 2011. Strategic Plan 2010-2015. Retrieved from: http://www. www.tearesearch.or.ke, (Accessed on: February 14, 2012).

Winter-Nelson, A. and A. Temu, 2002. Institutional adjustment and transaction costs: Product and inputs markets in Tanzanian coffee system. World Dev., 30: 561-574.