

Influence of Psychological Factors on the Adoption of Farm-Forestry Practices among Small-Scale Farmers in Narok-North Sub-County, Kenya

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Abstract

The objective of this paper is to examine the psychological factors that influenced the adoption of farm-forestry practices among small-scale farmers. Despite the numerous benefits farmers can derive from incorporating farm-forestry practices in their farmlands, the adoption of such practices has remained sub-optimal. Kenya's government has over the years implemented projects and enacted farm-forestry policies to encourage farmers to incorporate trees on farms. The researcher used an explanatory sequential mixed method research design with a sample size of 110 small-scale farmers in Narok-North Sub-County. Proportionate sampling technique was used to acquire the sample sizes of the different wards of the Sub-County while simple random sampling was used to obtain the research participants. Semi-structured questionnaires were administered to research participants to generate information on the psychological factors that were measured on a 5-point Likert scale. The results of the Mann-Whitney tests showed that farm-forestry adopters and non-adopters differed significantly in the various constructs that were used to measure attitude. The adopters had a more favourable attitude towards farm-forestry than the non-adopters. They also differed in their subjective norms in which farm-forestry adopters had social networks that supported the practice of farm-forestry. The results also showed that farm-forestry adopters indicated that they faced certain barriers that hindered their adoption of farm-forestry.

Terms: Psychological factors, adoption, small-scale farmers, farm-forestry practices.

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Introduction

Deforestation is a major problem worldwide; the International Union for the Conservation of Nature has noted that over half of the world's forests have been destroyed since the 1960s. Moreover, they indicated that a hectare of tropical forest is destroyed every second (IUCN, 2019). Furthermore, studies indicate that Africa has the world's fastest rates of deforestation; this is said to be a result of the continent's overdependence on primary resources (Ademiluyi, Okude, & Akani, 2008). Narrowing this down, statistics show that within a span of about 43 years, from 1963 to 2006, Kenya's closed canopy forest cover was reduced from 10% to a mere 1.17% (KFWG/DRSRS, 2006), falling way below the world's closed forest canopy of 24.1% and the African average of 9.3%. While Kenya's forest cover currently stands at 7.4%, lower than the globally and constitutionally recommended forest cover of 10%.

Promotion of farm-forestry is a major way of countering the high rates of deforestation, land degradation and wood deficits. Farm-forestry is defined as the integration and management of trees on farmland. It is a sustainable land use practice that is climate-smart and has been proven to prevent and reverse land degradation. Additionally, farm-forestry holds the potential of increasing forest cover in Kenya towards the constitutionally prescribed forest cover of 10% from the current level of 2% (GoK, 2012). This increase can be achieved directly through the widespread establishment of trees on farmlands or indirectly through reducing the exploitation of gazetted forests by supplying wood products from farms to meet the increasing demand for the products. Moreover, farm-forestry confers farmers numerous economic, environmental and social benefits.

The Kenyan Government over the recent years has been giving special attention to farm-forestry through various policies such as the Forest Act of 2005, the Forest Policy of 2007 and Farm-forestry rules of 2009. These policies stressed that the development of farm-forestry is an

approach to increasing forest cover, diversifying subsistence products and income while contributing to soil and water conservation (GoK, 2012). The Climate Change Action Plan 2013-2017, also acknowledged forestry as having the largest potential for climate change mitigation. Furthermore, it cited climate-smart agriculture and agroforestry as priority actions in the climate change mitigation and adaptation (Government of Kenya, 2012). This study aims to investigate the psychological factors that influence the adoption of farm-forestry practices among small-scale farmers in Narok North Sub-County. Many studies have focused on the socio-economic factors when understanding farmers' adoption behaviour but very few have investigated the role that psychological factors play in influencing farmers. Understanding the psychological factors that may influence the adoption of farm-forestry practices is important in helping in the development of specific policy tools and strategies that will encourage the uptake of farm-forestry practices. Consequently, this will lead to effective implementation of the farm-forestry related policies.

LITERATURE REVIEW

There is consensus among social scientists that socio-economic characteristics are not the only determinants of adoption of technologies. Indeed social science researchers have long argued that farmers' perception and attitude towards technology play an important role in influencing adoption. Adesina and Zinnah (1993) found that a farmer's perceptions of the attributes of modern rice varieties significantly affected adoption decisions in Sierra Leone. Furthermore, a study on on-farm tree growing in the Western Himalayas found that attitudes towards tree growing were the second most important determinant of adoption (Sood, & Mitchell 2004). The Theory of Planned Behaviour was applied to measure the psychological attributes of the respondents. The TPB tool has been applied by several studies to gain insightful understanding of farmers' decision to adopt a technology and the

perception they may have towards the technology (Zubair et al., 2011; Herath, 2013; Zubair, & Garforth, 2006; Bond, Kriesmer, Emborg, & Chadha, 2005).

Theory of Planned Behaviour posits that performance of a behaviour is determined by the intention to perform that behaviour (Ajzen, 1991). Behavioural intention is theorized to be determined by the attitude towards the behaviour, the subjective norms and the perception of behavioural control. Attitude in the context of TPB is "the degree to which an individual has a favourable or unfavourable evaluation of the behaviour in question" (Roca, 2011). The subjective norms are "the social pressure from important others (social networks) to perform or not to perform the behaviour while perception of behavioural control is the degree to which an individual feels that performance of the behaviour is under one's volitional control" (Ajzen, 1991; Zubair, et al., 2011). In the case of tree growing practices, adoption farmers may perceive the presence of factors that inhibit or facilitate the planting of trees and which they consider makes farm-forestry either easier or more difficult to practice (Zubair, & Garforth, 2006).

In their study of farmers' pesticide use, Bond, Kriesmer, Emborg, and Chadha, (2005) used the TPB tool and found it useful in investigating farmers' attitudes, subjective norms, perceived behavioural control and perceptions of pesticide use. Zubair and Garforth (2006) also used the TPB tool to explore the beliefs behind farmers' attitudes, to find out the role of subjective norms and the factors that enabled or disabled the successful practice of tree growing. They found out that "decision, whether to grow trees on farmland, is influenced by a farmer's perception of the benefits and losses in engaging in farm-forestry" (Zubair, & Garforth, 2006). They also discovered that pressure from social networks was an important element influencing farmers' adoption of farm-forestry. In a study of farm-forestry adoption by farmers in Malawi, the TPB tool was used to examine the influence of attitudes and adoption behaviour. The study found that respondents with a more positive attitude towards farm-forestry reported having

planted trees on their land. Likewise, respondents who experienced a more positive subjective norm also reported having planted trees on their farm in the past five years (Meijer, Catacutan, Sileshi, & Nieuwenhuis, 2015).

METHODOLOGY

This study was done in Narok North Sub-County of Narok County, in the south-eastern part of Kenya. The study used the cross-sectional survey research design to collect data from small-scale farmers in Narok-North Sub-county. A sample size of 110 small-scale farmers was obtained using the Nassiuma (2000) formulae. The study used a two-stage sampling procedure, proportionate sampling and simple random sampling. A semi-structured questionnaire was used to obtain primary data from small-scale farmers. The researcher used the TPB constructs as suggested by Ajzen (2006) to measure attitude, subjective norm and perceived behavioural control; Likert scales were used to measure the different components of TPB constructs. The second portion of the questionnaire was on the adoption of farm-forestry; this was measured on the basis of trees per hectare of land owned. Data analysis was conducted using SPSS median values and Mann-Whitney U tests. The Mann-Whitney test was used to test for significant differences in the median values of farm-forestry adopters and non-adopters. Mann-Whitney U tests were carried out separately for attitude towards farm-forestry, social norms and perceived behavioural control. T-tests were also carried out for the attitude index, subjective norms index and PBC index to test for significant differences among the farm-forestry adopters and non-adopters.

RESULTS AND DISCUSSION

The theory of planned behaviour constructs was used in this study to understand the rationality that underlies a farmer's decision to engage or not to engage in farm-forestry. These constructs included the farmer's attitude, subjective norm and perceived behavioural control. All the variables were measured on an ordinal scale which was a five-point Likert scale. Since the data obtained were ordinal in nature, using the mean as the measure of central

tendency was not appropriate and meaningful. Therefore, for descriptive statistics, the median was used as a measure of central tendency while the Mann-Whitney U test was used for inferential statistics as it tested significant differences between median answers of farm-forestry adopters and non-adopters.

To measure respondents' attitude towards farm-forestry, both positive and negative beliefs about the perceived consequences of farm-forestry were asked to the respondents. On the positive beliefs, most of the adopters strongly agreed on the positive consequences of farm-forestry, such as increasing income, increasing the availability of firewood and furniture wood, control erosion, and increased soil fertility. The majority of the adopters also disagreed on the negative beliefs of farm-forestry. This indicated that farm-forestry adopters had a more positive attitude towards farm-forestry since they strongly believed in the positive outcomes of farm-forestry, and they did not believe in the negative outcome of farm-forestry.

While a majority of farm-forestry non-adopters agreed on the positive outcomes of farm-forestry, they also agreed

on two negative statements on farm-forestry. These were; "planting trees on their farms will incur more costs" and "planting trees on their farms will increase pest outbreaks". Generally, both farm-forestry adopters and non-adopters believed in the positive outcomes of farm-forestry with the adopters having a slightly stronger belief than the non-adopters. However, the negative outcomes of trees were recognised, with the non-adopters having a stronger belief in them as compared to the adopters.

Mann-Whitney U test was carried out on the salient beliefs that measured attitude. The U-test is a non-parametric test, and in contrast to the t-test, it does not compare mean scores but median scores of two samples. Table 1 below presents the results of the median values and the Mann-Whitney U test. The results of the U test indicated that there were significant differences in the median scores of the belief strength among adopters and non-adopters of farm-forestry. Farm-forestry adopters and non-adopters differed in all the 13 salient beliefs on the outcomes of farm-forestry. With regards to the outcome evaluation of the salient beliefs, significant differences were also seen in all the 13 salient beliefs at 1% significance.

Table 1: Median and Mann-Whitney U test results for Attitude

Salient beliefs	Belief strength			Outcome evaluation		
	FF Adopters Median	FF non-adopters Median	Significance (Mann-Whitney U test)	FF Adopters Median	FF non-adopters Median	Significance (Mann-Whitney U test)
Planting trees on my farm will...						
Increase my income	5	4	0.00***	5	4	0.00***
Increase availability of fuel-wood and furniture-wood	5	4	0.00***	5	4	0.00***
Control soil erosion	5	4	0.00***	5	4	0.00***
provide shade for humans and animals	5	4	0.00***	5	4	0.00***
Is an important source of fruits for my family	5	4	0.00***	5	4	0.00***
Improve soil fertility	5	4	0.00***	5	4	0.00***
Cause hindrances to agricultural activities	2	2	0.00***	3	2	0.00***
Will incur more costs	2	4	0.00***	3	2	0.00***
Cause shade that will reduce crop yield	2	2	0.00***	3	2	0.001***
Increase pest outbreaks	2	4	0.00***	3	2	0.00***
Take up too much space	2	2.5	0.00***	3	2	0.00***
Lead to water scarcity	2	2	0.00***	3	2	0.00***
Cause hardpans	2	2	0.00***	3	2	0.00***

*** Significant at 1% level

The median scores of subjective norm scale for farm-forestry adopters indicated that they agreed that immediate family members, extended family members, friends, fellow farmers, farmer groups and village chief think they should plant trees on their farm. Median scores for farm-forestry non-adopters indicated that they disagreed that immediate family members, extended family members, friends, fellow farmers; farmer groups think that they should grow trees on their farm. They, however, agreed that the village chief thinks they should

grow trees on their farm. Generally, farm-forestry adopters had more social pressure to plant trees than farm-forestry non-adopters. Regarding motivation to comply, both farm-forestry adopters and non-adopters had the same median scores. Mann-Whitney U test was carried out to find out if there were significant differences in the median scores of farm-forestry adopters and non-adopters on the normative beliefs and the results are presented in Table 1. The results indicated that there was a significant difference in 5 of the 7 normative beliefs at 1% significance level. For the

motivation to comply there was no significant difference with salient referent among the farm-forestry adopters and non-adopters. These results closely resemble those of Zubair and Garforth (2006), who used the Mann-Whitney U

test to test for a significant difference in the beliefs underlying subjective between farm-forestry and non-adopters.

Table 2: Median and Mann-Whitney U test result for subjective norm

	Normative belief			Motivation to comply		
	FF adopter median	FF non-adopter median	M-W significance	FF adopter median	FF non-adopter median	M-W significance
Immediate family members	4	2	0.00***	3	3	0.26
Extended family members	4	2	0.00***	3	3	0.49
Farmer group	4	2	0.00***	3	3	0.08*
Friends	4	2	0.00***	3	3	0.54
Fellow farmer	4	2	0.00***	3	3	0.59
Village chief	4	4	0.14	3	3	0.61

*** Significant at 1% level * significant at 10% level

Perceived behaviour control consisted of factors that facilitate or hinder the performance of the behaviour. This study examined 3 factors that would facilitate the adoption of farm-forestry and six factors that could potentially hinder the adoption of farm-forestry. The median score for farm-forestry adopters on the factors that facilitate the adoption of farm-forestry was 4; that is, they agreed that those factors were true in their cases. The median score on factors that hinder adoption for farm-forestry was 2; indicating that adopters disagreed that those factors hindered the adoption of farm-forestry. Farm-forestry non-adopters median scores show that they disagreed that tree seedlings are easily available to them, but they agreed that they had enough water on their farm and also enough time to carry out all their farming activities.

On factors that hinder adoption, non-adopters median scores indicated that they agreed that farm-forestry was a long term business. They agreed that they often encountered livestock grazing on their land and that they had no knowledge of the appropriate tree varieties for

their area. But they disagreed that the market for tree products is unavailable, that rainfall is irregular and inadequate and that they encounter termites on their farms. The median scores on the power of control beliefs indicated that both farm-forestry adopters and non-adopters strongly agreed that the facilitating factors would make adoption of farm-forestry easy. However, for the power of control beliefs of the salient beliefs that hinder practising of farm-forestry, the median scores of farm-forestry adopters and non-adopters differed. The adopters indicated that even if the hindering factors existed, they would still practice farm-forestry while the non-adopters indicated that hindering factors would make it difficult for them to practice farm-forestry.

Mann-Whitney U test was carried out to see if there were significant differences in the median scores on the factors that facilitated or hindered adoption among farm-forestry adopters and non-adopters and the results are displayed in Table 2. The results showed there was a significant difference in the factors that facilitated adoption at 1%

significant level. Farm-forestry adopters significantly experienced factors that facilitated tree planting more than the non-adopters. On factors that hinder adoption, there were significant differences in 4 of the 6 factors, whereby farm-forestry non-adopters significantly saw hindering factors; “farm-forestry is a long-term business”, “I often encounter livestock grazing on my land” and “I have no knowledge on the tree varieties suitable for my area” were significant at 1% significance level. While “the market for tree products is unavailable” was significant at a 5% significance level. Regarding the power of control beliefs for the enabling factors, there were no significant

differences in the median scores of both the adopters and non-adopters of farm-forestry. On the other hand, with regards to hindering factors, the Mann-Whitney U results indicate that there were significant differences in the median scores of farm-forestry adopters and non-adopters at 1% significance level. These findings closely reflect findings by Zubair and Garforth (2006) who used Mann-Whitney to test beliefs concerning the factors that hinder or facilitate the performance of farm-forestry; lack of access to seedlings and damage of trees by animals were found to be significant.

Table 3: Median and Mann-Whitney U test results for Perceived Behavioural control

Salient control beliefs	Control beliefs			Power of control beliefs		
	FF adopters median	FF non-adopters median	M-W significance	FF adopters median	FF non-adopters median	M-W significance
Tree seeds and seedlings are easily available to me	4	2	0.00***	5	5	0.93
Water is sufficiently available in my land	4	4	0.00***	5	5	0.90
I have enough time to carry out all my farm activities	4	4	0.00***	5	5	0.92
The market for tree products is unavailable	1	2	0.011**	3	2	0.00***
Farm-forestry is a long-term business	2	4	0.00***	3	2	0.00***
I often encounter livestock browsing on my farm	2	4	0.00***	3	2	0.00***
Rainfall is irregular and inadequate	2	2	0.156	3	2	0.00***
I often encounter termites on my land	2	2	0.138	3	2	0.00***
I have no knowledge of the tree species suitable for my farm	2	4	0.00***	3	2	0.00***

** Significant at 5% level *** Significant at 1% level

The attitude indices for both farm-forestry adopters and non-adopters were computed by summing the product of belief strength and outcome evaluation. Farm-forestry adopters had higher attitude indices than farm-forestry non-adopters. A t-test was then run to see if there was a

difference in the mean indices of farm-forestry adopters and non-adopters. The results showed that there was a difference at the 1% significance level. Subjective norm indices were computed by summing the product of normative belief and motivation to comply. Here again,

farm-forestry adopters had a higher mean index than non-adopters. The t-test results also indicated that the mean of the two groups was statistically significant at the 1% significance level. For the perceived behavioural control construct, the indices were calculated by summing the

products of control beliefs and the power of control beliefs. Once more, the adopters had a higher mean index than the non-adopters. T-test results show that the mean was significant at 1% significance level.

Table 4: T-test results on the influence of psychological factors on the adoption of farm-forestry

Variable	Adopters	Non-adopters	t value	p-value
Attitude Index	171.36	147.46	6.47***	0.00
Subjective Norm	90.62	62.15	7.65***	0.00
PBC	95.95	83.52	5.23***	0.00

CONCLUSION AND RECOMMENDATIONS

The results showed that the psychological factors of farm-forestry adopters and non-adopters differed significantly. Farm-forestry adopters had a more favourable attitude towards farm-forestry as well as supportive social networks and fewer barriers to the practice of farm-forestry.

Thus, there is need to design policy strategies that will target at improving farmers' attitude towards farm-forestry. There is also need to recognise that farm-forestry non-adopters faced certain barriers that make it hard for them to practice farm-forestry and also a need to develop strategies that will enable farmers to overcome such barriers and be able to practice farm-forestry.

References

- Ademiluyi, I., Okude, A., & Akani, C, A. (2008). An Appraisal of land use and land cover mapping in Nigeria. *African Journal of Agricultural Research*, 581-586.
- Adesina, A. A., & Zinnah, M. M. (1993). Technology characteristics, farmer perceptions and adoption decisions a tobit model application in Sierra Leone. *Agricultural economics*, 297-311.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. (2006). Behavioural interventions based on the theory of planned behaviour. Retrieved from <http://people.umass.edu/aizen/pdf/tpb.intervention.pdf>.
- Bond, J. L., Kriesmer, S. K., Emborg, J. E., & Chadha, M. L. (2005). Understanding farmers' pesticide use in Jharkhand India. *Extension Farming Systems Journal*, 5 (1): 53-62.
- GoK. (2012). *Forests Act*. Nairobi: National Council for Law Reporting.
- Government of Kenya. (2012). *National Climate Change Action Plan 2013-2017*. Nairobi: GOK.
- Herath, C. S. (2013). Does intention lead to behaviour? A case study of the Czech Republic farmers. *Agric.. Econ. Czech*, 59 (13),143-148.
- KFWG/DRSRS. (2006). *Changes in Forest Cover in Kenya's Five "Water Towers" 2003-2005*. Nairobi: KFWG/DRSRS.
- IUCN. (2019). *International Union for the Conservation of Nature*. Retrieved August 20, 2019, from <https://www.iucn.org/resources/issues-briefs/deforestation-and-forest-degradation>

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- Meijer, S. S., Catacutan, D., Sileshi, G. W., & Nieuwenhuis, M. (2015). Tree planting by smallholder farmers in Malawi: Using the theory of planned behaviour to examine the relationship between attitudes and behaviour. *Journal of Environmental Psychology*, 43: 1-12.
- Roca, A. (2011). *A socio-psychological study of the adoption of farmers' agro-biodiversity friendly practices in Flanders* (Master's Dissertation). Retrieved from Ghent University Library: http://lib.ugent.be/fulltxt/RUG01/001/789/889/RUG01-001789889_2012_0001_AC.pdf
- Sood, K. K., & Mitchell, C. P. (2004). Do socio-psychological factors matter in agroforestry planning? Lessons from smallholder traditional agroforestry systems. *Small-scale Forestry*, 3(2), 239-255.
- Zubair, M., & Garforth, C. (2006). Farm Level Tree Planting in Pakistan: The Role of Farmers' Perceptions and Attitudes. *Agroforestry Systems*. 66, 217-229.
- Zubair, M., Garforth, C., Hussain, S. B., Zahid, D. M., Baloch, M. S., Shah, F. R., et al. (2011). Farm Forestry in Pakistan: An Application of Theory of Planned Behavior by Probing into the Measurement Issues. *Pak. J. Bot*, 43 (1):705-714.