

Farmers' knowledge, attitudes and perceptions towards timber out-grower schemes in selected districts of Malawi

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Timber out-grower schemes have proved to be one of the most profitable enterprises for rural households. No wonder, several analysts and researchers regard them as an alternative model to avoid problems of displacement and create 'win-win' outcomes for both rural communities and private investors in forestry. However, understanding farmers' knowledge, attitudes and perceptions towards tree out-grower schemes plays a key role in farmers' adoption of the interventions. This study examined these farmers' attributes towards out-grower schemes in selected districts of Malawi. Data were collected from 300 farmers who were randomly selected between September and October 2017 through semi-structured interviews and focus group discussions. The results revealed that 82% of the respondents participated in timber out-grower schemes, piloted by WVI and ICRAF. Based on a median score of 4.75 (IQR 4–5), respondents were strongly agreed on their knowledge on timber out-grower schemes as a basis for adopting the intervention. Using the cumulative Cube-root frequency method of stratification, the results revealed that more than half (51%) of the respondents belonged to the high category, and thus had high knowledge of timber out-grower schemes, whereas 32% and 17% had very high and medium levels of knowledge, respectively. The study also revealed that 79.3% of the respondents had a positive attitude towards out-grower schemes. Pearson correlation analysis revealed a positive, significant relationship between marital status ($r = 0.081$), household size ($r = 0.062$), education ($r = 0.051$) and knowledge of the respondents on timber out-grower schemes. A significant positive relationship was also observed between marital status ($r = 0.156$), household size (0.178), education (0.002), ethnic group (0.151) and attitudes of the respondents towards timber out-grower schemes. However, a negative relationship between knowledge and attitude was revealed ($r = -0.534$). The study therefore concludes that socio-economic factors, such as gender, education, ethnic group and household size, should be considered in upscaling timber out-grower schemes in Malawi.

Keywords: adoption, contract farming, cumulative cube-root frequency method, forest

Introduction

Malawi is endowed with a diversity of natural resources, which include forests, flora and fauna, fresh water and fertile soils (Government of Malawi 2012). It has a land area of about 11.9 million ha of which 33.38% is forested. The majority of the forests are located in rural areas. It is estimated that almost 85% of Malawi's population lives in rural areas (Kambewa and Utila 2008) and approximately 80% depend on natural resources for their subsistence, household income and livelihood (Fisher 2004; Jumble and Angelsen 2007; Yaron et al. 2011). Thus, the income derived from forest resources contributes significantly to rural livelihoods in Malawi similar to any other country in southern Africa, thereby reducing household vulnerability poverty levels and improving their wellbeing (Sunderlin et al. 2005; Angelsen et al. 2014).

Malawi's rural population plays an important role in both protection, conservation and exploitation of forests through varied livelihood strategies. Management of natural resources such as forests, therefore, is a challenging task

and this creates pressure on the forests in Malawi, which is one of the poorest and most densely populated countries in southern Africa (Clarkson 2012). With poor management of the natural resources, communities are not able to optimally and sustainably utilise the forest resource base. It is, therefore, not surprising to note that when subsistence agriculture fails, forest-based enterprises are usually the only source of extra income for the communities living adjacent to the forests and beyond.

Over the years, the Malawi Government, through the Department of Forestry, has been promoting protection and conservation of forest resources but deforestation and forest degradation continue to be a major challenge (Kambewa and Utila 2008). The deforestation and forest degradation are a result of uncontrolled firewood collection, infrastructure development, agriculture expansion, illegal unsustainable charcoal production, shifting cultivation, urbanisation, high population growth rate and curing tobacco (Kambewa and Utila 2008; Mauambeta et al.

2011). These drivers of deforestation have contributed to Malawi's highest deforestation rates in southern Africa, estimated to be in the range of 1.6% per year (FAO 2015).

One way of alleviating the aforementioned factors contributing to deforestation and forest degradation is to invest in tree planting programmes. However, the effectiveness and efficiency of the tree planting programmes and activities as well as the benefits associated with them depend on the involvement and participation of the local communities in tree planting and protection thereof. The Malawi Government, non-governmental organisations (NGOs), civil society organisations (CSOs), academia and research institutions, and development partners have introduced various initiatives to mitigate the constraints of deforestation and promote tree planting. The International Centre for Research in Agroforestry (ICRAF) and World Vision International (WVI) are piloting a project on small-scale timber out-grower schemes for commercialisation. The project aims at empowering forest-dependent communities in six districts of Malawi through the commercialisation of small-scale forestry production. The districts are Karonga and Mzimba in the Northern Region, Ntchisi and Dedza in the Central Region, and Machinga and Chikwawa in the Southern Region of Malawi.

An out-grower scheme (often referred to as contract farming) is defined as a contractual arrangement for the production and marketing of agricultural produce in which farmers and firms (mainly agroprocessing and/or exporting) enter into advance contracts to purchase produce of predetermined quality and quantity at a predetermined price and time often with the provision of certain services, such as inputs and technical assistance to the farmers (Singh 2002). Howard et al. (2005) outline some of the advantages of out-grower schemes, which include (1) helping smallholder farmers to generate income through sales of timber and poles, (2) provide timely inputs such as tree seedlings and (3) secure markets, and access to cash loans, technologies, trainings and technical expertise. In return, the farmers make their land and labour available for the forest activities and in some cases sell their timber and poles to the Forestry Company depending on the mutual agreement between the farmers and company (Andrew et al. 2000; Cairns 2000).

According to Vermuelen et al. (2003) and Chamberlain et al. (2005), small grower schemes or smallholder tree farming has proved to be a most profitable enterprise for rural households compared with producing alternative annual crops. Small grower schemes that are established in the rural areas not only contribute substantially to rural household's income but also address the issues of high unemployment rates in the rural areas. Although Malawi's economy is predominantly agriculture, timber out-grower schemes have never been assessed as potential revenue sources to forest-dependent communities. However, several analysts and researchers have suggested such out-grower schemes as providing an alternative model for avoiding problems of displacement and creating 'win-win' outcomes for both local communities and private investors (Von Braun and Meinzen-Dick 2009; Kay 2012). It is widely asserted that participation in out-grower schemes provide a good learning opportunity, income stability and access to

credit (Chamberlain et al. 2005; Karumbidza 2005; Masters and Kisiangani 2010; Smalley 2013).

The project on Empowering Forest Dependent Communities through Commercialisation of Small Scale Forestry is Malawi's entry into establishment of out-grower schemes into the forestry industry. It is with this understanding that a study was carried out to assess farmers' knowledge, attitudes and perceptions towards timber out-grower schemes in selected districts of Malawi. It is envisaged that the results of this study would help different stakeholders in upscaling the out-grower scheme approach in the future and economically empower many forest-dependent communities. This is based on the assumption that farmer's knowledge about a technology forms the basis for the perceptions and attitudes the farmers will have towards the technology, which enhances its adoption.

Materials and methods

Study area

Malawi has different types of forests of varying areas, defined by dominating tree species and governance systems. However, based on governance system classification, the majority of the forest is on customary land, which comprises over 50% of total forest cover. The ownership and control of this customary land forest type is under the authority of traditional chiefs/local leaders. The other forest type is classified as private plantations and woodlots, which comprises of only 0.5% of the total forest cover and is owned by private individuals and institutions. Details on the forest types in Malawi are presented in Table 1.

The study focused on six districts of Malawi, namely Karonga, Mzimba, Ntchisi, Dedza, Machinga and Chikwawa. Within these districts, the study targeted the seven impact areas where ICRAF and WVI are piloting a timber out-grower scheme project. The names of these impact Forest Reserve areas are Karonga South Escarpment (KSEFR) and Vinthukutu in Karonga district, Perekezi in Mzimba district, Mua-livulezi in Dedza district, Ntchisi in Ntchisi district, Masenjere Escarpments in Chikwawa district and Liwonde in Liwonde district. Figure 1 shows the physical location of the study areas. Both the district and the study areas were purposely sampled based on the ICRAF and WVI project area implementation.

Data collection

Household interviews were conducted in September and October 2017 to solicit information on the respondent's

Table 1: Forest types of Malawi and their size. Adapted from Kambewa and Utila (2008)

Forest category	Area (ha)	Percentage of total area
Natural forests (reserves)	870,052	22.0
Government plantations	90,000	2.0
Private plantations	20,000	0.5
Customary forests	1,988,255	50.5
National parks and game reserves	981,255	25.0
Total forest area	3,949,786	100

knowledge, attitude and perceptions towards timber out-grower schemes. A structured questionnaire comprising both open-ended and close-ended questions was administered to 300 households who were randomly selected from the households involved in the pilot project implemented by ICRAF and World Vision International. The distribution of the survey participants/respondents within the study area was systematic and uniform. Thus each district (6) contributed 50 respondents to the survey making 300 respondents all together. The questionnaire consisted of two parts. The first part was designed to collect information about household characteristics (socio-economic data) and assets. The socio-economic data collected included; age, sex, marital status, size of the household, main occupation, level of education, ethnic group, sources of income and

estimated income per month and per year. A scoring using five-point Likert Scale was used to measure farmers' knowledge, attitudes and perceptions towards timber out-grower schemes (Likert 1991).

A checklist was also developed that guided the focus group discussions (FGDs) to cross-check the information provided by the households. These discussions were carried out according to the methodology developed by Hennik (2007). One focus group discussion was carried out from each impact area, totalling seven focus groups during this study. Each focus group discussion consisted of 10–12 participants and lasted about 2–3 h. The participants of the FGDs were those members who held positions in the Block Management Committee for the forest reserve management. The open discussion questions focused on the knowledge,

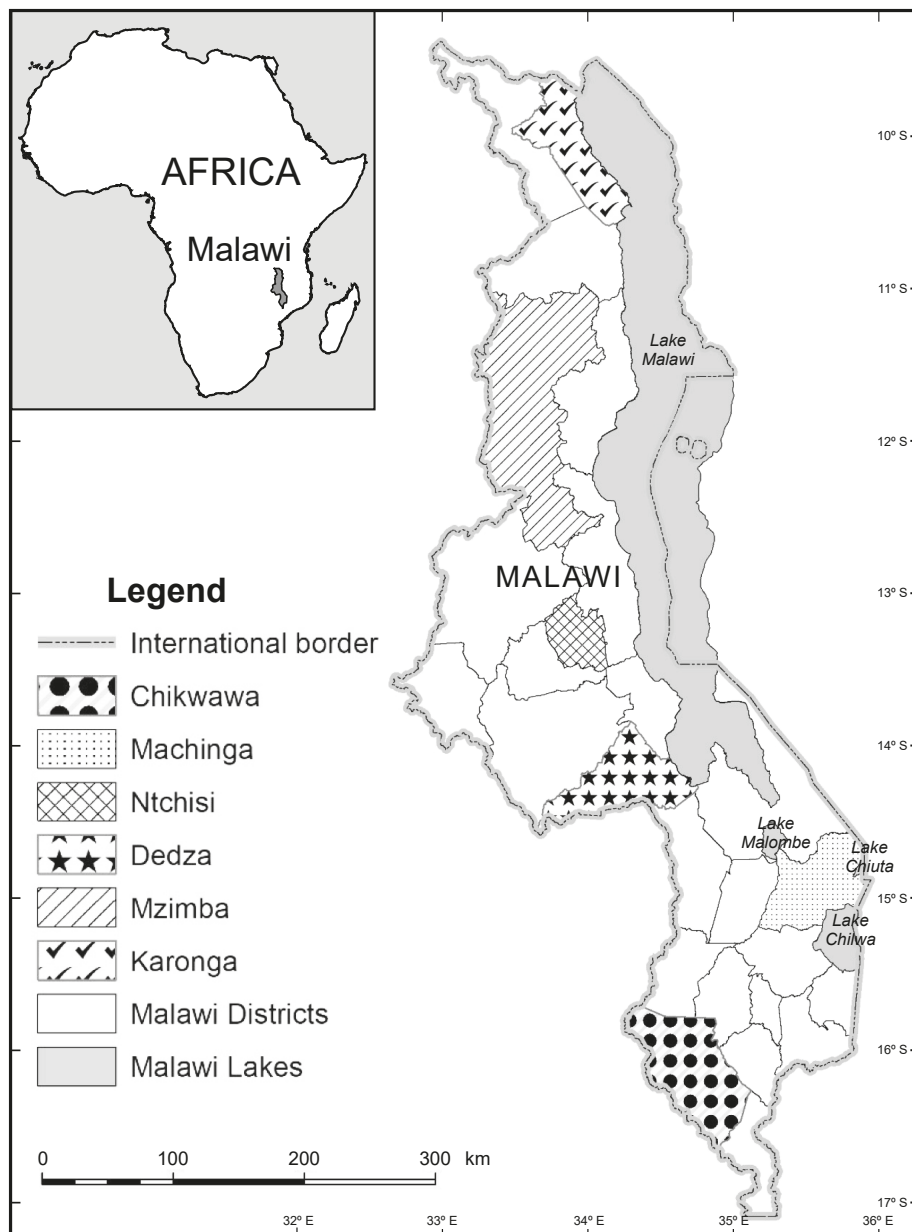


Figure 1: Map of the study area showing the location of ICRAF and WVI impact areas

attitudes and perceptions of farmers toward timber out-grower schemes in the study area.

Data analysis

To evaluate the knowledge and attitudes of farmers towards timber out-grower schemes, a Likert-type scale ranging from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = don't know/undecided, 4 = agree and 5 = strongly agree) was used, measured on an ordinal scale. As a result, median and interquartile ranges (IQR) of each item were used as measures of central tendency and dispersion. The non-parametric tests were used to determine correlations and differences between groups. Furthermore, 22 statements were used in evaluating knowledge and attitudes of farmers towards out-grower schemes. Twelve statements evaluated knowledge, whereas 10 statements evaluated attitudes towards out-grower schemes. These 22 statements are presented in Table 2. All analyses were done using SPSS.

All respondents who indicated that they had knowledge on tree out-grower schemes were further distributed into five categories of knowledge level (very low, low, medium, high and very high) using a cumulative cube-root frequency method of stratification (Singh and Mangat 1996) as explained below:

$$L_i = y_{i-1} \left(\frac{S_k - S_{i-1}}{L \sqrt[3]{f_i}} \right) (y_i - y_{i-1})$$

Table 2: Likert scale statements used to evaluate the knowledge and attitudes of farmers

Statements/items on knowledge of out-grower schemes
Involves animal rearing, fisheries, farming, tree planting
Provides alternative markets for smallholder farmers
Provides large opportunities for local products to enter global markets
Guarantees consistent supply to the markets
Offers out-grower scheme through organisations such as ICRAF etc.
Entrepreneurship provides opportunities to participate in out-grower scheme as investors
Can save costs associated with middlemen
Is not a multi-level market scheme
Is an agreement between farmers and contractors
Encourages transfer of technology and skills
Has a guaranteed market for the products that have been produced
Helps farmers have access to farming inputs, extension services and credit
Statements/items on attitudes of the farmers of out-grower schemes
Willingness to seek entrepreneurship opportunities
Willing to take the opportunity to attend trainings
Willingness to seek further information
Improves the standards of living
Feel more productive
Feel more professional if I am involved
Career objectives will be met if I am involved
Is acceptable for me even if I do not generate enough profits than other farming methods
I feel comfortable if I am involved
Willingness to venture into timber, fodder trees, medicinal plants, agroforestry trees, fruits, shrubs etc.

where L = number of strata, L_i = upper limit of the i th stratum, y_{i-1} = lower limit of the class in which L_i lies, S_k = cumulative total of $\sqrt[3]{f_i}$, $\sqrt[3]{f_i}$ = cube-root frequency of the i th class in which L_i lies, S_{i-1} = cumulative cube-root of the frequency of the preceding class to the class to which L_i lies, y_i = lower limit of the class in which L_i lies, and $y_i - y_{i-1}$ = width of the class in which L_i lies.

Results

Household characteristics of the study population

The sample survey results indicated that 76.7% of the study population were female and 23.3% were male (Table 3). The size of the rural households ranged from one to 13 with a mean household size of 5.69 individuals. As regard to the households interviewed, more than 80% were married. However, most of the household heads (78%) were aged under 50 years. In terms of education, the majority of the study population (68.2%) attended primary school and 16% had no formal education (illiterate). Regarding the

Table 3: Household characteristics of the study population ($n = 300$)

Variable	Frequency	Percentage
Age		
<20 years	4	1.3
20–25 years	45	15.0
26–30 years	28	9.3
31–35 years	53	17.7
36–40 years	54	18.8
41–45 years	21	7.0
46–50 years	29	9.9
>50 years	66	22.0
Gender		
Male	70	23.3
Female	230	76.7
Marital status		
Single	8	2.7
Married	243	81.0
Separated	2	0.7
Divorced	25	8.3
Widowed	21	7.0
Main occupation		
Farmer	245	81.7
Trader	43	14.3
Construction	2	0.7
Craft work	4	1.3
Domestic work	6	2.0
Level of education		
No formal education	48	16.1
Primary	204	68.2
Secondary	45	15.1
Tertiary	2	0.7
Ethnic group		
Chewa	82	27.5
Tumbuka	87	29.2
Sena	7	2.3
Ngoni	32	10.7
Yao	15	5.0
Lomwe	43	14.4
Mang'anja	19	6.4
Nkhonde	10	3.4
Wasukwa	3	1.0

main occupation of the household, about 80% of the study population were farmers. The remaining 20% comprised households who were traders, craft workers, domestic workers and construction workers. The estimated annual income ranged from MK5 000.00 to MK22 000 000.00 with a mean income per year of MK402 454.84. The main sources of income were farming (80%) and other sources included piece works, Village Savings and Loans, self-employment and selling of forest produce. With respect to ethnic group, the sample was comprised of Tumbuka (29.2%), Chewa (28%), Lomwe (14.4%), Ngoni (10.7) and the remainder (17.7%) belonged to other minority ethnic groups.

Participation of the farmer's in timber out-grower schemes

Participants were asked to indicate if they participated in timber out-grower schemes. The the highest proportion of the respondents (82%) were participating in timber out-grower schemes in the project impact areas. More than 90% of the respondents indicated that World Vision Malawi is the main promoter of the timber out-grower scheme in the study areas. Although small, United Purpose, an international NGO, was also mentioned as a promoter of the scheme. Figure 2 presents the promoters of the timber out-grower schemes in the study area.

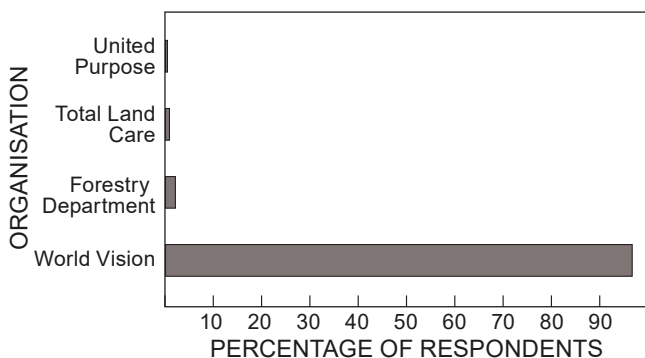


Figure 2: Promoters of timber out-grower schemes in the study area

Table 4: Knowledge of farmers on timber out-grower schemes

Statement	Score (%) ^a					Mean	SD
	1	2	3	4	5		
The government offers out-grower scheme through organisations such as ICRAF etc.	–	0.8	1.3	21.8	76.1	4.73	0.27
Entrepreneurship provides opportunities for the public to participate as investors	–	0.4	2.1	37.4	60.1	4.57	0.31
Provides alternative markets for smallholder farmers	0.4	0.8	3.8	38.2	56.7	4.50	0.43
Encourages transfer of technology and skills	0.4	0.4	2.9	40.8	55.5	4.50	0.39
Guarantees consistent supply to the markets	0.8	–	4.6	40.8	54.8	4.47	0.44
Provides large opportunities for local products to enter global markets	0.8	0.8	4.6	38.7	55.0	4.46	0.49
Helps farmers have access to farming inputs, extension services and credit	5.0	0.8	2.1	27.7	64.3	4.45	0.95
Involves animal rearing, fisheries, farming, tree planting	0.9	0.4	2.6	46.4	48.8	4.38	0.43
Has a guaranteed market for the products that have been produced	5.5	3.8	5.0	36.6	49.2	4.20	1.15
Can save middlemen's costs	1.7	2.1	16.5	38.0	41.0	4.16	0.80
Is an agreement between farmers and contractors	6.3	3.8	21.9	31.2	36.7	3.88	1.30
Is not a multi-level market scheme	24.1	18.1	16.9	16.9	24.1	2.99	2.28

^a Scores: 1 = strongly disagree, 2 = disagree, 3 = don't know/undecided, 4 = agree, 5 = strongly agree

Knowledge of the farmers on timber out-grower schemes

Based on the median score of 4.75 (IQR 4–5), the results revealed that the respondents strongly agreed on the statements pertaining to their knowledge on timber out-grower schemes as a basis for participating in the out-grower scheme. This reflects the possibility that most of the respondents were among the most knowledgeable farmers with regard to timber out-grower schemes, who also participated in various trainings offered by the project. The highest mean score was recorded against the statement *The government offers out-grower schemes through organisations such as ICRAF etc.* and the lowest mean score was recorded against the *The out-grower scheme is not a multi-level market scheme*. Table 4 presents the detailed results of the knowledge of farmers on timber out-grower schemes.

Farmers were asked if they had enough knowledge of timber out-grower schemes. In this regards, the results reveal that the majority of the respondents (95%) indicated that they had knowledge on timber out-grower schemes. This is also attributed to the enormous trainings that were reported to be received from both government and non-government organisations in these areas.

Results on knowledge levels from the cumulative cube-root frequency method of stratification revealed that 51% of the respondents were in the high category, indicating high knowledge of timber out-grower schemes, while 32% and 17% had very high and medium levels of knowledge, respectively. None of the respondents fell in the category of the very low or low knowledge of timber out-grower schemes. The computed total knowledge scores of the respondents ranged from 35 to 60 with a mean of 51.2. Figure 3 presents the detailed results on the knowledge level.

Attitudes of the farmers towards timber out-grower schemes

Respondents' attitudes towards timber out-grower schemes, based on the Likert's rating scale, is shown in Table 7. The results indicate that 79.3% of the respondents had a positive attitude towards out-grower schemes (median

score of 5, IQR 5–5). Responses to the statement *Willing to take the opportunity to attend trainings on out-grower schemes* recorded the highest mean score of 4.89 and the lowest mean score of 4.51 was recorded against the response statement of *Career objectives will be met if I am involved in out-grower schemes*. The computed total attitude scores ranged from 22 to 50 with a mean of 46.6.

Access to extension services, inputs and trainings

Respondents acknowledged receiving extension services from different organisations. About 44% of the survey participants indicated that the extension services on out-grower schemes in the study were offered by project extension workers from WVI, while 29.1% and 7.9% indicated these were offered by both project and government extension workers, and government extension workers only, respectively.

The results also show that farmers in the study area received inputs such as forest tree seedlings, fruit tree seedlings and tree seeds. Almost 90% of the inputs were from WVI, 3% from the Forestry Department, and 5% from other organisations such as Total Land Care and United Purpose. The forest tree seeds and seedlings received comprised those of *Khaya anthotheca*, *Albizia lebbek*, *Acacia* species and *Eucalyptus* species. On the other

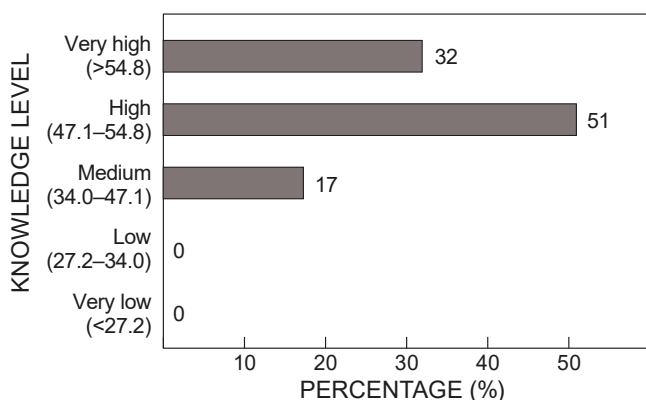


Figure 3: Distribution of respondents according to their level of knowledge

Table 5: Attitudes of farmers towards timber out-grower schemes

Statement	Score (%) ^a					Mean	SD
	1	2	3	4	5		
Willing to take the opportunity to attend trainings	1.5	6.2	–	–	92.3	4.877	0.55
Willingness to seek for entrepreneurship opportunities	1.5	9.2	–	–	89.2	4.846	0.57
Willingness to seek further information	1.5	10.8	–	–	87.7	4.831	0.57
Willingness to venture into timber, fodder trees, medicinal plants, agroforestry trees, fruit, shrubs etc.	–	–	–	21.5	78.5	4.785	0.41
Improves the standards of living	1.5	15.4	–	–	83.1	4.785	0.60
I feel comfortable if I am involved	1.6	–	–	25.0	73.4	4.688	0.64
Feel more productive	1.6	–	7.9	15.9	74.6	4.619	0.77
Feel more professional if I am involved	1.6	–	4.9	27.9	65.6	4.557	0.74
Is acceptable for me even if I do not get enough profits than other farming methods	3.1	1.5	–	29.2	66.2	4.539	0.85
Career objectives will be met if I am involved	3.1	–	3.1	30.8	63.1	4.508	0.83

^a Scores: 1 = strongly disagree, 2 = disagree, 3 = don't know/undecided, 4 = agree and 5 = strongly agree

hand, the fruit tree seedlings comprised those of orange, mango, tangerine and pawpaw. However, results from FGDs showed that most of the tree seedlings received did not survive due to poor species-site matching. Furthermore, farmers had no choice of the tree species to be received and planted. As regards to capacity building, most of the respondents indicated that they attended trainings on fruit production, tree production and nursery management, forest management, crop production, and business and market search. Figure 4 shows the different trainings attended by farmers in the study area.

Relationships between socio-economic characteristics and knowledge and attitudes

Results from the Pearson correlation analysis, conducted using a bivariate method, revealed a positive significant relationship, although small, between marital status ($r = 0.081$), household size ($r = 0.062$), education ($r = 0.051$) and knowledge of the respondents on timber out-grower schemes. A significant positive relationship was also observed between marital status ($r = 0.156$), household size ($r = 0.178$), education ($r = 0.002$), ethnic group ($r = 0.151$) and attitudes of the respondents towards timber out-grower schemes. The results further showed a positive and strong relationship between knowledge and attitude of farmers towards timber out-grower schemes ($r = 0.534$, $p = 0.000$). Thus, those farmers with knowledge on timber out-grower schemes also reported a positive attitude on timber out-grower schemes. On the other hand, no significant correlations were observed between age, gender, main occupation, annual income of the respondents and their knowledge and attitude towards timber out-grower schemes. Table 6 shows the results of the relationship between social economic parameters, knowledge and attitude.

Discussion

The results reveal that a large proportion of the communities in the study area participated in timber out-grower schemes promoted by the project. Through their participation in these schemes, the communities had accessed inputs such as fruit trees and forest tree seedlings, trainings on fruit production, seedling production,

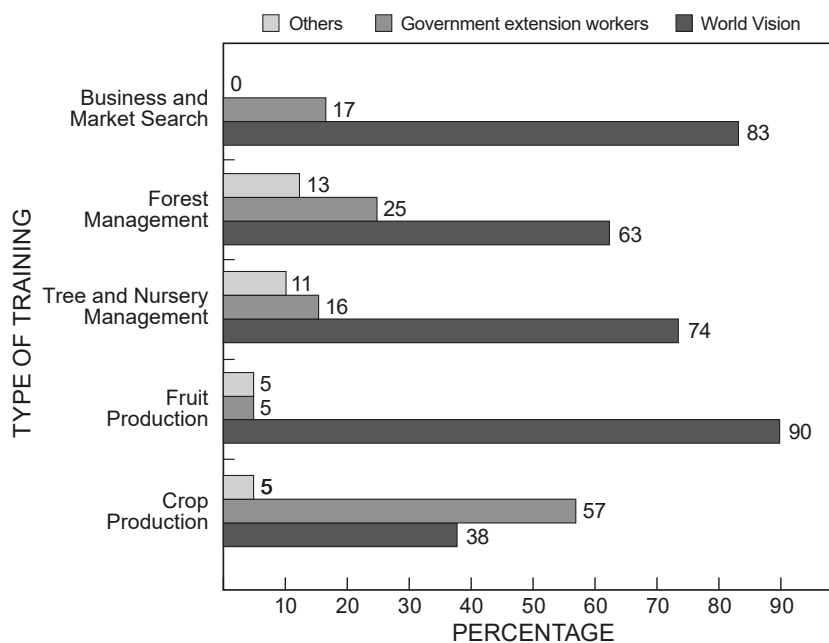


Figure 4: Trainings attended by respondents under timber out-grower schemes

Table 6: Relationships between socio-economic data, knowledge and attitude

Variable	Knowledge (<i>r</i> value)	Attitude (<i>r</i> value)
Age	-0.032 ^{ns}	0.301 ^{ns}
Gender	-0.136 ^{ns}	-0.125 ^{ns}
Marital status	0.081 ^{**}	0.156 ^{**}
Household size	0.062 ^{**}	0.178 ^{**}
Main occupation	0.056 ^{ns}	0.135 ^{ns}
Education	0.051 ^{**}	0.002 ^{**}
Ethnic group	-0.054 ^{ns}	0.151 [*]
Annual income	-0.057 ^{ns}	0.061 ^{ns}

* $p < 0.05$ (two-tailed), ** $p < 0.01$ level (two-tailed), ns = non-significant

nursery management and forest management. The other reasons the communities joined in timber out-grower schemes was to engage in alternate and additional source of income. At the time of evaluation, the communities had not started generating income from the trees grown as they are still young. Several examples of research undertaken in South Africa, Ghana, India and Thailand have shown that forest out-grower schemes contribute positively to the livelihoods of the rural households (Cairns 2000; Desmond and Race 2000; Howard et al. 2005). For the growers/farmers, out-grower schemes are intended to generate income from under-utilised land, access trainings, new technologies, secure markets, loans, technical support and other extension services. In Zambia, Matenga and Munguzwe (2017) reported that households on out-grower schemes achieved high income compared with non-participating households. However, due to the scale of production, which was small, the income was not enough to take them out of poverty. In addition, access to land became a clear issue in advocating for productive and

effective scalable tree out-grower schemes (Matenga and Munguzwe 2017). This clearly indicates that for the timber out-grower scheme piloted by WVI and ICRAF in Malawi to achieve its full potential, the communities should gain access to financial support or other sources of income while trees mature. Furthermore, tree out-grower schemes being promoted should not be regarded as a way out of poverty but rather an additional income stream. Other alternative livelihood options have to be explored in addition to the tree out-grower schemes.

According to Meijer et al. (2015a), the perceptions farmers have regarding an innovation are closely related to knowledge they have about it. Their perceptions and knowledge will then determine their attitudes towards the innovation. The results from this study suggest that respondents in this study area had high knowledge of timber out-grower schemes. Most of the respondents strongly agreed to all the 12 statements regarding knowledge on timber out-grower schemes. The high knowledge might be a reflection of the success of sensitisation and training conducted under the project by WVI and ICRAF. Farmers showed high expectations from the tree out-grower schemes as most of the trainings and awareness campaigns they received emphasised much on the expected benefits. This was also revealed during the focus group discussions and the key informant interview results. Knowledge of technology by the farmer is imperative for better adoption and upscaling any new innovation. Begum (2005) noted that farmers' possession of technical knowledge regarding innovation plays a big role in driving the farmer to accept contract farming in Bangladesh.

The study also revealed that farmers had a positive attitude towards timber out-grower schemes in the study area. Positive attitude towards something drives farmers to accept new ideas. A positive attitude towards any

innovation will increase the likelihood of adoption and vice versa (Meijer et al. 2015a). As such, understanding people's attitudes towards sustainable forestry enterprises such as a timber out-grower scheme is essential for developing and implementing policies aimed at sustaining the forest resource base (Marcus 2001; Dolisca et al. 2006; Lee et al. 2009). Meijer et al. (2015b) examined the farmers' attitudes on tree planting in Malawi using the theory of planned behaviour. These authors found that farmers had a positive attitude towards tree planting. The findings are also similar to those of D'Silva et al. (2010) and Bahaman et al. (2010), who reported that Malaysian youths had high knowledge and a positive attitude towards contract farming. The fact that farmers are eager to adopt tree out-grower schemes in Malawi implies that opportunities of upscaling are immense.

The results of this study also reveal that the relationship between marital status, household size, education and knowledge of the respondents on timber out-grower schemes was positive and favourable. In addition, significant and positive relationships were also found between marital status, household size, education, ethnic group and attitudes of the respondents towards timber out-grower schemes. Married couples, households with large families, and educated households with high knowledge showed a positive attitude towards timber out-grower schemes. The study has revealed that marital status, household size, education and ethnic group are important factors to be taken into consideration when upscaling timber out-grower schemes in Malawi. The results further show that there is a negative relationship between knowledge and attitude. The results are in consonance with research results by Meijer et al. (2015b), who reported that knowledge, attitudes and perceptions are influenced by socio-economic characteristics of the farmers (e.g. gender, age, marital status, education and income), and environmental and political factors. However, no significant relationships were observed between age, gender, main occupation, annual income of the respondents and their knowledge and attitude towards timber out-grower schemes.

Conclusion and recommendations

This study concludes that farmers in the study area received enough information and had high knowledge on timber out-grower schemes. This led to their positive attitudes towards timber out-grower schemes. Socio-economic factors such as gender, education, ethnic group and household size should be taken into consideration when upscaling timber out-grower schemes in Malawi. Variables such as age, gender, occupation and income of the farmers did not have a clear influence in the upscaling of timber out-grower schemes. These results must draw the attention of and inform policy-makers to introduce tree out-grower schemes as potential interventions to promote tree planting. Based on this study, it is recommended that timber out-grower schemes be upscaled to the remainder of the country. Timber out-grower schemes are a promising initiative to economically empower the forest-dependent communities in rural areas of Malawi. It is further recommended that different institutions should take the responsibility to upscale timber out-grower schemes in Malawi. The current study of attitudes

and perceptions was conducted before the benefits of timber outgrowing were fully realised. As these timber trees mature, more studies would be necessary to gauge whether these attitudes and perceptions change.

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References

- Andrew M, Fabricius C, Timmermans H. 2000. Private-sector community partnerships in the Eastern Cape. Overview report. Instruments for sustainable private sector forestry, South Africa series. London: International Institute for Environment and Development; Pretoria: CSIR-Environmentek.
- Angelsen A, Jagger P, Babigumira R, Belcher B, Hogarth NJ, Bauch S, Borner J, Smith-Hall C, Wunder S. 2014. Environmental income and rural livelihoods: a global-comparative analysis. *World Development* 64(Suppl. 1): S12–S28.
- Bahaman AS, Jeffrey LS, Hayrol Azril MS, Jegak U. 2010. Acceptance, attitude and knowledge towards agriculture economic activity between rural and urban youth: the case of contract farming. *Journal of Applied Sciences* 10: 2310–2315.
- Begum IA. 2005. Vertically integrated contract and independent poultry farming systems in Bangladesh: a profitability analysis. *Livestock Research for Rural Development* 17: 8.
- Cairns RI. 2000. Outgrower timber schemes in KwaZulu-Natal: do they build sustainable rural livelihoods and what interventions should be made? Instruments for sustainable private sector forestry, South Africa series. London: International Institute for Environment and Development; Pretoria: CSIR-Environmentek.
- Chamberlain D, Essop H, Hougaard C, Malherbe S, Walker R. 2005. Part 1: The contributions, costs and development opportunities of the forestry, timber, pulp and paper industries in South Africa. Johannesburg: Genesis Analytics.
- Clarkson G. 2012. On farm tree planting in Malawi. *Agriculture for Development* 16: 29–32.
- Desmond H, Race D. 2000. Global survey and analytical framework for forestry out-grower arrangements. Final report. Canberra: Department of Forestry, Australian National University.
- Dolisca F, Carter DR, McDaniel JM, Shannon DA, Jolly CM. 2006. Factors influencing farmers' participation in forestry management programs: a case study from Haiti. *Forest Ecology and Management* 236: 324–331.
- D'Silva JL, Shaffril HAM, Uli J, Samah BA. 2010. Socio-demography factors that influence youth attitude towards contract farming. *American Journal of Applied Sciences* 7: 603–608.
- FAO (Food and Agriculture Organization of the United Nations). 2015. *Southern Africa's forests and people: investing in a sustainable future*. Rome: FAO.
- Fisher M. 2004. Household welfare and forest dependence in southern Malawi. *Environment and Development Economics* 9: 135–154.
- Government of Malawi. 2012. Malawi growth and development strategy II: 2011–2016. Malawi: Poverty Reduction Strategy Paper. IMF Country Report no. 12/222. Washington, DC: International Monetary Fund.

- Hennink MM. 2007. *International focus group research: a handbook for the health and social sciences*. Cambridge: Cambridge University Press.
- Howard M, Matikinca P, Mitchell D, Brown F, Lewis F, Mahlangu I, Msimang A, Nixon P, Radebe T. 2005. Small-scale timber production in South Africa: what role in reducing poverty? Umhlali: Fractal Forest Africa; Durban: Fakisandla Consulting; Pietermaritzburg: Institute of Natural Resources; Creighton: Rural Forest Management cc; London: International Institute for Environment and Development.
- Jumbe CB, Angelsen A. 2007. Forest dependence and participation in CPR management: empirical evidence from forest co-management in Malawi. *Ecological Economics* 62: 661–672.
- Kambewa P, Utila H. 2008. Malawi's green gold: challenges and opportunities for small and medium forest enterprises in reducing poverty. IIED Small and Medium Forestry Enterprise Series no. 24. London: International Institute for Environment and Development.
- Karumbidza JB. 2005. A study of the social and economic impacts of industrial tree plantations in the KwaZulu-Natal province of South Africa. Montevideo: World Rainforest Movement.
- Kay S. 2012. Positive investment alternatives to large-scale acquisitions of leases. Amsterdam: Transnational Institute for Hands off the Land Alliance.
- Lee TM, Sodhi NS, Prawiradilaga DM. 2009. Determinants of local people's attitude toward conservation and the consequential effects on illegal resource harvesting in the protected areas of Sulawesi Indonesia. *Environmental Conservation* 36: 157–170.
- Likert R. 1991. *A technique for the measurement of attitudes*. New York: Columbia University Press.
- Marcus RR. 2001. Seeing the forest for the trees: integrated conservation and development projects and local perceptions of conservation in Madagascar. *Human Ecology* 29: 381–397.
- Masters L, Kisiangani E. 2010. *Natural resource governance in southern Africa*. Johannesburg: Africa Institute of South Africa.
- Matenga CR, Munguzwe H. 2017. Impacts of land and agricultural commercialization on local livelihoods in Zambia: evidence from three models. *Journal of Peasant Studies* 44: 574–593.
- Mauambeta D, Chitedze D, Mumba R, Gama S. 2011. Status of forests and tree management in Malawi. A position paper prepared for the Coordination Union for Rehabilitation of the Environment CURE.
- Meijer SS, Catacutan D, Ajayi OC, Sileshi GW, Nieuwenhuis M. 2015a. The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *International Journal of Agricultural Sustainability* 13: 40–54.
- Meijer SS, Catacutan D, Sileshi GW, Nieuwenhuis M. 2015b. 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.
- MNREE (Ministry of Natural Resources, Energy and Environment). 2010. Malawi state of environment and outlook report: environment for sustainable economic growth. Environmental Affairs Department, Malawi.
- Singh 2002?
- Singh R, Mangat NS. 1996. *Elements of survey sampling*. Boston, MA: Kluwer Academic Publishers.
- Smalley R. 2013. Plantations, contract farming and commercial farming areas in Africa: a comparative review. FAC Working Paper no. 55. Brighton: Future Agricultures Consortium.
- Sunderlin W, Angelsen A, Belcher B, Burgers P, Nasi R, Santoso L, Wunder S. 2005. Livelihoods, forests, and conservation in developing countries: an overview. *World Development* 33: 1383–1402.
- Vermeulen S, Nawir AA, Mayers J. 2003. Better livelihoods through partnership? A review of the impacts of deals between communities and forestry companies on local development. Paper presented at the International Conference on Rural Livelihoods, Forests and Biodiversity 19–23 May 2003, Bonn, Germany.
- Von Braun J, Meinzen-Dick R. 2009. Land grabbing by foreign investors in developing countries: risks and opportunities. IFPRI Policy Brief 13. Washington, DC: International Food Political Research Institute.
- Yaron G, Mangani R, Mlava J, Kambewa P, Makungwa S, Mtethiwa A, Munthali S, Mgoola W, Kazembe J. 2011. Economic valuation of sustainable natural resource use in Malawi. Nairobi: UNDP-UNEP Poverty-Environment Initiative; Lilongwe: Ministry of Finance and Development Planning.