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Effect of acquisition of farm inputs on the economic empowerment of small holder farmers in tharaka nithi county, Kenya

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Abstract
The main objective of this study is to analyse effect of acquisition of farm inputs on the economic empowerment of small holder farmers in Tharaka Nithi County, Kenya. This study is important because its outcome will improve the understanding of the mechanisms under which conservation agriculture contribute to empowerment of rural households. The study used Sustainable livelihoods approach. This study adopted a quantitative approach and employed a cross-sectional design. Stratified random sampling technique was used to select the sample of 150 respondents, consisting of small holder farmers undertaking conservation agriculture practices in Mukothima, Nkondi and Chiakariga wards in Tharaka Nithi County. Primary data was collected using a semi-structured questionnaire. Data was analysed using Statistical Package for Social Sciences (SPSS version 27). Data was presented in form of bar charts, pie charts and frequency distribution tables for ease of understanding. The findings showed that acquisition of farm inputs; building social capital; and markets access had varied effects on access to household spending on essential goods and services (consumption), household income (sale of farm produce) and income security (savings). Analysis showed that whereas training, workshops, extensions, certified seeds, herbicides, groups, airtime, transport, and brokerage fees had a statistically significant positive relationship with economic empowerment of small holder farmers; crop residue, subscriptions, and market levies had a statistically significant negative relationship. This shows that significant challenges in trade-off crop residues, payment of subscriptions and high market levies hinder the economic empowerment of small holder farmers. The study recommends households to invest in sustainable markets such as cooperative and producers' associations, as these not only guarantees them continued access to farm inputs, information, and extension services.

Keywords: acquisition, farm inputs, economic empowerment, empowerment, small holder farmers

Introduction
According to Agresti (2018) [1], there is heightened attention by global leaders on finding sustainable ways of exploiting the natural capital to alleviate poverty and empowering communities without undermining the natural resource base both for the current generation and posterity. Conservation Agriculture (CA) has largely been tipped by climate smart economists to have the potential of apportioning and handling natural capital to achieve social, economic, and environmental objectives especially in sectors where productive land uses contend with environmental objectives. Conservation agriculture is practised by 350 million small holder farmers on 3% of the 1500 million acres of arable land worldwide (Knowler, Bradshaw, & Gordon, 2015) [22].
The management of environmental and natural resources, i.e. the natural capital stock, of a community is important for achieving sustainable economic development (Barbier, 2003) [3]. 80% of farmers in Kenya depend heavily on natural capital for their subsistence and household earnings, either from cultivation, fisheries, forestry, or tourism (Kumwenda, Botha, & McLean, 2013) [25]. However, recent findings suggest that resource-rich societies, especially rural economies, are largely not reaping the fruits of this comparative advantage. Despite small holder farmer's significance in rural communities, they farm in relatively unfavourable environment as compared to their large-scale commercial counterparts; they experience barriers which hinder them from productive farming (World Agroforestry Center, 2009) [37].
Economic empowerment refers to improved access to productive assets and opportunities and entrepreneurially beneficial information (Dohmwirth, 2013) [11]. It entails increased capacity of farmers 'to participate in, contribute to and benefit from' the productive processes such as farming. The process has to appreciate the contribution of each person, respect their inherent dignity and give them an equal platform to bargain for fair distribution of the gains of production (Uwantenge & Mbabazi, 2015) [36]. Economic empowerment increases women's access to economic resources and opportunities including jobs, financial services, property and other productive assets, skills development and market information (Dohmwirth, 2013) [11].
Poor rural households generally have say over community decisions, such as the allocation of the productive natural communal assets that would boost their income derived from farming (Thiessen, 2016) [35]. It has been

observed that of the rural households, women are adversely affected in terms of limited control over household assets, and community resources (Farnworth & Colverson, 2015) [12]. Conservation Agriculture has increasingly been promoted as a viable alternative to traditional farming practices. Conservation agriculture is a radically different way of farming founded on three key principles: minimal soil disturbance; maximum soil cover; crop rotation/inter-cropping.

Soil cover is achieved through the use of crop residues, with additional grass mulch as required. Minimal soil disturbance is achieved through the use of permanent planting basins (zai holes). Crop rotation is achieved whereby the main carbohydrate crop (maize or sorghum) is rotated with a legume crop (groundnuts, cowpeas, soybeans) and a third crop chosen by the farmer, usually a cash crop (soybean, sunflower) or a food reserve crop (sorghum). Together, these simple techniques reduce the energy needed to farm, help avoid excessive depletion of nutrients, enable farmers to plant as soon as the first rains start, maximise the benefits (whilst minimising the cost) of fertiliser and reduce soil erosion (Concern Worldwide, 2013) [8].

Conservation agriculture increases economic chances because increased output increases returns from surplus, surplus that is produced using resources that are procured freely from nature (Just Hope International, 2015) [20]. CA is seen to be largely making it easier for farmers to keep forests intact while at the same time earn a living (Yin & Meyer, 2016) [38]. Mulching with crop residues can improve water-use efficiency by 10–20% through reduced soil evaporation and increased plant transpiration. According to the Conservation Report of 2014, investment by development finance institutions (DFIs) and private investments in sustainable production projects, including forestry and agriculture are on the rise. The report shows that private investment in sustainable agriculture grew more than 600% from 2004-2008 to 2009-2013, increasing from $67 million to $472 million and generating an internal rate of return (IRR) of between 10 to 14.9% for the private investors (NatureVest & EKO, 2014) [27].

Adopting and rolling out conservation Agriculture has faced a myriad of resistance despite its positive attributes. The resistance emanates largely from the high demand of crop residues for mulching, at the expense of fodder for livestock; the incomprehensibility of zero tillage, zero use of fertilizer and use of herbicides as a route to increase crops yields. Also, there is the challenge of farmers having to wait 3 to 7 years to reap the benefits of CA such as increase in crop yields and conserve the environment. Insecure land tenure is also a major hindrance (Murray *et.al*, 2016) [26]. In many of the developed and developing countries CA has been used as best alternative production system. Historically, there have been attempts to cultivate crops without tillage. However, modern non-tillage research began in the 1940s and adoption by farmers in the early 1960s as one of the principal components of CA. Today, more than 150million hectares of agricultural land worldwide are under no tillage. In Latin America, the technology has experienced 74 fold increases since 1987, coming from 670.000 ha to 49.6million ha in the year 2008 as compared to a 6.5 fold increase in the USA.

Approximately 47 percent of the land is under CA in South America, US and Canada (39%), Australia (9%) and 30% the rest of the countries (Derpsch, 2005) [9]. It has been established that CA can significantly save on the production cost per acre soybeans under no-tillage. For example, in Argentina USA and Brazil the production cost of soybeans was reduced by US$ 27.00, US$ 14.18 and US$ 11.50 respectively. However, even though CA has been considered as a key alternative for intensifying agricultural production while maintaining or restoring key ecosystem services, the potential of CA in a context of smallholder agriculture has raised many questions (Giller *et al*., 2009) [14]. Therefore, the dissemination of the practice should be concentrated on "socio-ecological niches" where it is most likely to be adopted by smallholders (Giller *et al*., 2009) [14].

The households in Tharaka Nithi County remain prone to risks of food insecurity as a result of the effects of climate change. The county falls under the category of Arid and Semi-Arid Lands (ASAL's) which receive inadequate and erratic rains thus resulting to immense decline in crop yield and hence food insecurity. A big percentage of farmers in Tharaka Nithi have over time practised traditional ways of farming majorly due to limited skills (Tharaka Nithi County Government, 2014) [33]. The National Council of Churches of Kenya (NCCK) in partnership with Canadian Food Grains Bank (CFGB) promotes the adoption of CA through the identification of lead farmers who are willing to test and promote the approach in their community. Lead farmers are chosen based on their farming skills, interest in new technology and respect within the community (NCCK, 2013) [28]. A total of 600 small holder farmers are undertaking CA practices in Mukothima, Nkondi and Chiakariga wards of Tharaka Nithi County.

Statement of the Problem

The contribution of agriculture to Kenya's economy is substantial as it accounts for 25 per cent of Gross Domestic Product (GDP) and 75 per cent of the work force (BRIDGE, 2014) [6]. Eight out of ten of Kenyans residing in rural areas have their livelihoods directly or indirectly stemming from agriculture. Specifically, the conservation agriculture approach holds an important key to household economic empowerment through increased productivity, environmental management and improved time use (KENDAT, 2014) [21].

The alarming rate at which African land is experiencing desertification, quickly becoming un-arable, makes it urgent to embrace appropriate technology in agricultural production. Small holder farmers are adversely affected due to their vulnerability to effects of climate change and variability of weather patterns (The Aid4Agriculture coalition, 2014) [34]. Amidst these challenging situation, other developing nations like Brazil are up taking CA practices, and have been able to substantially increase food production 2.28 times with increases in land under

cultivation of less than 0.3 (IFAD, 2014) [19]. According to FAO food production must increase at least 2 times by 2025 to feed the population in sub-Saharan Africa.

Although there is an opportunity through adoption of CA to make farming more productive and environmentally sustainable, information is lacking on the mechanisms under which the practice contributes to household economic empowerment. Several studies on CA tend to focus case studies of countries that have succeeded in scaling up the practice, the bottlenecks they face and how they have managed to address them, and lessons learnt (IFAD, 2014; Thiessen, 2016) [19, 35]. It is against this background that this study has been conceptualised with a view to determine the effect of adoption of conservation agriculture on household empowerment of small holder farmers in Tharaka Nithi County together with the opportunities that it presents for smallholder farmers.

Main Objective of the Study

To assess the effect of acquisition of farm input on the economic empowerment of small holder farmers in Tharaka Nithi County.

Research Questions

What is the effect of acquisition of farm inputs on the economic empowerment of small holder farmers in Tharaka Nithi County?

Justification of the Study

The study is important to the small holder farmers practising Conservation Agriculture in Tharaka Nithi County and other Counties in Kenya. The study will increase the knowledge of the farmers on the specific investment in CA practices that will contribute significantly to the economic empowerment of their households. The study will be useful to financial development institutions, private investors and government policy makers as it will inform them of the specific areas of conservation management that require capacity building and policy review so as to ensure the productivity of the agricultural sector. Various scholars and researchers are expected to find the findings of this study useful for their scholarly works. It is hoped that most of them will use the findings and recommendations as a basis for their studies and thus contribute to new knowledge and insights in conservation agriculture and economic empowerment. The study will contribute to enhancing the sustainability of the livelihoods and ecosystems of the households in Tharaka Nithi County and its environs.

Literature Review

Acquisition of farm inputs and the Economic Empowerment of Small Holder Farmers in Tharaka Nithi County, Kenya

Hohfeld and Waibel (2013) [18] analysed the costs of input in agriculture in three provinces of Northeast Thailand. Two thousand farm households were targeted. Results showed that 30% of rural households undertake small expenditures in inputs. Whereas farmers with huge tracts of land are likely to invest; the wealthier ones are more likely to make heavy investments in farm inputs. It was also observed that increased access to capital increases the likelihood of investing in market driven agriculture, but does not influence household expenditure on inputs. Women usually invest a higher proportion of their earnings in their families and communities than men.

Teshome, Kassa, Emana, and Haji (2012) [32] analyzed the major determinants of expenditure behavior of farm households – expenditure seeking to increase the productivity of land, household assets and tools production. Farmers are likely to invest in livestock related costs such as construction of sheds, cultivation of land, irrigation equipment, agro-forestry and other related farm machinery costs. It was noted that households look forward to reap big in terms of incomes and output from such investments both in the short run and in the longrun. Out of a sample of 700 respondents, a fifth had invested in productive farm assets such as land, equipment, buildings/structures and other facilities. It was also noted that both the nature of asset and its resultant quality plays an important role on the level of returns on investment (Teshome, Kassa, Emana, & Haji, 2012) [32]. Globally, an estimated 15 percent of land, and 40 percent of agricultural land is degraded (International Food Policy Research Institute, 2012). The degradation is caused mainly by human induced activities such as deforestation, overgrazing, pollution, among others. The effect of degradation is largely felt by the poor as they incur more to restore fertility; are worst hit by losses in productivity and food insecurity. In order to cushion the poor farmers from the adverse effects of degradation, conservation agriculture is tipped as a cost saving technology as well as fertility restoring technology with benefits overflowing to include time saving. It is estimated that with conservation agriculture households not only save US$55 in cultivation costs, 60 litres of fuel and 40 percent of water; but also have the potential of increasing yields by 250kg per hectare (Derpsch & Friedrich, 2009) [9].

Farmers practising conservation agriculture inevitably have to incur opportunity cost which arises from the choice or rather trade-off of leaving crop residues in the field rather than feeding them to livestock or even selling to earn extra income. This opportunity cost is disproportionately felt by small scale farmers who are fond of leaving the residue as fodder for livestock. It has been noted that the gains of this residue are much higher for small scale farmers when fed to livestock as compared to those gained from conservation agriculture at household level. These gains are even higher when discounted at market rates for cost of capital. Government

can step in to scale the gains of conservation agriculture to be community-level, in the long run (Derpsch & Friedrich, 2009) [9].

The Livelihoods Framework

The livelihoods framework seeks to analyse the various dimensions of the livelihoods of the poor, with a special focus on the livelihood strategies - ways of combining and using assets - being pursued, the assets and the activities. The livelihoods framework provides a way of thinking which views the poor as operating in a context of vulnerability as shown in Figure 2.1 below.

Within the context of vulnerability, the poor are seen as having constrained access to productive assets or income generating opportunities. This experience of vulnerability is entrenched in the environment the poor are operating within, determining and influencing the various livelihood strategies and outcomes being pursued (Chambers and Conway, 1992) [7]. Thus, "a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Chambers & Conway 1992, 6) [7].

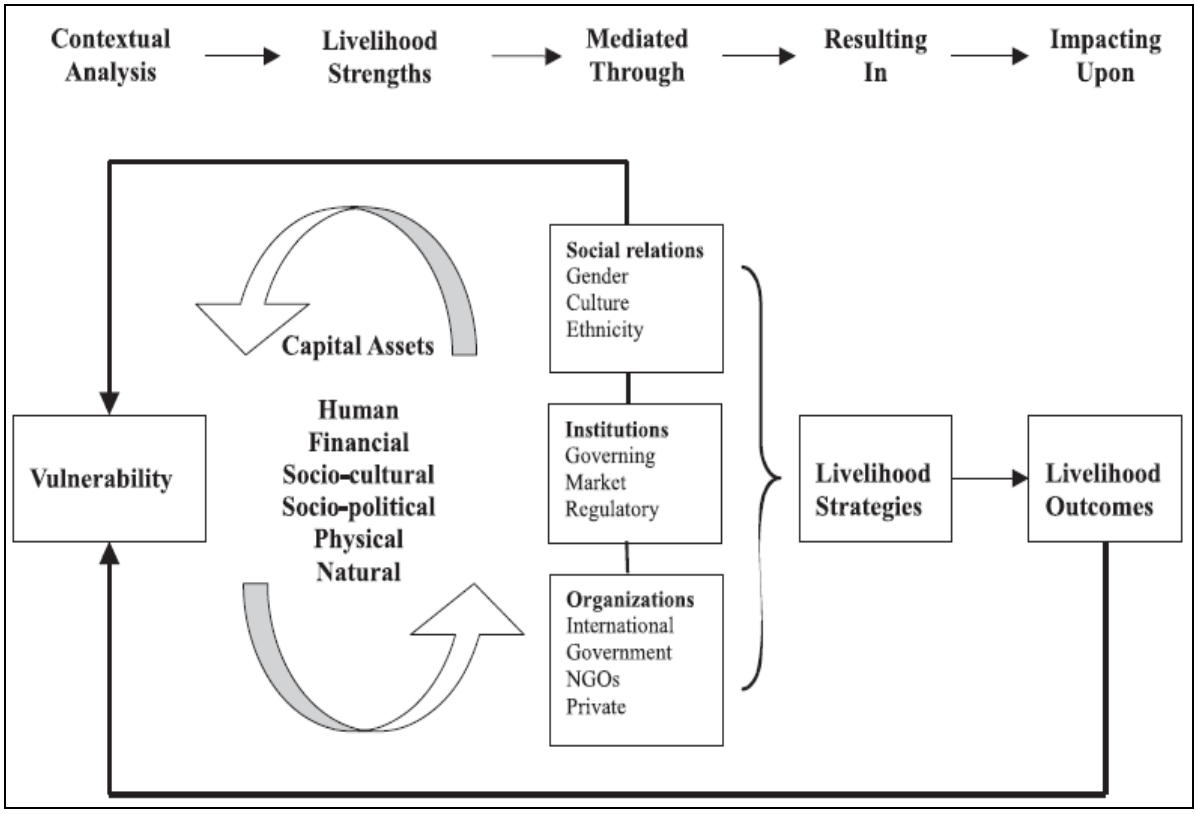

Fig 1: Livelihoods Framework

This approach recognizes that the livelihoods of the poor are complex, and thus this approach provides a logical tool to analyse the issues surrounding the lives of the poor (DFID, 2016) [10]. The livelihoods of the poor are complex because there are multiple causes – effect relationships affecting the reason for the poverty situation, strategies adopted by the poor to reduce poverty, the resilience of the livelihoods, and the effect on the lives of the poor.

This approach notes that smallholder farmers have their own portfolio of productive assets and livelihood strategies and activities that they make use of to cope with poverty, vulnerability and external shocks. Strategies include subsistence farming; commercial farming; pursuing employment as a labourer or undertaking other self-employment activities such as petty trade. Some households may have just a single livelihood activity while others may opt to diversify their livelihood activities either within the agriculture sector or other totally different sectors, but mostly within the natural resource based sectors (Knowler, Bradshaw, & Gordon, 2015) [22].

This approach also takes into account the external environment, structures, processes and systems that affect the lives of the smallholder farmers. Social relations such as gender relations, institutions such as market forces, and development organizations through their programmes affect the livelihoods and income levels of poor households (Alexander & Welzel, 2012) [2]. According to the livelihood framework, the poverty outcomes experienced by the poor as a result of the various livelihood strategies they adopt can be seen in terms of their effect on livelihood assets; livelihood security; and environmental sustainability. Krantz (2001) [24] notes that most smallholder farmers pursue increased access to productive assets and improved income security and are largely unconcerned with environmental sustainability.

Economic Empowerment of Small Holder Farmers

Essentially, household empowerment entails poor people reclaiming power, taking control of their productive assets and making effective choices that transform their lives holistically. For small holder farmers, empowerment may be through acquisition of knowledge and skills, assets, acquisition of social connections and valuable market information to enable them to increase yields, have higher economic returns and access to household income security leading to access to household spending on essential goods and services. CA aims to enhance resilience by reducing vulnerability to disasters such as drought, pests, disease and other environmental shocks; and improving the capacity of smallholder farmers to adapt in the face of longer-term stresses like shortened seasons and erratic weather patterns (Nelson & Huyer, 2016) [29].

Research Methodology

Research Design

The study adopted a quantitative approach and employed a cross-sectional design since the intention was to gather quantitative data to describe the adoption of Farm Inputs by smallholder farmers and their levels of economic empowerment. Descriptive research portrays an accurate profile of persons, events, or situations (Gay & Diehl, 2008) [13].

Target Population

Population is the group to which a researcher would like the results of the study to be generalizable. It could also be set of all cases of interest and might be virtually any size or might cover almost any geographical area (Gay & Diehl, 2008) [13]. The target population comprised of 600 small holder farmers undertaking CA practices in Mukothima, Nkondi and Chiakariga wards of Tharaka Nithi County. The population was deemed as being the best suited to give the study relevant information for addressing the purpose and research questions of the study. The target population is distributed as shown in Table 1 below.

Table 1: Target Population

Ward	Small holder farmers
Mukothima	280
Nkondi	175
Chiakariga	145
Total	600

Source: NCCK (2013)

Sampling Technique

This study used probability sampling in which all the elements in the population had equal chance of being selected. Specifically, stratified random sampling where the sample is constrained to include elements from each of the strata was deployed. In this way, the sampling technique increased the sample's statistical efficiency and also provided adequate data for analysing the various subpopulations. Other than this, it enabled different research methods and procedures to be used in different strata. Proportionate distribution was then used determining the sample size of each stratum. Proportionate sampling is where each stratum is properly represented so that the sample drawn from it is proportionate to the stratum's share of the population (Saunders, Lewis, & Thornhill, 2009) [30]. This technique was preferred because it allows for a more accurate estimation of the characteristics of the population from the sample. Additionally, purposive stratified sampling was used in household interviews so as to ensure that the representative adopters and non-adopters of CA were sampled within the area of study.

Sample Size

The sampling frame describes the list of all population units from which the sample was selected (Grimes & Schulz, 2002) [16]. It is the physical representation of the target population and comprises of all units that are potential members of a sample (Kothari, 2019) [23]. The sample size the study was derived using the Bryman & Bell (2007) [4] formula for determining the sample size as shown below:

$$n_0 = \frac{z^2.p(1-p)}{d^2}$$

Where

n_0 is the initial sample size for proportion
z^2 is the Z value which at 95% confidence level it is 1.96
p is the population proportion, in this case it is 0.5 for both p and 1-p
d^2 is the Margin of Error at 5% (0.05)
Thus, the initial sample size for proportion is 196.
The size of the sample, n is given by the formula:

$$n = \frac{n_0.N}{n_0 + (N-1)}$$

$$n = \frac{196x600}{196 + 599}$$

Where

N is the size of the population
Substituting n_0 in the formula the sample size n is 150 respondents.
The target population is distributed as shown in Table 2.

Table 2: Sample Size

Ward	Small holder farmers
Mukothima	70
Nkondi	45
Chiakariga	35
Total	150

Data Collection Procedure
The study utilized semi-structured questionnaires which was administered to all heads of selected household so as to gather information on household demographic characteristics and specific CA techniques adopted.

Pre-testing
A pilot study was conducted to test the suitability of the farmers' interview schedule. A sample of 15 (10% of the actual sample) adopters was randomly selected and interviewed. This was done in order to check for content and criterion validity of the farmers' interview schedule. The pre-test was significant in ascertaining the amount of time needed to administer the tools. The respondents that took part in the pre-test exercise were excluded from the actual survey.

Validity of Research Instruments
Healy & Perry (2000) [17] explain that validity determines whether the research truly measures that which it was intended to measure; it estimates how accurately the data obtained in the study represents a given variable or construct in the study. The study ensured reduction of construct validity by deriving the research variables from existing theoretical frameworks. The questionnaire was given to agricultural and research experts in research to seek their opinion about the adequacy and representativeness of the instrument and to ensure it covered all the variables being measured as a way of eliminating content validity.

Reliability of Research Instruments
Healy & Perry (2000) [17], assert that reliability is the extent to which results are consistent over time and an accurate representation of the total population under study. Cronbach Alpha was used as a measure of reliability and internal consistency. Cronbach Alpha is a reliability coefficient that indicates how well items in a set are positively correlated to one another. It measures the inter-correlations among test items, with a measure of 1 being higher in terms of internal consistency and reliability and 0.7 to 0.9 being acceptable (Revelle & McDonald, 2007) [31]. Cronbach's alpha is a general form of the Kunder-Richardson (K-R) 20 formula.
The formula is as follows:

$$KR20 = \frac{S_2 s_2}{S_2 (k-1)}$$

$KR20$ = Reliability coefficient of internal consistency
k = Number of items used to measure concept
S_2= Variance of all scores
s_2 = Variance of individual items

Data Collection Procedures
The first step of the data collection process was to acquire a letter of authorization from the management of NCCK who facilitated smooth collection of data. The researcher also approached the smallholder farmers to request for their participation. During the exercise the respondents were assured that strict confidentiality will be maintained in dealing with their responses in line with the code of ethics in data collection procedures. The questionnaires were distributed in a drop wait and pick fashion to ensure a high response rate.
Using the letter of authorization from the management of NCCK to conduct the study, the researcher together with the agricultural extension staff visited the participants so as to administer the questionnaires.

Data Analysis and Presentation

The collected data was processed and organized for statistical analysis. Data analysis entailed coding the responses; tabulating the data; and performing several statistical computations (i.e. averages, frequencies, percentages and regression coefficients). The study used descriptive statistics method for presenting and summarizing the variables. Inferential statistics, specifically multiple regression analysis was also used. The general multiple regression models for this study is as follows:

$$Y = \propto_0 + \propto_1 X_1 + \propto_2 X_2 + \propto_3 X_3 + \propto_4 X_4 + \epsilon$$

Where

Y is the dependent variable 'empowerment of small holder farmers'
$\propto_0$ is the constant of the regression equation
$\propto_i$ is the coefficient of X_i for i = 1,2,3,4,5
X_1 is the acquiring agricultural knowledge
X_2 is the acquisition of farm inputs
X_3 is the building of social capital
X_4 is the market access
$\epsilon$is the error term.

According to Cooper & Schindler (2009), the method allows a researcher to digest and understand large quantities of data and effectively communicate their importance aspects in a research study. Data was analysed using Statistical Package for Social Sciences (SPSS) which is a software tool for data analysis.

Data Analysis and Presentation

Analysis of Response rate

One hundred and fifty (150) questionnaires were administered to the target population. A total of 69 questionnaires with all questions completed were returned, which represented a response rate of 46%. The moderate response rate can be explained by the Covid-19 social distancing protocols and related restrictions. With this moderate response, the research can be described as successful. Most of the respondents answered all the questions and so there were some missing values.

The results of the response rate are as tabulated in Table 3.

Table 3: Response Rate

Ward	Frequency	Percentage
Mukothima	18	26.1%
Nkondi	22	31.9%
Chiakariga	29	42%
Total	69	100%

The study also sought to analyze demographic variables as follows

Gender

The Gender of the respondents was found to be as shown in Table 4.

Table 4: Gender of the respondents

Gender	Frequency	Percentage
Women	39	56.5%
Men	30	43.5%
Total	**69**	**100%**

Table 4.3 shows that Women were the majority Gender at 56.5% (39) while Men were the minority Gender at 43.5% (30). This shows that majority of the small holder farmers in the 3 Wards are Women. This also shows that the findings are representative of the views of both women and men.

Age of the Respondents

From the questionnaires filled and returned it emerged that 12 (17.4%) respondents aged 18 - 30 years; 18 (26.1%) respondents aged 31 – 40 years; 24 (34.8%) respondents aged 41 - 50 years and 15 (21.7%) respondents aged 51 years and above, as shown in Table 5.

Table 5: Age of the Respondents

Age	Frequency	Percentage
18 – 30 years	12	17.4%
31 – 40 years	18	26.1%
41 – 50 years	24	34.8%
51 years and above	15	21.7%
Total	69	100%

Clearly, majority (34.8%) of the small holder farmers in the 3 Wards are middle-aged and above. This also shows that the findings are representative of the views of adults in all age categories, hence the study is not biased to any age category.

Household Size

From the questionnaires filled and returned it emerged that 15 (21.7%) respondents come from households with one to three members; 25 (36.2%) respondents come from households with four to six members; 17 (24.6%) respondents come from households with seven to nine members and 12 (17.4%) respondents come from households with ten and above members, as shown in Table 6.

Table 6: Household Size

Household Size	Frequency	Percentage
One to Three	15	21.7%
Four to Six	25	36.2%
Seven to Nine	17	24.6%
Ten and above	12	17.4%
Total	69	100%

Clearly, majority (36.2%) of the small holder farmers in the 3 Wards come from households with four to six members. This shows that the findings are representative of the views of respondents from households with different sizes; hence, the study is not biased to any household size category. Additional analyses will be conducted to determine the effect of family size on agricultural productivity hence household income, savings, and access to household spending on essential goods and services.

Land Size

From the questionnaires filled and returned it emerged that 8 (11.6%) respondents come from households with one to three acres; 34 (49.3%) respondents come from households with four to six acres; 16 (23.2%) respondents come from households with seven to nine acres and 11 (15.9%) respondents come from households with ten and above acres, as shown in Table 7.

Table 7: Land Size under Cultivation

Land Size	Frequency	Percentage
One to Three	8	11.6%
Four to Six	34	49.3%
Seven to Nine	16	23.2%
Ten and above	11	15.9%
Total	69	100%

Clearly, majority (49.3%) of the small holder farmers in the 3 Wards come from households with four to six acres. This shows that the findings are representative of the views of respondents from households with different land sizes.

Descriptive Statistics: Acquisition of Farm Inputs

The respondents were asked to indicate their level of agreement relating to statements on the acquisition of farm inputs. The study findings were as presented in Table 4.17 below. The respondents were supposed give their opinion based on the likert scale as follows; strongly disagree= 1.0 – 1.8, disagree= 1.9 – 2.6, neutral= 2.7 – 3.4, agree = 3.5 – 4.2, strongly agree = 4.3 - 5.

Table 8: Acquisition of Farm Inputs

	SD	D	N/A/D	A	SA	Mean	S.D
Purchase of certified seeds is necessary for productivity in my farm	23	17	5	20	4	2.49	1.37
	33%	25%	7%	29%	6%		
Purchase of certified seeds forms a significant part of my farm input expenses	29	14	4	18	4	2.33	1.40
	42%	20%	6%	26%	6%		

The economic empowerment benefits I derive from investing in certified seeds exceeds the costs	30	11	6	20	2	2.31	1.37
	43%	16%	9%	29%	3%		
Purchase of certified herbicides is necessary for productivity in my farm	14	11	7	30	7	3.07	1.35
	20%	16%	10%	43%	10%		
Purchase of certified herbicides forms a significant part of my farm input expenses	16	25	8	18	2	2.49	1.20
	23%	36%	12%	26%	3%		
The economic empowerment benefits I derive from investing in herbicides exceeds the costs	40	13	3	13	0	1.84	1.17
	58%	19%	4%	19%	0%		
Sometimes I am required to leave crop residues in the field rather than feeding them to livestock or even selling to earn extra income.	27	25	5	11	0	2.01	1.06
	40%	37%	7%	16%	0%		
Trade off of crop residues means I spend more in purchasing fodder for my livestock	9	6	5	16	33	3.85	1.45
	13%	9%	7%	23%	48%		
The economic empowerment benefits I derive from trade-off of crop residues in the field exceeds the costs	7	9	17	17	19	3.46	1.30
	10%	13%	25%	25%	28%		

The findings in Table 8 shows that the respondents agreed that trade off of crop residues means they spend more in purchasing fodder for their livestock. The respondents also agreed that the economic empowerment benefits they derive from trade-off of crop residues in the field exceeds the costs; but they were neutral that purchase of certified herbicides is necessary for productivity. This shows that crop residues, and certified herbicides, unlike certified seeds are a critical component among households practicing conservation agriculture. Murray (2016) [26] notes that small holder conservation farmers have to make choices between short term returns of feeding livestock with crop residue, the immediate income from selling fodder, and the relatively long term gains of protecting the soil, and increasing yields. Three new factors were successfully constructed using factor analysis and assigned as the variables in Acquiring farm inputs. To check the reliability of the results, the study used Cronbach's alpha methodology and the findings are displayed in Table 4.20.

Table 9: Reliability Analysis

Component	Mean	SD	Cronbach's Alpha	N of Items
Certified Seeds	3.530	1.042	.709	3
Herbicides	3.462	1.034	.719	3
Crop residues	3.572	1.117	.714	3

Summary, Conclusions and Recommendations

Summary of the Findings

Acquisition of farm inputs

The findings shows that the respondents acknowledge that trade off of crop residues means they spend more in purchasing fodder for their livestock and that the economic empowerment benefits they derive from trade-off of leaving crop residues in the field exceeds the costs. Certified seeds and crop residues have a statistically significant positive relationship with access to household spending on essential goods and services. Certified Seeds and Herbicides have a statistically significant positive relationship with both access to income and access to savings. Herbicides has a statistically significant negative relationship with access to household spending on essential goods and services; Crop residues has a statistically significant negative relationship with access to income, and a statistically significant positive relationship with access to savings. Drought hinders access to farm inputs. This is further aggravated by lack of indigenous seed varieties and inappropriate technology of seed preservation; lack of raw materials; lack of storage facilities and high cost of labor; and lack of awareness.

Conclusion

From the study, the researcher concluded that the objective of the study had been achieved. The research findings indicated that obstacles in accessing farm inputs, effect on access to household spending on essential goods and services (food consumption), access to income (sale of farm produce) and income security (savings). Analysis showed that whereas training, workshops, extensions, certified seeds, herbicides, groups, airtime, transport, and brokerage fees had a statistically significant positive relationship with economic empowerment of small holder farmers; crop residue, subscriptions, and market levies had a statistically significant negative relationship. This shows that significant challenges in trade-off crop residues, payment of subscriptions, and high market levies hinder the economic empowerment of small holder farmers. Conservation agriculture is valued by the small holder farmers since it is appropriate for arid and semi-arid areas; requires less skills; enhances self-employment; is good for environment and the ecosystem; aligns with cultural values; and it is profitable.

Recommendations

Based on the findings of this study the following recommendations were made to enhance the economic empowerment of smallholder farmers:

Acquisition of Farm Inputs

The study recommends government subsidies on farm inputs to encourage adoption of a balance between short term returns of feeding livestock with crop residue, the immediate income from selling fodder, and the relatively long term gains of protecting the soil, and increasing yields. Government can incentivize farmers practicing conservation agriculture since they inevitably have to incur opportunity cost which arises from the choice or rather trade-off of leaving crop residues in the field rather than feeding them to livestock or even selling to earn extra income. This opportunity cost is disproportionately felt by small scale farmers who are fond of leaving the residue as fodder for livestock.

Suggestions for Further Research

This research contributed to the existing body of knowledge on hindrances/enablers of economic empowerment of small holder farmers in Kenya. While the findings of this research pointed out on challenges accessing farm inputs in conservation agriculture in Tharaka Nithi County, the research should be extended to all farming communities in Kenya. Measures of challenges of knowledge acquisition, accessing farm inputs, building social capital, and accessing markets, and economic empowerment of small holder farmers should be enhanced to include more quality indicators and control variables.

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