Financial service access and agriculture commercialization of smallholder rice growers in Kilombero District: The moderating role of institutional cultural cognition

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\textbf{Abstract}

The study was conducted in Tanzania to assess the effect of financial service access on the agricultural commercialization of smallholder rice growers in Kilombero under the moderating effect of institutional cultural cognition. Primary data were collected from 397 smallholder farmers, and after data cleaning, we remained with 358 responses subjected to regression analysis. Data were analyzed using hierarchical multiple regression analysis with the help of IBM SPSS software. The findings revealed that financial service access significantly positively affected commercialization. Also, the results confirm that institutional cultural cognition has a significant negative moderation effect on the relationship between financial inclusion and agriculture commercialization. The results suggest that reducing cultural cognition can increase financial service access. So, if the wrong perception and beliefs of the poor and marginalized society toward formal financial services can be reduced, then access to formal financial services will be increased, thus improving the level of agriculture commercialization. Also, we recommend that policymakers and the government set policies to reduce the cost of accessing financial services and enhance financial services availability.

\textbf{Keywords:} Financial Service Access, Agricultural Commercialisation And Cultural Cognitive

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Introduction

The agriculture sector is the economic engine of the majority of Sub-Saharan Africa (SSA) countries, as it accounts for 21.42\%, 32.7\% and 26.9\% of the GDP of Nigeria, Ethiopia and Tanzania, respectively (BOT, 2021; Central Bank of Nigeria, 2019; NBE, 2020). In addition, the sector contributes more than 80\% of employment in SSA, while in Ethiopia and Tanzania, it contributes 72.7\% and 65.5\% of the employment, respectively (URT, 2017; UNDP, 2015). Also, the sector contributes more than 80.4\% of the employment in Kilombero District (NBS, 2012). Regarding export earnings, the sector contributes 40\% in SSA (IFAD, 2017) and in Tanzania the sector contributes 30\% of export earnings (URT, 2017). In addition, Smallholder farming is a means of livelihood for many rural households in developing countries like Tanzania, and it has been the mainstay of the rural economy, mainly saving as the source of income and food supply (Omiti et al., 2007).

Despite its significant contribution to the economy, employment, export earnings and food supply, the sector suffers from a chronic inability to access finance from financial institutions (Fowowe, 2020). Recent data from BOT show that in 2020/2021 financial year, the agriculture sector received only 7.0\% of commercial bank lending, while personal loans received 35.9\%, Trade 16.8\% and manufacturing 10.1\% (BOT Report, 2021). Transaction costs incurred in accessing financial services, such as bank fees, minimum balance, lack of physical access, long loan processing time, strict documentation and collateral requirement, are the crucial barrier for accessing financial services from financial institutions (Bongomín et al., 2018). Other factors constrain access to finance include
lack of confidence with financial institutions, language barriers, and the perception that services are not suitable for poor people (Seman, 2016).

Countries, including Tanzania, have emphasized improving financial access to their unbanked population and the agriculture sector (Asuming et al., 2018; Chandio et al., 2020). In the case of financial access, the National Financial Inclusion Framework (NFIF), which covers the period from 2014-2022, was established in Tanzania to increase financial access and usage (NFIF, 2018). In the case of the agriculture sector, the Tanzania government established the Agriculture Sector Development Programme (ASDP) phase I & II (URT Report, 2015). ASDP-II covers the period of 2015-2025 and intends to achieve an agricultural growth rate of 6% through adoption of yield-enhancing technology, improve access to credit and transfer the sector into modern, commercial and highly productive sector (URT, 2017).

Despite the effort taken by developing countries, little is known about how these programs have affected the degree of financial inclusion in SSA, particularly for the rural population (Asuming et al., 2018). Studies indicate that about 1.7 billion adults globally remain unbanked, with majority living in developing countries like Tanzania (Demirguc-Kunt et al., 2018). In addition, a study by Jeckoniah et al. (2020) shows that the regions of Tabora, Simiyu, Kagera and Morogoro have 31% of committed farmers in the county who are financially excluded. Lack of access to financial services, particularly credit, prevents farmers from purchasing crucial agricultural inputs, which lowers their productivity and limits their ability to participate in the market (Kabiti et al., 2016). Studies show that if economic sustenance in developing countries like Tanzania is to be achieved, then agricultural commercialization is a strategy to be adopted as it can shift farmers’ perspectives on farming from subsistence farming towards a profitable business (Pingali and Rosegrant, 1995). However, commercial agriculture requires capital to acquire agricultural inputs and a market for agricultural output.

According to the transaction cost economic theory (TCT), markets are affected by transaction cost resulting from asymmetrical information among the economic agent (Williamson, 1979). Ochieng et al. (2015) and Okoye et al. (2016) have proved that access to market information is a significant indication for accessing market. In addition, Agarwal and Hauswald (2010) observe an information asymmetry problem in financial service provision whereby financial institutions lack sufficient information about their client; likewise, clients lack information about bank prospects. Thus, facilitating access to finance and market for farmers requires a mechanism that promotes information sharing to lower farmers’ transaction costs. According to Dequech (2004), institutional arrangement can facilitate information sharing that would not be available otherwise and guide contract enforceability through the rules of the game or human devise constraints that influence how people think and act.

According to North (1991), institutions are composed of formal and informal constraints. The informal constraints comprised of norms and cultural cognitive (North, 1991). Cultural cognitive refer to the shared conceptions that constitute the frame through which meaning is made (Scott, 2001). Scott (2001) states that cultural cognitive aspect of institutions help individuals such as poor to make meaning based on shared conception guided by culture. According to Scott, poor action is guided by cultural cognitive frames and cultural assumptions, which enable them to develop sense-making skills such as accessing and using financial services. The argument by Scott was supported by Mashingo and Schoeman (2010), who show that most Africans, especially women prefer saving/credit group because it is the mechanism that deepens the relationship and enhances the financial experience. Unfortunately, TCT fails to integrate institutional, cultural cognitive aspects in enabling information sharing and guide contract enforceability in financial intermediation and commercialization

Moreover, a significant number of empirical studies have been done on commercialization and financial inclusion. Studies on agriculture commercialization, include those looks at the determinant of commercialization (Krause et al., 2019; Rubhara and Mudhara, 2019), drivers of commercialization and profitability (Arymo et al., 2019), and social network and commercialization (Mwema and Crewett, 2019). Studies on financial inclusion include those examine the link between mobile money and financial inclusion (Evans, 2018), determinant of financial inclusion (Asuming et al., 2018; Lott, 2018). Also include studies examining the link between financial regulation and financial inclusion (Kodongo, 2018) and the link between financial intermediation and financial inclusion under moderating effect of institutional pillars (Bongomin et al., 2020). However, none of these studies looks at the link between financial access and commercialization or the moderating effect of cultural cognitive on the link between financial access and commercialization. So this study aims to examine the moderating effect of institutional cultural cognitive in the relationship between financial inclusion and agricultural commercialization

In addition, several studies have, however, demonstrated that access to financial services has a positive effect on farmers’ market participation or commercialization (Abu & Haruna, 2017; Narayanan, 2016; Ochieng et al., 2019; Ogundeji et al., 2018; Rubhara and Mudhara, 2019). However, because of the different contexts, and because the studies were carried outside Tanzania, they serve as the basis for conducting this study. The rationally of addressing the current contextual gap is supported by Kabiti et al. (2016) and Mihreties (2021), who asserted that a low level of financial services access, especially credit, leads to farmers’ inability to access essential agriculture input, so reduces farmers productivity and participation in market/commercialization.
Literature review

Financial services access and agriculture commercialization

Finance is an enabler for farmers in purchasing different agricultural implements (Pandey et al., 2018). However, access to finance depends on the presence of financial intermediaries such as bank, fiancé houses, microfinance banks and other licensed institutions, which play a role of pulling funds from the surplus unit and lend it to the deficit unit on request for investment or other needs (Bongomin et al., 2018). Abu & Haruna (2017) also observe that communities with Banks, public transport and accessible road are more likely to be financially included. This implies that a bank in a community not only stimulate participation but also reduce transaction cost in accessing bank services.

Among the major challenge facing smallholder farmers’ productivity in LDC is access to credit (Hussein & Thapa, 2016). However, a study by Sekeyi et al. (2017) shows a negative relationship between credit and production, but access to credit among farmers ensures use of improved inputs, thus resulting in an increase in production and farmers’ participation in commercial market (Twumasi et al., 2019). Thus, lead to improvement in household welfare and poverty reduction.

Access to finance can also be made easy through use of technology. A study by Hoerning and Bourreau (2016) recognizes mobile money services as a tool to enhance financial inclusion. Mobile money services improve access to financial services for the unbanked population; thus, mobile banking is the extension of banking service delivery through a mobile phone (Gibney et al., 2015; Hoerning&Bourreau, 2016). Availability of Mobile money services facilitates cash storing and remittance over the phone, and the services are easily available for all kinds of people, from the poor to the rich. Examples of such services in Tanzania include M-Pesa, Tigo Pesa, Airtel Money, T-Pesa and Hallowspea. In addition, entering of new financial services providers, like bank agency service providers in the market, pave a way for provision of various financial products or services that may suit economic status of the poor. Therefore, affordable financial services enable farmers to save and invest more and have alternative means of making and receiving payments; thus, they can easily obtain credit to expand production, promoting commercialization (Abu and Haruna, 2017).

**H1: Financial services access positively affects agriculture commercialization**

Moderating effect of institutional cultural cognitive in the relationship between financial access and agriculture commercialization.

Cultures cognitive are regarded as shared conceptions that constitute the frames through which meaning is made (Scott, 2001). They are characterized by the interpretation and conception of meaning by actors which is considered to be a significant factor in influencing societal attitude and behaviour (Bongomin et al., 2015; De Mooij & Hofstede, 2010). Additionally, Scott (2001) emphasizes how external cultural frames influence internal interpretive processes. The cultural cognitive aspect of institutional, according to Scott (2001), aids individuals such as poor in creating meaning based on culturally guided shared conception. Thus it shapes individual beliefs, decisions and actions through implicit rules regarding what is right and what is wrong in the community (Suchman, 1995, as cited in Kazumi and Kawi, 2017).

Bongomin et al. (2015), citing World Bank (2001), provide that poor household behavior and actions toward financial inclusion depend largely on cultural institution frames that either promote or limit their financial decision and choice making, which determines their inclusion or exclusion from accessing basic financial services. For example, a study by Kanagaretman et al. (2014) suggest that societies with high uncertainty avoidance attitudes have a low tolerance for ambiguity because they feel threatened and insecure by life uncertainties. Thus when it comes to revealing information about their business or other generating activities to lenders, borrowers tend to be less transparent and secretive (Asare et al., 2020). However, financial transparency is essential in the credit market because lenders want as much information as possible about the borrowers to whom they extend credit. Therefore, lenders/financial institutions view borrowers who disclose more information as more transparent, while those who disclose less information as information opaque and unfavourable (Dong and Men, 2014).

Moreover, culture helps to build trust through cultural values and beliefs (Ojong, 2017). It enables the formation of social relations, such as the formation of farm group, which act as instrumental in tackling the problem of asymmetries of information which creates uncertainties and increase TC, such as costs of searching for market and credit information (Bolarinwa, 2020; Ojong, 2017). According to TCE, some farming households have managed to reduce costs and participate in commercialization through cooperative or farming groups (Coase, 1937, as cited in Bolarinwa, 2020).

**H2: Institutional cultural cognitive significantly moderates the relationship between financial services access and agricultural commercialization.**
Methodology

This study adopted a cross-sectional research design. The design was adopted because it enables us to measure both dependent and independent variables at the same time using the same questionnaire. Furthermore, the design allowed us to collect large amounts of data over a short period. The study population comprised smallholder rice growers living in Kilombero District in Morogoro region. The area was selected because majority of district land is along the Kilombero Valley, which is a wetland that supports both small-scale farming and large-scale farming. Moreover, among the seven districts of Morogoro, Kilombero lead in rice production in 2019, where 57.4% of the region production comes from Kilombero district (URT, 2015). The sample size for this study was computed based on estimated population of 55,484 household rice growers in the study area. The sample was computed by using the formula derived from Yamane (1973). According to Yamane sample size is given as \( n = \frac{N}{1+N(e)^2} \) where \( N \) = targeted population, \( n \) = sample size and \( e \) = tolerance error (5% or 95%). Therefore, a total of 397 smallholder rice grower farmers were selected. Multistage random sampling technique was used in this study in order to select division, ward, village and household surveyed.

Variable measurement

Financial services access: Refer to the depth of outreach of financial services such as bank penetration in terms of branch or point of sale devices in rural areas demand side barriers that customers face to access financial institutions such as cost and information (Mindra & Moya, 2017). To measure financial service access among smallholder rice growers in the study area we use five access indicators used by scholars such as Kodongo (2018), Mindra & Moya (2019), and Sekyi et al., (2017). The indicators include (i) Presence of financial institutions (ii) credit availability (iii) mobile money service availability, (IV) formal and informal credit accessibility (V) accessibility road. All the questions were anchored onto a five-point Likert scale score of strongly disagree (1), disagree (2), not sure (3), Agree (4) and strongly agree (5).

Cultural cognitive: This is the shared conceptions that constitute the frames through which meaning is made (Scott, 2001). Cultural cognitive was measured using six items, which comprises three items from saving and borrowing behaviour adopted from Bongomin et al. (2018) and other three items from group membership adopted from Silong and Gadanakis (2020). All the questions were anchor onto a five-point Likert scale score of strongly disagree (1), disagree (2), not sure (3), Agree (4) and strongly agree (5).

Agriculture commercialization: other scholars (Abu & Haruna, 2017; Ochieng et al., 2016; Rubhara&Mudhara, 2019) measure commercialization using commercialization index proposed by Govereh et al. (1999). The index is given as a proportional of total crop output sold to the total output crop produced. However, scholars such as Yaseen et al. (2018) and Rabbi et al. (2019) use endowment of crop production and household market participation characteristics to measure commercialization. According to Rabbi et al. (2019), a farmer is said to commercialize if he sells part of his output in the market. Poor recording keeping by farmers resulted to difficulty in obtaining data on amount of rice produced and sold, thus led us to adopt market participation indicators. Three items relating to reasons for involving in rice production were measured using a five-point Likert scale.

Control Variables: Based on previous scholars’ studies (Amfo et al., 2021; Kabiti et al., 2016; Mariyono, 2018; Sekyi et al., 2017), we tested for number of control variables to account for factors other than the theoretical construct of interest that could explain variance in the dependent variable (i.e. Agricultural commercialization). Farming experience, age, on-farm income and irrigation availability have been found to influence agriculture commercialization. We measured farming experience as years spent in rice farming, on- farm income as income from rice cultivation, Age as the age of the household and irrigation availability check whether the farmer is either in developed or traditional irrigation schemes.
Table 1: Summary of the measurement variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>No of items</th>
<th>Code</th>
<th>Measurement items</th>
<th>Measurement</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control variables</td>
<td>4</td>
<td>AGE</td>
<td>Age of household head</td>
<td>Years</td>
<td>Abu &amp; Haruna, (2017); Kabiti et al., (2016); Amfo et al., (2021)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE</td>
<td>Farming experience</td>
<td>Years spend in rice farming</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI</td>
<td>Main source of income is agriculture</td>
<td>Nominal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IRR</td>
<td>Irrigation availability</td>
<td>Nominal</td>
<td></td>
</tr>
<tr>
<td>Financial service access</td>
<td>6</td>
<td>FA1</td>
<td>Presence of financial institution</td>
<td>Ordinal scale</td>
<td>Kodongo (2018); Mindra&amp; Moya (2019); Sekyi et al., (2017)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FA2</td>
<td>Credit availability</td>
<td>1= strongly disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FA3</td>
<td>MMS availability</td>
<td>2=Disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FA4-</td>
<td>Formal and informal credit</td>
<td>3= Not sure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FA5</td>
<td>accessibility</td>
<td>4= Agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FA6</td>
<td>Accessible road</td>
<td>5=Strongly Agree</td>
<td></td>
</tr>
<tr>
<td>Institutional cultural cognitive</td>
<td>6</td>
<td>CC1-</td>
<td>Serving and borrowing behaviour</td>
<td>Ordinal scale</td>
<td>Bongomin et al (2018); Silong and Gadanakis (2020)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CC3</td>
<td></td>
<td>1= strongly disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CC4-</td>
<td>Group membership and involvement</td>
<td>2 = Disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CC6</td>
<td>in commercial farming</td>
<td>3= Not sure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 = Agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5=Strongly Agree</td>
<td></td>
</tr>
<tr>
<td>Commercialization</td>
<td>3</td>
<td>RC1-</td>
<td>Reason for involving in rice</td>
<td>Ordinal scale</td>
<td>Rabbi et al. (2019); Yaseen et al (2018)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RC3</td>
<td>production</td>
<td>1= strongly disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 = Disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3= Not sure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 = Agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5=Strongly Agree</td>
<td></td>
</tr>
</tbody>
</table>

Data analysis

Collected data from the field were checked for completeness, accuracy, and error. The completed questionnaires were serial numbered and loaded in a statistical package for social science research (SPSS/23). Then frequencies were generated to identify missing values, and a box plot was used to identify outliers in data. The result shows that there is no outlier in our data set. Then we test for regression assumption using normality, linearity, homoscedasticity and multicollinearity. Normality and linearity were tested using a p-p plot of standardized residual and standardized predicted value. The results showed no issue of normality or linearity since all dots on the normal p-p plot were very close, falling along the diagonal (Keith, 2019; Hair et al., 2014). Also, the result shows that the histogram was bell-shaped, so there was no issue of normality. In addition, we tested for homoscedasticity using a scatter plot of standardized residual against standardized predicted value. Results show no serious homoscedasticity issue as all points fall within the threshold range of ±3. Finally, we tested for multicollinearity using tolerance value (TV) and variance inflation factor (VIF). Scholars (Field, 2005; Hair et al., 2014) recommend a cut-off value for VIF < 5 and TV > 0.2 to indicate the absence of multicollinearity. As shown in Table 2 below, those criteria were met. So all the assumption was met, allowing us to proceed with hierarchal multiple regression analysis.

Table 2: Multicollinearity diagnoses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Collinearity Statistics</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.811</td>
<td>1.233</td>
</tr>
<tr>
<td>FE</td>
<td>.777</td>
<td>1.287</td>
</tr>
<tr>
<td>IRS</td>
<td>.950</td>
<td>1.053</td>
</tr>
<tr>
<td>SI</td>
<td>.921</td>
<td>1.086</td>
</tr>
<tr>
<td>Cent_FA</td>
<td>.935</td>
<td>1.069</td>
</tr>
<tr>
<td>Cent_CC</td>
<td>.935</td>
<td>1.069</td>
</tr>
<tr>
<td>FAXCC</td>
<td>.973</td>
<td>1.028</td>
</tr>
</tbody>
</table>

Reliability and validity

Before conducting regression analysis and hypothesis testing, we assess the reliability and validity issues. Reliability refers to the degree of constituent between multiple measurements of variables (Bongomin et al., 2018). In this study, Cronbach alpha was used to assess the internal consistency of the instrument used (Cronbach, 1951). According to Abdullahi et al. (2021) and Jensen and...
Kristensen (2021), internal consistency is achieved when cronbach alpha exceeds 0.7. All values of Cronbach alpha for FA, CC and RC obtained in Table 3 below were above 0.7, so reliability was achieved. In addition, content and convergent validity were also achieved as the result of exploratory factor analysis obtained indicated that all the items correlated and loaded with each other.

### Table 3: Reliability analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>No of items</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial service access (FA)</td>
<td>6</td>
<td>0.917</td>
</tr>
<tr>
<td>Cultural cognitive (CC)</td>
<td>6</td>
<td>0.879</td>
</tr>
<tr>
<td>Rice commercialization (RC)</td>
<td>3</td>
<td>0.770</td>
</tr>
</tbody>
</table>

### Hierarchical regression analysis

According to Akhtar et al. (2018), the moderation test is considered a significant test in social science research as it explains precisely the type of causal association between the independent and dependent variables. Moderation analysis can be performed in two ways (i) interaction moderation and (ii) Multi-group moderation. In the first case, the whole data set is used to scrutinize moderation's effect; in the second case, a set of data is split, which might be a categorical variable (Hair et al., 2014). The current study used interaction moderation, so it employed hierarchical regression analysis. Hierarchical regression is considered the appropriate technique for estimating the relationship between financial access and agricultural commercialization and the proposed moderation effect of institutional cultural cognitive. The technique has received much endorsement as a model estimator in many studies (Adil et al., 2021; Adomako et al., 2016; Bongomin et al., 2018; Yang et al., 2022). As recommended by previous scholars (Jose, 2008; Keith, 2019), to avoid unnecessary colinearity, variables of interest were centred first before creating the interaction term. According to Keith (2019), centering involves subtracting the variable mean score and resulting in a new variable with mean zero and standard deviation equal to original standard deviation. The hierarchical regression analysis involved three steps. The first step involves estimating the non-hypothesized variables (control variables). The second step involves introducing the main effect variables and finally the third step involved estimation of the interaction term (FAXCC) nested in the main effect model. As indicated in Table 2 above all the variables involved in the regression estimation reveal no multicollinearity issue as VIF < 5 and TV> 0.2. Thus all the variables could be used to interpret the regression result. The regression equation model for all three steps is shown hereunder.

\[
Rc = Age + FE + SI + IRR + e
\]

\[
Rc = Age + FE + SI + IRR + (FA + CC) + e
\]

\[
Rc = Age + FE + SI + IRR + (FA + CC) + (FAXCC) + e
\]

Where

- \(Rc\) = Rice commercialisation
- \(Age\) = Age of the household head
- \(FE\) = farming experience
- \(SI\) = source of income (on-farm or off-farm)
- \(IRR\) = irrigation availability
- \(FA\) = Financial service access
- \(CC\) = cultural cognitive
- \(e\) = error term

### Table 4: Hierarchical regression analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.119*** (0.040)</td>
<td>-0.109** (0.036)</td>
<td>-0.114** (0.035)</td>
</tr>
<tr>
<td>FE</td>
<td>0.186*** (0.039)</td>
<td>0.132** (0.036)</td>
<td>0.128** (0.035)</td>
</tr>
<tr>
<td>IRR</td>
<td>0.037 (0.083)</td>
<td>0.028 (0.076)</td>
<td>0.040 (0.075)</td>
</tr>
<tr>
<td>SI</td>
<td>0.690*** (0.133)</td>
<td>0.518** (0.121)</td>
<td>0.457** (0.120)</td>
</tr>
<tr>
<td><strong>Main effect</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FA-cent</td>
<td>0.341*** (0.041)</td>
<td>0.352*** (0.040)</td>
<td></td>
</tr>
<tr>
<td>CC-cent</td>
<td>0.159*** (0.035)</td>
<td>0.162*** (0.035)</td>
<td></td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAXCC</td>
<td></td>
<td></td>
<td>-0.137*** (0.036)</td>
</tr>
</tbody>
</table>

\[R^2\] 0.152 0.324 0.350
\[\Delta R^2\] 0.172*** 0.026***

*\(P<0.05\), **\(P<0.01\); ***\(P<0.001\)
Results

The results obtained in Table 4 above provide the results of the hierarchical regression model for rice commercialization. The graph of interaction term regarding financial services access and cultural cognitive is provided in Figure 2. As shown in step 1 of Table 4, out of the four non-hypothesized (control) variables, three variables, source of income ($\beta =0.690$, $P<0.001$), farming experience ($\beta=0.186$, $P<0.001$), and age ($\beta =-0.119$, $P<0.01$) were statistically significant associated with rice commercialization. However, irrigation availability ($\beta =0.037$, $P>0.05$) had an insignificant effect on commercialization. In addition, the results obtained in step 2, which involved introduction of the main variables (FA and CC), revealed that both FA and CC have significant positive effect on commercialization ($\beta =0.341$, $P<0.001$) and ($\beta =0.159$, $P<0.001$) respectively thus lead to support hypothesis H1. Also, the result obtained in step 3 revealed that the interaction term between FA and CC is significant but negative ($\beta=-0.137$, $P<0.001$), thus lead to support hypothesis H2. The graph of this interaction (Figure 2), shows that the relationship between financial access and commercialization is high with a low level of cultural cognitive and less with high level of cultural cognitive.

Discussion

The purpose of the current study was to examine the effect of financial service access on agricultural commercialization under the moderating effect of institutional cultural cognitive. We also anticipated the effect of non-hypothesized (control) variables in such relationship. The result obtained show that control variables, including farming experience, on-farm income and age had significant effect on commercialization. The results are consistent with some previous empirical findings (Abdullah et al., 2017; Kabiti et al., 2016; Mihretie, 2021), who found that farming experience and on-farm income had a significant positive effect on commercialization. The results suggest that increasing farming experience and on-farm income increase productivity and farmer participation in the market, thus positively affecting household farmers' welfare. However, the results were inconsistent with those of Mariyono (2018), who found a negative relationship between farming experience and commercialization.

Furthermore, the results found a negative relationship between age and commercialization. The result is consistent with those of Rubhara and Mudhara (2019) and Abafite et al. (2016), who also found a negative relationship between age and commercialization. This is due to the fact that older people are more risk averse than younger people so they might not be willing to venture into food crop selling to guard against volatility of food prices, thus creating a negative relationship with commercialization. However, the results were inconsistent with those of Kabiti et al. (2016), and Mariyono (2018) found positive relationship between age commercialization.

Back to the main objective, the study intends to examine the relationship between financial access and commercialization under moderating role of cultural cognitive. The results find that financial service access positively and significantly affect commercialization, thus support hypothesis H1. The results are consistent with previous empirical findings (Abu and Haruna, 2017; Ochieng et al., 2019; Rubhara and Mudhara, 2019) which revealed that financial service access support agriculture commercialization. According to Abu and Haruna (2017), the availability of financial institutions, such as banks in a community, stimulates participation and reduces transaction costs in accessing financial services. Thus, financial institution availability such as bank in a community, enable poor to use the service like opening accounts, saving money and applying for credit. In addition, access to credit boost productivity and net income of a farmer (Khandker and Koolwal, 2016; Ogundeji et al., 2018), because credit enable farmer to adopt contemporary technology, and in turn, increase marketable surplus and participation in the market (Bhattarai et al., 2013). Kurjaluoto et al. (2021), also show that access to mobile money services significantly changes the social and economic circumstances of underprivileged and unbanked people, include farms in non-western countries. Thus, financial service access in terms of availability of financial institutions, credit and mobile money services had positive association with commercialization.

Additionally, the empirical findings of this study revealed that cultural cognitive indeed facilitates the relationship between financial services access and agricultural commercialization, thus support hypothesis H2. However, the interaction effect between FA and CC was negative, which suggests that as the level of CC is reduced, the effect of financial access on commercialization is higher but as
the level of CC increases, the effect of FA on commercialization is reduced. The results are consistent with previous empirical findings (Scott, 2001; Mohamed et al., 2020). According to Scott (2001), poor actions are guided by cultural assumptions which enable them to develop sense-making habits such as accessing and using financial services. In addition, the reason why most farmers have tendency of using informal financial services regardless of high risk associated with the service is because the transaction are straightforward, simple and streamlined lined to the needs and situation of most marginalized groups (Mohamed et al., 2020). Also, Akudungu (2016), confirm that informal sources play a vital role in providing credit, especial to those who have reluctance to access credit from formal sources. Thus, if poor perception and beliefs of poor and marginalized individuals toward formal financial services can be reduced, then access to formal financial services can be increased, thus bust productivity and commercialization.

**Conclusion**

This research gives evidence that financial service access is significantly and positively related to agriculture commercialization. The study also confirms that institutional cultural cognitive play a vital role in moderating the relationship between financial services access and agricultural commercialization among smallholder rice growers in Tanzania. The results draw attention, because of lack of theoretical evidence, in explaining the moderating role of institutional cultural cognitive in the relationship between financial access and agricultural commercialization. The findings are in line with previous scholar work and, thus provide evidence that the impact of a third variable (cultural cognitive) is worth considering while investigating a relationship between financial service access and agricultural commercialization, as confirmed in this study.

First, the current study uses a cross-sectional research approach leaving out the longitudinal study. Future studies using a longitudinal approach with a national representative sample may provide a better understanding of the moderating effect of institutional cultural cognitive on the relationship between financial inclusion and agriculture commercialization. Second, the current study uses quantitative data and ignores qualitative data in measuring the variable under study. Future studies using mix data or qualitative data may be conducted. Finally, this study used data collected from smallholder rice producers, leaving out medium and large producers. Future studies may consider including medium and large rice producers.

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