The Link between Farm Household Objectives and Investment in Irrigation Scheme: Implications for Collective Action Coordination Efficiency

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Abstract

This paper examined the association between farm household varying objectives (commercial or subsistence orientation) and own investment expenditures (enterprising tendency) interdependence in explaining the implications for Collective Action (CA) coordination in the common. Cross sectional research design was employed to collect data from a total of 184 randomly sampled farm households involved in rice irrigation farming in the selected seven irrigation schemes located in five districts of Ngudu, Misungwi, Shinyanga rural, Bunda and Rorya within the Lake Victoria basin. Collected data were analysed using 2SLS regression analysis to establish factors determining enterprising tendency, a proxy for coordination incentive. Results indicated that farm household objectives; particularly commercial/market oriented production was an important incentive for coordination. This variable must be hand in hand with other exogenous variables designated as "excluded instruments" for greater impact, which positively and significantly supported market oriented production. Other variables like trust, contact cost/communication and experience were important determinant of enterprising tendency (incentives/ disincentive) in the Tanzanian irrigation systems CA coordination. The study recommends strengthening of advisory services in the irrigation schemes, particularly capacity building with regard to business development services (BDS) for commercial oriented production, and a comprehensive CA management training tailored particularly, into building trust among member farmers, which positively influenced enterprising tendency. Improvement of group leadership management training- which was a disincentive for investment in the irrigation, and so do CA coordination is crucial.

Key words: Transaction cost, collective action coordination, irrigation systems, 2SLS, Instrumental variable, Tanzania

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1.0 Introduction

In most developing countries worldwide, the policy for the management of natural resources such as forestry, rangelands, protected areas, and water particularly, irrigation systems and water sheds have been decentralized in a varying degree such that the communities themselves have to manage such resources (Agrawal and Ostrom, 2001; Meinzen-Dick, 2004; Araral, 2008). This policy shift is a response towards among other factors, greater awareness of the governments in regard to incentive problems amongst these resources management. In Tanzania, smallholder irrigation systems are either traditional improved or modern schemes managed by the community. The institutional arrangement for irrigation water resource management and utilization is such that the community organize themselves into groups of irrigators/ water users association (WUA) in accordance with the rights and eligibility of member irrigation farming participation. The irrigation farming participation rights are defined by their institution in collective action (CA) and government common resources management guidelines and policy. In order to access irrigation water such groups (irrigators) are granted ownership in form of common water right permit (NIPO, 2009). This institutional arrangement had the expectation that would enhance ownership through property rights and hence efficient organization for greater impact of the irrigation systems performance.

However, the situation has not been the case as expected because the irrigation systems performance is still hopeless. The existing awkward situation is such that frequent entry and exit of farmers, and smaller cultivated land area compared with their holdings coupled by land abandonment in various irrigation schemes persist (NIPO, 2009; SUA, 2010; Msuya and Isinika, 2011; MAFC, 2011), notwithstanding the huge investment directed towards infrastructure (irrigation hardware) development. Until now, the policies in Tanzania have not paid sufficient attention on the institutions and mechanisms of organizational aspects related to coordination efficiency of collective action (CA), which is a soft ware in irrigation systems performance. As a result, the irrigation systems perform poorly, (Water sector, 2009; You et al., 2010; NAPO, 2013). A number of factors have been pointed out to contribute to the problem of inefficiency performance of the irrigation systems. They include among other factors, poor water management and control (WMC), inefficient extension services (NIPO, 2009; SUA, 2010), and farmers' disregard of by-laws (Rajabu and Mahoo, 2008). Practically, these underlying contributing factors described above are a manifestation of lack of collective action (CA) amongst farmers. Particularly, scholars have explained CA variations on natural resources management across the world by groups or sociability identification, environmental (ecology) and technology congruency, and economic factors on their own right (Wade, 1987; Ostrom, 2002).

Other scholars, Meinze-Dick, (2000), Araral , (2008), and Ostrom, (2002,2010), have identified factors such as group size, physical characteristics of the common resource, and characteristics of resource users such as age, poverty incidence, and salience of resource to the livelihoods of the users as factors influencing collective action successfulness. However, all together these studies have ignored other individual household incentives related to entrepreneurial activities (entrepreneurship) and the embeddedness of such factors like transaction costs (contact, contract and control), and unobserved characteristics like preferences, which can condition farmers' decisions to foster or deter CA (irrigation software) successfulness (Dercon et al. 2012; Araral, 2013).

In the main stream economic theory, entrepreneurship is viewed as judgemental decision under uncertainty over deployment of assets and innovation aspects (Jos and Bart, 2008; Klein, 2009). Entrepreneurs are the founders, the owners and the managers of the firm all rolled into one and are responsible for organising the other factors of production so that the firm- in this case an irrigation system, can produce a good or services (Earl and Wakeley, 2005). Clearly, uncertainty in water management and control (WMC) is an important characteristic of the irrigation systems management challenge (NIPO, 2009; SUA, 2010), hence farm household decisions based on farming objectives as an entrepreneur on own expenditures (investment), and utilization of the productive resources can foster or deter CA successfulness in the common.

In essence, individuals choose to become entrepreneur based on personal rewards offered by opportunities and their capabilities. Extensive bodies of literature exist to throw lights on the factors which influence entrepreneurship. Holtz-Eakin et al., (1993) have shown that the size of an inheritance (wealth from parents) affect the likelihood of an individual (consumer) becoming an entrepreneur and the amount of capital employed/invested. Further, they indicated that other factors such as knowledge of production, technologies and ownership of property rights, such as patents rights or common water right permit in case of irrigation systems, education, training, experience, in additional to access to information about market opportunities, abilities and business judgment orientation are also likely to influence the decision to become entrepreneur. Scholars, e.g. Katundu and Gabagambi (2014) using binary logistic regression model have also reported that factors like entrepreneurship education, parents' education are some of factors likely to influence entrepreneurial tendency among University graduates. However, all these studies have not integrated the transaction cost (TC) in the entrepreneurial aspects, which is intertwined in the entrepreneurial activities, and there is a consensus that TCs shape the process of entrepreneurship discovery (Foss and Foss, 2006).

Consistently, TC analysis can be applied to issues of irrigation systems management to understand the institutional and coordination efficiency, where collective action (CA) is considered as an institutional tool or software that translates into efficient performance of the irrigation systems. According to Williamson, (2005) transaction cost economics concentrates on the relative efficiency of different exchange processes. In irrigation systems, transaction costs could be defined as the costs of acquiring and handling the information about the mobilization of voluntary cooperation on irrigation infrastructure operation and maintenance (O&M), water allocation and distribution, water management and control, contributions of relevant costs and contracts compliances, resource users' reputation adherence (respect of laws and regulations) on interactions, and so on. On the other hand, next to the economic objectives, which can condition farmers to foster or deter CA coordination is the household farm objectives expressed in preferences of their plans of action. For example, Jacoby et al. (2014) studying evaluation of rangeland management contend that management decisions are usually influenced by farmers' objectives, apart from interrelation of ecological, economic and social factors. Together, these studies are useful and have provided insights on coordination and management of resources by resource users (farmers) as a starting point for this research.

Along these lines, this paper extends beyond the above factors to identify some of not previously identified variables that influence collective action coordination in the irrigation systems in the context of farm household objectives and enterprising tendency

interdependency (reverse causation) using instrumental variable strategy, notable, the two stage least square (2SLS) to establish the causation. The work contributes to the existing literature by extending the 2SLS analysis approach to farm household objectives as relevant factors in explaining the decision to enterprising tendency in the common, with the view to understanding CA coordination incentives. Most studies investigating enterprising tendency (Katundu and Gabagambi, 2014), and the effect of farmers' objectives on economic phenomenon have assumed exogeneity relations in variables (Kallas et al., 2009; Jcoby et al., 2014), which is usually not the case.

Specifically, this very study thoroughly explored how varying farm objectives affect the extent of entrepreneurship (private specific investment decisions) of a household in a CA setting in irrigation systems, and introduced transaction cost variables like information search/contact cost, and group characteristics in terms of governance related variables such as group leadership style/discretion, which have not been investigated before in an integral way in irrigation systems research. The paper tested the hypothesis that "household own investment (specific private own expenditures) decision in irrigation farming does not depend on farming objectives because irrigation is important for resource users in enhancing food and income regardless of the enterprising orientation the farmer took''. It take the conception that jointly owned firm (-a common resource characterized by the rivalry of consumption and difficulty of exclusion) where entrepreneurial activities take place at different levels of organization: collectively and individual independent member. The collective organization pattern involves cooperative entrepreneurship such that the activities of the jointly owned aspects such as collective efforts like operation and maintenance of irrigation infrastructure or contributions, and those of individual owned are interdependent (Jos and Bart, 2008).

To this end, this paper concentrates on individual farm household incentives to enterprising tendency in the common (common resource pool), where the deployment of own assets takes place in an uncertainty conditions particularly, with regard to water management and control (NIPO, 2009), and disregard of bylaws (Rajabu and Mahoo, 2008). Understanding the investment enterprising decisions for smallholder farmers- at an individual independent entrepreneur is important for critical success of CA working in the irrigation systems, because the performance of individual farm household entrepreneur crucially depend on the collective organization environment in that common resource (Jos and Bart, 2008)). Foss et al. (2006) put forward that the significance of the capital asset on the production of good is determined by an entrepreneur, as expressed in the willingness to pay for the service of that asset. Thus, the level and factors influencing own private investment expenditures under uncertainty are important characteristics of the entrepreneurship and reflects CA coordination incentives, besides are indicators for performance evaluations in the irrigation systems.

2.0 Conceptual and theoretical framework

Collective action is related to management success and member patronage, at the same time most capital asset expenditures by a farmer in irrigation systems are sunk cost in case not used, or if are firm specific that have no alternative use (Aramyan et al. 2007). Accordingly, famers face dilemma in decision making because of uncertainty resulting from water management and control variations (NIPO, 2009), and disregard of by laws, which as a result create free riding and opportunistic behavior operating environment amongst water resource users (Rajabu and Mahoo, 2008). Alongside, household preference (which is latent and only observed by actions) usually determine the differences in livelihood strategies (plans) undertaken among resource users. These differences in livelihood strategies (driven by their

objectives) are likely to be a result of largely unobserved household characteristics, expressed in terms of differences among household endowment and enterprising tendency (choices) such as investment judgment, farming orientation, inputs used, off farm activities engagement, and valuation and choice of accessible economic activities/opportunities against irrigation system through implicit ranking. Enterprising tendency (entrepreneurship) plays a greater role in driving organizational coordination functions of firms (Maharati and Nazemi, 2012).

In its entirety, entrepreneurship covers a broad spectrum ideas and definitions ranging from occupational, innovation, and business creation to organization /coordination point of views (Hall and Sobel, 2006; Jos and Bart, 2008; Soriano, 2010). Although, a good body of literature on entrepreneurship exist, all together, have concentrated on the role of entrepreneurship, but the contribution to the firm coordination has been neglected or else not clearly tackled. This paper links entrepreneurship and coordination. Entrepreneurship has been defined as a judgmental decision making over deployment of assets in face of uncertainty and bringing about coordination of the firm- an irrigation system (Jos and Bart, 2008; Maharati and Nazemi, 2012). The firm (irrigation system) as an organisation is dedicated to the planning of sustainable resource utilization based on information synthesis and operating environment by the entrepreneurial founder (resource users), and is effected more by its managerial organization embedded in an institution framework of CA. Thus, The CA institution (management) and government guidelines define the property rights for entrepreneurs' resource utilization in the irrigation systems.

The paper seeks to integrate farm household objectives, transaction costs, and governance related factors such as group leadership style to understand enterprising tendency as an incentive for coordination of CA. The enterprising tendency is measured in terms of own annual irrigation expenditures committed for irrigation farming, to imply that the price or cost (investment) of the resources used by the entrepreneur reflects the opportunity cost of their employment in other uses (Hall and Sobel, 2006). The implication is that the higher the capital asset invested the higher the motivation for ensuring firm coordination efficiency in order to safeguard losses would be for the investment made. On the other hand, farm household objectives are operationalized in the context of economic motivation hierarchy structure as in Kallas et al., (2009), which are measured as dummy values of commercial or subsistence farming objectives. Transaction costs and governance related factors are measured in their various respective proxies. The framework is thus centered on management theory of investment that account for farm and personal characteristics (Aramyan et al. 2007), and farm household investment (e.g. Barnum and Squire, 1979) that explains the household as both producer and consumer under imperfect markets, and entrepreneurship theory, which is built in from firm and transaction cost economics theories- that portrays an organization- embedded in the institution framework of CA management (Casson,1998; Williamson , 2005). These combined theories provided the basis to investigate the linkages between the farm household objectives and decisions on investment enterprising tendency, which is assumed as a locus of CA acceptability and economic organization coordination successfulness.

3.0 Methodology

The study area

The study was conducted in the Lake Victoria water basin (LVB) in 2014 covering seven irrigation schemes hosted in each of the five districts named in brackets: Mahiga irrigation scheme (Ngudu), Igongwa (Misungwi), Nyida (Shinyanga rural), Maliwanda and Nyatwali (Bunda), and Cheleche and Irienyi (Rorya). These districts have different agro ecological system defined by different farming system zonation (FSZ), characterized by the interactions of cultural, agro-biological aspects like dominant soil types, rainfall distribution and socio economic factors such as input-output markets, own farmers priority on crops cultivated and resources capabilities. Because of good correlation between local soils, parent materials, landforms, historical settlement patterns and current local farming systems, the Zonation is based on land unit approach, in which soils and physiography played a dominant role (Van Kekem, 1999).

These selected districts have also more or less homogeneous characteristics on other aspects related to culture, input-output market characteristics, and crops grown particularly, in the irrigation schemes where rice/paddy is the major crops grown. Accordingly, Mahiga, Igongwa and Nyida irrigation schemes are traditional improved, whose depend on temporary rivers for their water source. Maliwanda, Cheleche, and Irienyi are also traditional improved schemes, but with reservoir/ dams constructed to collect rain water during the season. Virtually, all these schemes are seasonal operating mainly during rainy season employing gravity method for water abstraction from the water source and distribution in the plots/field. However, there is an exception of Nyatwali irrigation scheme because it uses electrical pump for water abstraction and the main source of water being Lake Victoria; hence the only scheme that operates all year round in the study area.

Research design

The study relied on primary data involving cross sectional design, which drawn individual farmers participating in irrigation farming. The collected data comprised of farm households and groups characteristics, which covered mainly the governance, transaction costs, technology characteristics, and the social capital variables in the form of their various proxies. Farm household was used as a unit of observation for the analysis. To identify the causal effect relations, the design compared farmers participating in the irrigation farming by creating stratification during analysis: those engaged in irrigation farming perse*;* and those engaged in both irrigation and rain fed in each of the scheme surveyed to identify the factors which influence the enterprising tendency in the common.

Sampling procedure and sample size

The survey employed a multi stage sampling procedure based on two stages approach. First, purposive sampling was used to obtain a total of 7 irrigation schemes-both traditional improved and modern, which are distributed along water basin of Lake Victoria in the five districts described above. The selection criteria for the irrigation schemes were based on the potential functional (operational) of the irrigation facilities, and age of the scheme (that is, has been working/operational for the past 5-10 years or so) in order to capture the dynamic conditions. The second stage involved survey respondents selection, where from each scheme, 30 farm households- participants in the irrigation farming, in addition to off farm activities engagement were randomly sampled. In total 7 irrigation schemes and initially 210 households were thought, however, 184 households (about 87.6% response rate)-those who were willing to participate in the interview were reached.

Data types and Analysis Method

Primary data set collected were constructed to suit addressing the simultaneity bias of variables with an interdependence mechanism, where the independent variable- farming objective (commercial or subsistence)/treatment and the outcome of interest (dependent variable)- investment expenditures proxied as enterprising tendency both are endogenous. The data type used for the structural equation dependent variable, investment expenditures (*Inv)* was indirectly measured as own annual/private total irrigation expenditures /investment made in the irrigation farming during the cropping period to account for real capital asset use (total cost in Tanzania shillings -logged), that was as a proxy for measuring the extent of enterprising tendency.

The independent variable- farm household objectives (FO*),* which is also endogenous in the structural equation, was measured as a dummy variable- whether the farmer is commercial/semi-commercial or subsistence oriented. Exogenous variables were identified and constructed to serve as instruments for X_1 (assumed to influence farmer objectives/ orientation, (FO)- these included output quantity marketed, proximity/distance to the irrigation schemes, output market distance (all measured in km), and transaction costs mainly contact costs measured in monetary value of contact/communication e.g. phone & travel costs (Tzs), and number (frequency) of meetings. Other instrumental variable data included were saccos service access (dummy), farming support services -which included extension service support (dummy), soil fertility status in the irrigation scheme (dummy), off farm activities engagement (dummy), household labor force availability (number of eligible member for farming), and irrigation type (dummy). The exogenous variables included in the structural equation were, sex (dummy), ownership of land within the irrigation scheme(dummy), group leadership style(dummy), non tangible benefits like information sharing (categorical), trust (dummy), experience in irrigation farming (years), contact/communication cost (Tanzania shillings/currency).

Analysis method

Instrumental variable (IV) strategy was implemented to analyse the collected data for the variables with simultaneous characteristics described above. Different estimators such as Generalized Method of Moment (GMM), Limited Information Maximum Likelihood (LIML) and Two Stage Least Square (2SLS) exist in estimating IV (Verbeek, 2012). To control for the endogeneity problem, this study adopted a 2SLS because has advantage over other estimators described above in that it is computationally simple such that does not require the use of optimisation algorithms (i.e. can estimate parameters even if cannot be solved analytically from the first order conditions). It can also perform better under small sample (Verbeek, 2012), and it is efficient in the class of all IV estimators (Wooldrige, 2010).

Mathematically, the 2SLS modelling proceeds in the following two steps: First, the true/structural equation is specified as:

$$Y_i = \alpha_{10} + \beta_{11} X_1 + \beta_{12} X_2 + e_i \qquad (1)$$

Where, Y_i = endogenous outcome variable (log of total annual investment cost (Tzs) made in irrigation farming during the season $X_1 = X1_i$ = Independent variables which is endogenous- farm household objective (FO)- (dummy- 1= commercial or 0= subsistence oriented farmer) X_2 = Independent variables which are exogenous (personal characteristics: age, sex, ownership of land in the irrigation scheme, trust, experience, group leadership

style/discretion, and non tangible benefits- measured as defined above. $\beta_1, \beta_{2,}$ = Parameters to be estimated, and e_i = error term which is assumed to be correlated with the endogenous variable

Second, some variable(s) Z (instruments), which influence $X1_i$, but does not influence Y_i are found. Correspondingly, the equation follows by including all exogenous variables from equation (1) above.

It is written as:

$$X_{1i} = \alpha_{20} + \beta_{31} Z_i + \beta_{32} X_2 + e_i \quad (2)$$

Equation (2) allows generation of new values/ predicted value for the variable $\vec{X1}_i$, such that

The predicted value $\vec{X1}_i$ can now be substituted for $X1_i$ in equation (1) above for estimation.

Equation (1) is re- written as:

$$Y_i = \alpha_{10} + \beta_{11} \vec{X1}_i + \beta_{12} X_2 + \left(e_i + \beta_{11} \vec{u}_i \right) \quad (3)$$

Equation (3) was estimated using OLS method using STATA version 11 computer statistical program.

4.0 Results and Discussion

4.1 Farm households' characteristics for irrigators in the study area

Many farmers surveyed had primary level of education (73.2%), and 86% were married living with their spouse (Table 1). On average the farm household families comprised of 8 persons (members) residing and eating on the same pot, and having a mean of 3.9 persons for labour force supply available for farming activities, indicating that large number of members were dependants; perhaps these were children or old persons who cannot work. However, most of these respondents had an average of 2.14 acres land holding within the irrigation scheme utilizing the total land or portion of it for irrigation farming depending on the cropping seasons' rainfall conditions, availability of labour and the CA management arrangement. About 88.9% of interviewed household used animal traction in irrigation farming for land preparation/tillage, pointing an advancement of technologies use, nevertheless, a few respondents owned at least an average of 2 ox ploughs for households owning livestock.

More farmers owned livestock in the study area with an average number of 10.8 for cattle, 7.5 for sheep and goat (shoats), and 16.5 for chicken. An interesting characteristic of these surveyed households is that most farmers interviewed had stayed longer in the village without migration or mobility. This has an implication on collective action management, and social interactions as a social capital, particularly with regard to membership club formation because they know each other (Woolcock and Narayan, 2000), and is a pre-condition to CA coordination take off. Social capital is associated with networks and norms aspects that

promote trust, which facilitates coordination and cooperation for mutual benefits of interactive members. Thus, migration of individuals might have negative impact on social capital by interfering trust among members, but also possible to move away the social capital with them to new places (Lesage and Ha, 22012).

Table 1: Farm household characteristics

Variable	Mean	Percent
Family size (persons)	8 (184)	-
Household labour force (persons)	3.9 (184)	-
Land holding in the irrigation scheme (acres)	2.14 (161)	-
Cattle ownership (numbers)	10.8 (135)	-
Sheep and goat (number)	7.5 (118)	-
chicken	16.5 (135)	-
Marital status (% living with spouse)	-	86.4 (159)
Formal education level (% primary level)	-	73.2 (134)
Irrigation farming tools used (% ox plough)	-	88.9 (136)
Irrigation farming tool owned (number of oxplough)	2 (65)	-
Number of years consecutively living in the village without migration/mobility	32.3 (169)	-

Note: number of respondents in parentheses

4.2 Enterprising tendency in irrigation systems under collective action management

Entrepreneurship is predominantly associated with individual's activities, and is usually determined by diversities in objectives. Diversities in objective of farmers influence preferences and adaptation of different strategies for livelihood sustenance by undertaking different entrepreneurial activities. At the same time, entrepreneurship also possess the role of coordination of the firm/resource utilization by upholding institutions (law, morality, norm) embedded in, like in the irrigation systems CA. Using 2SLS strategy to correct the endogeneity in the model of farm household objectives and investment (annual expenditures) interdependence, this section presents empirical results to explain the effect of varying farm household objectives (commercial or subsistence) on investment enterprising tendencies in the irrigation systems under CA management. The summary statistics and definition of variables used in the 2SLS regression are presented in table 2.

Table 2: Definition and summary statistics for all variables used in the 2SLS regression

Variable	Definition	Unit measure	mean	Std
loginv	Annual own expenditures	Tanzania shilling (currency)- logged	12.6	1.3
famobject	Farm household objectives	Dummy-(1= commercial, 0 =subsistence)	0.82	0.38
ownlandirrg	Land ownership in irrigation command area	Dummy (1=yes, 0= no)	0.88	0.32
gpleader	Leadership governance style in the group	Dummy- (1= good, 0= bad)	0.65	0.47
nontangible	Non tangible benefits	Dummye 1= information and external service access,0= none	0.8	0.4
trust	Trust in group members and leadership	Dummy(1=trust, 0= none)	0.95	0.19
expirrig	Experience in irrigation farming	years	8.8	5.3
contactcost	Contact monetary costs	Tanzania shillings (currency)	9078.7	38482.6
sex	Sex of respondent(farmer)	Dummy (1=male, 0 = female)	0.80	0.39
irrgreliability	Irrigation physical characteristics (water) reliability	Dummy (1= reliable, 0= not reliable)	0.72	0.44
sacosaccess	Sacos (financial service) accessibility	Dummy (1= accessible, 0= not easily accessible)	0.22	0.41
rateirrh2o	Rate of irrigation water distribution	Category(=fairly good, 2=satisfactory, 3= poor)	1.69	0.65
offarm	Off farm activities engagement	Category (1= salaried,2=casual labour,3= small business 4= non)	3.09	1.78
farmsucsuport	Farm service support obtained	Dummy(1=yes, 0= none)	0.25	0.43
quntityirrmarkt	Output quantity marketed	bags	100.5	358.15
distancemarket	Proximity/distance to the market	km	5.59	7.42
hhlabor	Household member eligible for working on farm/labour force	number	3.9	2.2
soilirrgat	Soil irrigation fertility level in the irrigation scheme	Dummy (1= fertile, 0= not fertile)	0.37	0.48
irigtnypedumy	Irrigation type	Dummy (1= modern, 0= traditional improved	0.16	0.37

The data contains missing values that were list wise deleted in a complete set analysis and only 38 sample size remained for the final analysis. Before presenting the regression results, tests of validity of instruments and endogeneinety were performed to provide evidence of the choice of the model. The Durbin-Wu Hausman specification test results for endogeneity rejected the null hypothesis that farm household objective variable **(famobject)** is exogenous and concludes that the variable **famobject** and investment (**loginv**) are all interdependent (endogenous), hence the use of 2SLS is appropriate in order to correct the endogeneity problem and establish the causality. The test results are presented in table 3. Empirical results from 2SLS regression indicate that overall, the instruments are jointly significant as indicated by the chi square value ($p> 0.000$ and R^2 (Table 4).

The variable farm household objectives (**famobject**)-a dummy variable measured as 1= commercial oriented, 0= subsistence oriented farmer was positive and significant at less than 5% level. The results suggest that farm household objectives, notably commercial oriented production promotes positively investment enterprising tendency in irrigation scheme under CA. That is, a one percent increase in commercial orientation for a farm household increases investment on own annual irrigation expenditures (enterprising tendency) by 210% than their

counterpart subsistence oriented farm households in a similar irrigation scheme. Thus, the empirical results show the importance of accounting for farm households' objectives in promoting enterprising tendency in a CA setting and other collective entrepreneurship, such as any agricultural cooperative organizations. The implication is that commercial/market oriented farm households have an incentive to ensure coordination which is reflected in the positive investment made, as in the willingness to pay for services. These results are supported by other studies which indicated that the diversities in farmers' objectives and livelihood strategies explained the observed differences in allocative and technical efficiency levels of farmers (Berkhout, 2009). Further, these results point to the need, particularly in strengthening capacity of farmers on the aspects related to agri- business chains participation to enhance their capital investment for commercial oriented production objectives. This is important particularly in enhancing incentives for CA working in the irrigation scheme. At the same time, however, farm household objectives tend to be influenced by other exogenous variables designated as "excluded instruments" such as output quantity marketed, output market distance, access to financial services /saccos (sacosaccess), off farm support services (off farm support), soil fertility status in the irrigation scheme land (soilirrgat), irrigation type -whether tradition improved or modern (irigtypedumy) and household labour force availability.

The significance of endogeneity test (Table2) confirmed that the assumed exclude instruments are valid and correctly excluded from the equation, implying that the variables are relevant, positively and significantly influence enterprising tendency. The included exogenous variables in the structural equation like trust in group members and leadership (**trust)** was significant at 10% level, and positively influencing the investment (enterprising tendency). The variable trust result is also supported by other scholars e.g. Fafchamps (2002), pointing that trusting others enables economic agent to operate more efficiently, besides, it is essential for both economic exchange and public good delivery. Fafchamps, (2012) also argues that trust can reduce transaction costs, encourage respect of contract, and facilitate cooperation. Thus, in this respect a unit point of 1% increase in trust of farmers exerted to members and leaders in a group of CA in the irrigation scheme supports/encourage investment enterprising tendency by increased own expenditures of farm household in the irrigation farming by 254%, and so increased coordination efficiency. Sex variable (**sex)** measured as 1= for male and 0= female, was positive and significant at less than 5% level indicating that male farmers support increased investment expenditure allocation in the irrigation farming under CA. In other words, being male farmer increases investment/ enterprising tendency by 148% own annual expenditures in irrigation farming for commercial oriented production than are female farmers, perhaps because of the cultural setting usually adapted in the most Tanzanian households that male are the main decision maker in most of households.

The variable experience in irrigation farming (**expirrig**) was significant at 10% level and negatively correlated to influencing investment enterprising tendency. A one point increase in experience reduces the investment enterprising tendency by 10.6%, implying that experience in irrigation farming does not matter in making investment venture decisions, perhaps because entrepreneurship venture is associated with judgmental decision under uncertainty over deployment of assets (Jos and Bart, 2008; Klein, 2009), hence these farmers had bad experience with the historical information regarding the firm / resource operating environment. The variable transaction cost related to contact and information search cost in monetary value (**contact cost)** was negative and significant at 1% level, suggesting that an

increase of one percent information search/contact cost reduces investment enterprising tendency. Though, the extent of reduction was not in a significant impact, had an implication on coordination incentives, particularly in the management organizations. These results are supported by other studies e.g. Casson,(1998) pointing that the instrumental importance of contact and information is on coordination, hence an increase in contact cost is likely to reduce coordination incentives as implied in the extent of enterprising tendency. Other variables, like ownership of land in the irrigation scheme command area (**ownlandirrg**) was negative and not significant, implying that farm household not owning and in the irrigation scheme command area had a disincentive in injecting capital investment and so do CA coordination. Group leadership style variable (**gpleader**) was negative and not significant. Though not significant, it had an implication that reduced/ disincentive of enterprising tendency favored farm households/farmers who considered the CA had bad group leadership style. The non tangible benefits (**non tangible**) such as aspects related to information sharing and use of CA as a bridge to access external support was not significant and negatively correlated to investment enterprising tendency. Although did not matter, the results imply that increasing existence of such attributes in the CA organization was a disincentive for enterprising tendency (i.e. reduced enterprising tendency), perhaps farmers have no information and knowledge regarding external support through CA organization, or had bad experience with support provided through collective action due to unequal benefit sharing. These results point to the need of strengthening and improvement of the negatively correlated variables to enhance incentives for enterprising tendency (Table 3).

Table 3: Summary of 2SLS regression estimated results

Dependent variable: log(inv)			
Variable	**coefficient**	**SE**	**Z value**
Famobject	2.10975	1.09	1.93**
Sex	1.48664	0.63	2.35**
Ownlandirrg	-0.06924	0.91	-0.08
Gpleader	-0.19679	0.68	-0.29
Nontangible	-0.25378	0.34	-0.74
Trust	2.54401	1.44	1.76***
Expirrig	-0.10662	0.06	-1.91**
Contactcost	-0.00002	4.99	-4.65*
Constant	8.58139	2.11	4.05*
Endogeneity test:	**Durbin Wu Hausman specification test:** Durbin (score) chi^2 (1)= 11.5231 (P value =0.0007) Wu-Hausman F(1, 28) =12.186 (P value = 0.0016)		
Instrumented:	Farm household objectives		
Excluded instruments:	Irrgreliability, sacosaccess, rateh20, offarm, farmsacsuport, quantityirrmarkt, distancemarket, hhlaor,soilirrgat,irigtnypedumy,		
N=38 Wald chi^2 (8)=45.09 , Prob> chi^2=0.0000, R^2=0.4551			

Notes: Significance levels: * = p<1%, ** = p<5%, and ***= p<10%

5.0 Conclusions and Recommendations

This paper investigated the linkages between household farm objectives and enterprising tendencies for irrigation farmers to understand their incentives for CA coordination efficiency. The null hypothesis that household own investment (specific private own expenditures) decision in irrigation farming does not depend on farming objectives because irrigation is important for resource users in enhancing food and income regardless of the enterprising orientation the farmer took is rejected, which confirm the importance of taking into account the farm household objectives in promoting CA coordination. The study concluded that farm household objectives, particularly commercial/market oriented production objective is an incentive for CA coordination efficiency in the irrigation systems, as is reflected in the level of enterprising tendencies (like the willingness to pay for the service) measured by investment value committed. Other exogenous variables designated as "excluded instruments" which positively and significantly supported the farm household commercial/market oriented objective, such as output quantity marketed, market distance, access to financial services /saccos, off farm support services (off farm support), soil fertility status in the irrigation scheme land, irrigation type, and household labour force availability had the greatest support in policy prescription for CA coordination. These variables have to be taken into account. Other incentives were factors such as trust in group members and leadership, which was positive and significant in influencing enterprising tendency. Other factors such as absence of good group leadership style, lack of non tangible benefits like use of CA as a bridge for support services access and information sharing, lack of land ownership in the irrigation scheme command area, and increasing contact/communication cost such as travel or phone costs for the CA participation were disincentives for enterprising tendency, and so do coordination efficiency among farmers.

The study recommends strengthening of advisory services in the irrigation schemes, particularly capacity building with regard to business development services (BDS) for commercial oriented farmers to enhance their investment and hence incentives for coordination efficiency of the CA. This can be through value chain development and formation of stronger sustainable partnership model that can effectively work out in bringing together different key actors and support service providers to enhance both tangible and non tangible support services, which their lack were observed to be disincentives for coordination efficiency among farmers. The study further, recommends a comprehensive CA management training tailored particularly, into building trust among member farmers, which positively influenced enterprising tendency, and group leadership- which was a disincentive for investment in the irrigation.

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