

**THE DYNAMICS OF COMMUNITY PARTICIPATION IN IRRIGATION
MANAGEMENT FOR IMPROVED RICE PRODUCTION IN KISUMU COUNTY,
KENYA**

BY

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ABSTRACT

Community participation in rice irrigation management has the potential to boost rice production as acknowledged in both developed and developing countries. In Ahero and West Kano irrigation schemes in Kisumu County, Kenya, the transfer of irrigation management to the local farmers was implemented as from 2004. Empirical studies show low and ineffective participation of local farmers in rice management which has contributed to minimal improvement in rice production in the two schemes. However, these studies have not addressed the rationale for the minimal participation of the farmers in rice management. Consequently, this study sought to examine the dynamics of community participation in rice irrigation management for improved rice production in the two schemes. The specific objectives of this study were to: investigate the influence of socio-economic characteristics of the farmers on their extent of participation in rice irrigation management, examine the nature of participatory relationships among the farmers and with National Irrigation Board in irrigation management, and assess the constraints the farmers encounter while participating in rice management. The study was guided by Participation Theory posited by Sherry Arnstein (1969) which stresses that for a community to effectively participate in any management, they must have the power to make decisions. It also theorizes that seizing this control is the true aim of community engagement. The study used a cross-sectional descriptive research design. The study area covered Ahero and West Kano irrigation Schemes with a population of 1,188 registered farmers. A sample size of 352 farmers was obtained using a table for determining sample size for finite population developed by Krejcie and Morgan (1970). Respondents were selected using systematic random sampling while key informants and focus group members were selected through purposive sampling. Primary data was collected using semi-structured questionnaires administered to 352 farmers, 10 key-informant interviews, 4 focus group discussions consisting of 10 discussants and non-participant observations. Quantitative data was coded and analyzed using descriptive statistics namely frequencies, percentages and means and presented in tables while for categorical variables, either cramer's value or regression analysis were used. Qualitative data was analyzed thematically and presented in form of narratives and verbatim reports. Majority of the socio-economic characteristics of the farmers had negative influence on their extent of participation in rice management activities. There were conflicting participatory relationships among the farmers and between Water Users Association and National Irrigation Board in rice management which hindered farmers from actively participating in rice irrigation management. Some of the constraints observed such as lack of appropriate institutional framework, unpreparedness, unempowerment and disproportionate gender representation in management were found to limit active participation of the farmers in irrigation management. The study therefore recommends empowerment of farmers especially women and youth through training. Further, the position of National Irrigation Board and Water Users' Association with clearly defined roles and responsibilities in rice management should also be incorporated into policy discussions. There is also need for a proportionate representation of all gender and youth in the rice irrigation management activities to ensure effective participation of all farmers in management to improve rice production in Ahero and West Kano irrigation schemes.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study



For many decades, many rice irrigation schemes in both developed and developing countries were managed by various government agencies at different periods. The approach used was top-down or centralized modes of management. However, top-down management has suffered from a lack of ownership and apathy and is consequently unsustainable (Pritchett & Woolcock, 2002). A top-down approach/ centralized mode of management entails passive participation of local farmers in a sector meant to benefit them (FAO, 2010). According to the World Development Report [WDR], (2004), top-down management has failed the poor in gaining access to quantity and quality services. It is well documented that most government agencies have been inefficiently managed, inadequately controlled, are debt ridden and offer poor products and services to their clientele (WB, 2010). Many government agencies have been identified as major contributors to the poor performance of irrigation agriculture in particular (WB, 2010). Pritchett and Woolcock (2002), point out that such failure is systemic, because it has routinely occurred even in settings where intentions and resources linked to irrigation are reasonably good.

Consequently, a large and increasing number of countries around the world, over the years, have turned over the management responsibility of irrigation systems from government agencies to the local communities such as local farmers, a phenomenon generally referred to as Irrigation Management Transfer (IMT) or devolution (Vermillion, 1997). According to Vermillion (2003), IMT strategy is the relocation of responsibility and authority in rice management from state or government agencies to non-governmental bodies such as Water Users Associations (WUAs) which caters for local rice water users through Participatory Irrigation Management approach (PIM). PIM consists more of behavioural or attitudinal changes that seeks to strengthen the relationship between water users and government agency by actively increasing local farmers' involvement in management activities in the schemes while reducing or completely disengaging the government agency's bureaucratic involvement in irrigation management such as in rice schemes (FAO, 2007).

IMT emerged in response to the merits of self-sufficiency and the drive for a more active participation amongst the water users in irrigation system management. Peter (2004) stresses

that the concept of community participation is constructed on the premise of actively involving all the community members or the beneficiaries of development at all levels of development process including management. For example, in active participation, the local rice farmers or their representatives such as the WUAs, make major decisions together with the agency or even develop their own agenda in rice management. In passive participation, farmers or their representatives are merely told what is planned but they are not allowed to introduce new ideas in management (Analgo et al., 2014). However, Chitere and Mutiso (1991) points out that participation is an evolutionary process whereby beneficiaries have the power to influence the direction and execution of development projects as active participants and not just mere recipients of projects benefits. As a reform agent, the government agency is responsible for the organizational development of local rice farmers or their WUAs in management at the initial stage and eventually allowing the local farmers or their WUAs have more power and control in major rice management activities (FAO, 2007).

The philosophy behind IMT lies in the perception that increased ownership, decision-making authority and active participation in the management of irrigation systems by all local rice farmers create and force a binding commitment from such farmers to be more effective and responsible towards their obligations (FAO, 2007). Reports by Shah et al., (2002) and Vermillion (2003) show that IMT offers farmers the opportunity to gain control over water supplies which is a powerful incentive to participation in irrigation management hence improvement in rice production. Empirical studies by Salina and Humberto (1994), Angood et al., (2003) and Hussain and Hanjira (2004) indicate that there is a strong linkage between farmers' participation in irrigation management and improved rice production. In the case of a study undertaken by Salinas and Humberto (1994), the strategy effectively improved rice production and food security in the Azua rice irrigation scheme such that the Dominican Republic declared that all other rice and non rice irrigation schemes should implement IMT strategy and allow farmers or their representative, equivalent to WUA manage these schemes. Thus active community participation in rice irrigation management has the potential of improving rice production.

In developed countries such as the USA, France and New Zealand, where rice irrigation agriculture was being practiced, the transfer of irrigation management to the local rice community started from the 1950s through the 1970s. The transfer involved complete disengagement from government agencies unlike in many rice schemes in developing

countries. The rice schemes in developed countries have stronger legal systems and local institutions that are more capable of handling rice management activities (Shah et al., 2002). The schemes are completely devoid of government interference. And empirical data show positive results in economic performance in most of these rice schemes in developed countries (Vermillion, 2003). The reasons given for the success of rice management in the developed world include the existence of effective and dedicated permanent farmers who have both technical and managerial skills in irrigation agriculture. Irrigation is therefore central to a dynamic high- performing agriculture. Moreover, the average farm size is large enough, ranging from 10-50 hectares or more, for a typical or significant proportion of farmers in the command area to operate like agri-businessmen (Shah et al., 2002). Rice management in these schemes tends to be smooth, relatively effortless and successful because only a few farmers are involved in the process of irrigation (Shah et al., 2002). However, these conditions in developed countries are different from many irrigation schemes in developing countries especially in Africa where the socio-economic and cultural contexts of the local communities are different from those of developed countries.

In the developing world, the transfer of rice irrigation management to local farmers became a national strategy in the 1980s through to the 2000s (Vermillion, 2003 and 1997). Empirical studies on the impact of the transfer of management to the local communities show more improved rice production in many rice schemes in Asian countries compared to rice schemes in Africa. For example, studies by Brabben et al., (2004) in Bangladesh; Das (2005) in Orissa, India; Shah et al (2002) report in Philippines, Indonesia and Thailand and de Brauw et al (2008) study in China found that rice production had improved tremendously by between 150% and over 300% after the transfer of rice irrigation management to local rice farmers or their water users associations. These studies in Asian countries indicate a strong linkage between local farmers' participation in rice irrigation management and improved rice production.

In most of Asia countries, rice is not only the staple food, but it also constitutes the major economic activity and source of employment and income for rural populations. Rice farmers in most Asian countries have had long years of experience in growing rice (Shah et al., 2002). In many Asian countries like India and China, both male and female farmers have equal chances of actively participating in rice irrigation management (de Brauw et al., 2008). There is a proportionate distribution of gender in rice management and this has influenced rice

production. Rice is grown both for local and export consumption (Shah et al., 2002). In fact, many African countries import rice from Asian countries.

In Africa, several rice schemes have implemented IMT from 1990 to present times. However, Swallow et al., (2005) report that the introduction of IMT/ PIM in many African countries further led to the near collapse of many rice irrigation schemes. The empirical studies in irrigation schemes in Malawi (Nkhoma & Mulwafu, 2004), Ghana (Adeoti, 2009) Ethiopia (Gebregziaber et al., 2009), South Chad (Kolawole, 1995) and Zimbabwe (FAO, 2000), KwaZulu, South Africa (Sonyolo et al., 2011) showed very minimal improvement in rice production after irrigation management transfer. For example, empirical study by Gebregziaber et al., (2009) in Tigray in Ethiopia show that before introduction of IMT, the average rice production per hectare was 3 tonnes and that even after the transfer of management to the local farmers, the average rice production per hectare has remained at 3 tonnes per hectare. The empirical studies have concentrated on the impact of the transfer in management in terms of economic performance and rate at which the local rice communities are participating which has been found to be low and inactive. However, these studies have not addressed the various forces (dynamics) behind community participation in rice irrigation management including the constraints that the rice farmers experience as they participate in rice irrigation management for improved rice production in many schemes in Africa which are found in varied socio-cultural background such as Ahero irrigation scheme (AIS) and West Kano irrigation scheme (WKIS) in Kisumu County, Kenya.

There are studies in Africa showing that there was low and ineffective participation of the rice farmers in management after IMT was implemented. Examples include: studies by Nkhoma and Mulwafu (2002) in Malawi; Sonyolo et al., (2011) in the KwaZulu-Natal rice scheme in South Africa; Kabutha and Mutero (2002) and Thairu, (2010) in Kenya. All these studies found that there was low and ineffective participation of rice farmers in management. However, these studies have not highlighted the reasons for this low and ineffective participation of the local farmers in rice management and their implication in rice production.

Erhabor (1982) and Tarfa (1990) in their studies in two rice schemes in Nigeria, stress the importance of knowing the socio-economic characteristics of the local participants in rice irrigation management and rice production. However, studies that have attempted to examine the relationship between socio-economic characteristics of farmers and their extent of

participation in rice management in various parts of developing countries including Africa have shown varying and sometimes contradicting views on their impact on the farmers' level of participation in irrigation management and rice production. While some socio-economic characteristics have had a positive influence in some areas, the same characteristics have not had any significant implications in other areas.

For example, a Chandran and Chadracherry (2004) study in the Kerala rice scheme in India, observed no significant implications that age had on rice irrigation management. All farmers participated in rice management regardless of their age. However, Zarafshani et al. (2008) and Omid et al. (2012) studies in two different rice irrigation schemes carried within Iran, observed that age had varied significant impact on farmers' level of participation in rice irrigation management. While the youth (35 years and below) actively participated in the Doroodzan rice scheme in Iran, the same age group only passively participated in rice management in the Dez rice scheme in the same country. Studies conducted in South Africa (Sonyolo et al., 2011; Sishuta 2005; Kamara et al., 2002) have all shown low involvement of the youth in rice irrigation management. However, the studies did not address how age as a socio-economic characteristic influences participation in the management of rice production. This need has further been advocated by Erhabor (1982) and Tarfa (1990) who conducted their studies in Nigeria and recommended the major socio-economic characteristics that should be considered while participating in irrigation agriculture. These included: gender, age, level of education, duration of involvement with irrigation farming, farm size, and farm income or benefits. The studies in Iran, South Africa and Nigeria did not show any evidence that being a youth had any effect on their extent of participation in rice management hence rice production. Besides, these empirical studies mainly concentrated on the part played by the youth but were silent on other age brackets. This is despite the fact that for participation to be successful, all beneficiaries of the project must be actively involved in the entire project processes including management regardless of age (Chitere & Mutiso, 1991).

Gender has also been identified as a key socio-economic characteristic that influences the level of participation in irrigation management for improved rice production. For example, Rajbhandari (2008) found that women's participation in rice management in Nepal was very minimal especially in connection to WUA management. This situation was also similar to a study conducted by Gebregziabher et al., (2009) in Ethiopia. Studies by Gueye (2014) in Bukina Faso and Kiseto (2014) in the Kwamadebe rice irrigation scheme in Kondoa District,

Tanzania have shown that the low participation of women in irrigation management has retarded the progress of irrigation schemes including rice production. However, these studies, carried out in varied socio-cultural contexts, did not reveal the reasons for low-representation of one gender, women, in rice irrigation management and its implication on rice production in schemes such as AIS and WKIS.

The other socio-economic characteristics such as the educational attainment of rice farmers, farm size, year of farming experience and income from rice farming were also found to be associated with varied knowledge gaps in relation to the participation in rice management and rice production found in several empirical studies. Empirical studies by Azizi and Zamani (2009) in Doroodzan rice scheme in Iran; Karamjavan (2014) in Zonoic rice scheme in Iran and Analgo et al (2014) in Ghana show that highly educated people participated more in rice management than their less educated counterparts. However, these studies were done in large scale rice irrigation schemes where technical knowledge and skill was required. Low educational attainment was also blamed for limiting access to information and understanding commercial rice farming (Shah et al., 2002). However, these studies done in Iran or Ghana could not address the influence of education in small scale rice irrigation schemes such as the case of rice irrigation schemes such as AIS and WKIS.

Available studies on farm size observed that farmers with large farm size participated in farm management activities more than their counterparts with small farm sizes (Arum et al., 2012; Adeoti, 2009). The studies found that local farmers who work tiny plots are forced to pursue what Chambers (1983) referred to as a "fox strategy" of depending on a variety of sources to earn a livelihood but the information on the implication of such behaviour to management and rice production is not known. Available information reveals that farm sizes in AIS and WKIS are small as they range from 1 to 4 acres (KNBS, 2010; Swallow et al., 2005). However, the studies have not addressed the relationship between farm size and the extent of participation in management and rice production in schemes such as AIS and WKIS.

Studies on rice schemes in Mozambique (Lahiffs, 2003), Zimbabwe (Manzungu et al., 1999) and South Africa (Bembridge, 2000) found that extended stays in rice farming provides farmers' with ample incentive to make long-term development investments on their land. However, Bembridge (2000) used longitudinal research design. These studies were done in areas with varied socio-cultures from those of AIS and WKIS. Nyangito and Odhiambo

(2004) reviewed studies on agricultural productivity in Kenya and found that staying in farming area for an extended period of time enhances group synergy, cohesion and encourages co-operation among farmers. There was therefore need to find out the relationship between rice farming experience and farmers' participation in management in rice management and the effect of such a relationship on rice production in schemes such as AIS and WKIS.

Income earned from rice farming was also found to be associated with varied knowledge gaps in relation to participation in rice management and rice production. Empirical study by Analgo et al., (2014) and Adeoti (2009) in Ghana show that farmers who gain income from irrigation schemes participate more actively in irrigation management activities than their counterparts who gain very little income from rice. This finding concurs with Gebregziabher et al. (2009) study in Ethiopia and Maleza and Nishimura (2007) study in Bohol, Phillipines. However the schemes in Bohol and Ghana were large scale unlike the case of the rice scheme in Ethiopia, AIS and WKIS. Farmers with large farm sizes have apparently invested more resources on irrigated rice cultivation and are thus keen on maximizing their substantial investments (Shah et al., 2002). In AIS and WKIS, the farmers are allocated between 1-4 acres of land for rice growing (KNBS, 2010; Swallow et al., 2005). There was need to find out if the income earned from such farm sizes in AIS and WKIS made them to actively or passively participate in rice management and hence rice production.

White (2003) believes that there is a great likelihood that the participation process can be stage managed and abused by more powerful external forces in pursuit of both their covert and overt interests. Sinclair (2011) reports that some policy framework for community participation in rice irrigation management focuses more on "ceremonial" than actual participation. Similarly, Nyong'o (2007) indicates that a vast majority of community participation strategies exist merely on paper rather than in practice. Thus IMT's significance should not be measured only through IMT outcome and impacts but even through participatory relationships among the participants in rice management. According to Suhardiman (2013), participatory relationships refers to the way in which the beneficiaries of projects or their government agency behave towards each other as they participate in irrigation management such as rice management.

Studies by Wester (2004) in the Lerma-Chapale rice irrigation scheme in Mexico and by Suhardiman (2013) in Indonesia observe that when the IMT was being advocated for by the international donors, who perceived the irrigation agency both as a government agent incapable of managing the irrigation system and as a reform agent, responsible for the formulation and implementation of IMT. As an incapable government agent, the agency's role in management has to be reduced and paralleled by the empowerment of WUAs (Suhardiman, 2008; 2013) Yet as reform agent, the agency is responsible for the organizational development of the WUAs (Suhardiman, 2008).

Paradoxically, IMT is to be implemented not only by the very government agency whose power and authority will be reduced by the policy, but also by the very agency which was perceived as incapable of managing irrigation systems in the first place. According to Suhardiman's (2013) study in Indonesia, the government agency, perceived the proposed management transfer to be a potential threat to its bureaucratic power, interest, resources and existence. From the agency's perspective, farmers' increased role and involvement in system management could potentially reduce the agency's decision-making authority and power. Apthorpe (1986, p 380) reports that their government agency's reservation or resistance towards IMT is often camouflaged in the language of "lack of capabilities of the communities or lack of political will". This study therefore attempted to contribute to the debate by bringing to light the nature of the participatory relationships between farmers and the government agency, NIB in rice irrigation management and the implication of their participatory relationship on rice production in AIS and WKIS which are culturally different from Indonesia or Mexico.

There are empirical studies that demonstrate how rice irrigation management as a joint responsibility among household members at household level has a positive impact on rice production. de Brauw et al., (2008) study in a rice scheme in China found that there was a joint participation of all family members in rice growing process including management and this had influence in rice production. This finding concurs with Tewari (2001) study in a rice scheme in Durban, South Africa and Bergall (2000) report on active participation in Central Africa. However, Hamada and Samad (2011) report in Kenya indicate that there was low representation of one gender (women) in management. However, the studies have not addressed the behavioural attitude that existed between male and female farmers as they participated in rice irrigation management at household level. This study therefore attempted

to bring to light the nature of the participatory relationships that existed among the farmers themselves as they participated in rice irrigation management and the implication of their participatory relationship on rice production in schemes such as AIS and WKIS.

Kabutha and Mutero (2002) in their study in Mwea rice scheme, Kirinyaga County, Kenya, reported that the local farmers demanded to be included in the management in 1998 due to hardships they were experiencing through government agency, National Irrigation Board (NIB) management. For example, the local rice farmers were settled within the scheme and at age 18, their children were forced out of the schemes to settle elsewhere. Further to that, the local rice farmers were not making any profit in rice production yet they were providing labour in all their rice schemes (Kabutha & Mutero, 2002). But according to Muchai (2000a), the success in improved rice production was short-lived. Muchai (2000b) further found that the demands of running the scheme after the transfer of management are far greater than the monetary cost. And Kabutha and Mutero (2002) also found that "all signs indicate that NIB has no plan to leave major rice management activities of the scheme for farmers in Mwea irrigation scheme" (p. 207).

The situation in AIS and WKIS, however, is different from that of Mwea irrigation scheme. PIM was implemented from 2004 but not through a revolt. Thairu's (2010) and Njagi's (2009) studies in AIS and WKIS have mainly explored the consequences of changes in rice management using descriptive analysis which according to () do not determine cause and effect in research. For example, in their studies on impact of IMT in AIS and WKIS among other schemes, Thairu (2010) and Njagi, (2009) mainly used descriptive analysis based on data obtained from the Kenya National Bureau of Statistics (KNBS), National Irrigation Boards (NIB), various Economic surveys and the statistical Abstract produced by the government of Kenya to analyze impact of IMT. Their methodology excluded analysis at household level which could have shown some causes of low rice production with the introduction to IMT/PIM. Quantitative data at household level would have provided information on why households engage or do not engaged in rice farming including rice management. Thairu (2010) and Njagi (2009) studies relied heavily on secondary data from KNBS and NIB which might not be entirely accurate. The study did not address the influence of socio-economic characteristics of the farmers on extent of their participation in rice production including management in AIS and WKIS. This study further attempted to bring to light the nature of the participatory relationships among the rice farmers themselves at

household level and with NIB at scheme level in rice irrigation management and the implication of their participatory relationship on rice production in schemes such as AIS and WKIS.

The studies by Thairu (2010) and Njagi (2009) found that there was minimal participation of the local rice farmers leading to minimal rice production as shown in Table 1.1.

Table 1.1: Distribution of rice production in Ahero and West Kano Irrigation Schemes in Tonnes from 2003-2016

Year	Ahero Irrigation Scheme	West Kano Irrigation Scheme
	Production	Production
2003	75	0
2004	74	48
2005	48	60
2006	85	60
2007	75	80
2008	75	64
2009	73	60
2010	65	54
2011	60	55
2012	63	40
2013	55	35
2014	48	30
2015	48	40
2016	44	42

Source: *NIB data in AIS (2016)*

Table 1.1 suggest that even after 10 years or more of irrigation management transfer, rice production from the two schemes have continued to decline. In AIS and WKIS, the farmers were found to have been allocated between 1-4 acres of land to grow rice (KNBS, 2010; Swallow et al., 2005) but on average the two schemes were producing between 2-3 tonnes per hectare (NIB, 2013; Thairu, 2010) when essentially they should be producing 4-6 tonnes or more per hectare (Chackacherry, 2012; FAO, 2010). However, the studies did not expose the constraints the farmers experienced as they participated in rice irrigation management which led to low rice production in AIS and WKIS. This study therefore sought to investigate the existing gaps in the community participation in rice irrigation management that led to low success rate in improving rice production in AIS and WKIS.

There may be some other factors contributing to low rice production but this study mainly concentrated on the dynamics behind local farmers' participation in rice irrigation management and its implication on rice production in AIS and WKIS in Kisumu County, Kenya.

1.2 Statement of the Problem

Many irrigation projects fail in their management and experience low rice production because when the management structures are designed the community's socio-economic characteristics are often not considered. In addressing the socio-economic characteristics that influence the level of participation in rice management for improved rice production in AIS and WKIS, previous studies have not shown how socio-economic characteristics of the farmers such as age, gender, level of education, farm size, year of experience and income earned from rice production influence their level of participation in rice irrigation management and rice production. The success of IMT as a strategy depends on the relations between the local rice farmers in AIS and WKIS and NIB as the government agency. The relations can influence rice production. Nevertheless, the nature of the participatory relationships of rice farmers and NIB as they participated in rice management and its influence on rice production in AIS and WKIS has hardly been examined. There has been a marked decrease of rice production ever since the introduction of irrigation management transfer in AIS and WKIS in 2004. However, despite this decline, little has been done to assess the constraints that farmers experience as they participate in rice irrigation management which is key to the improvement of rice production in AIS and WKIS.

1.3 Research Questions

This study set out to answer the following research questions:

- i. What is the influence of the farmers' socio-economic characteristics on the extent of their participation in irrigation management for improved rice production in Ahero and West Kano irrigation schemes?
- ii. What is the nature of participatory relationships among the rice participants in irrigation management for improved rice production in Ahero and West Kano rice irrigation schemes?

- iii. What constraints do the farmers encounter as they participate in irrigation management for improved rice production in Ahero and West Kano rice irrigation schemes?

1.4 Objectives of the Study

The general purpose of the study was to examine the dynamics of community participation in irrigation management for improved rice production in Ahero and West Kano irrigation schemes in Kisumu County, Kenya.

The specific objectives were to:

- i. Investigate the influence of socio-economic characteristics of the farmers on the extent of their participation in irrigation management and rice production in Ahero and West Kano irrigation schemes.
- ii. Examine the nature of participatory relationships among the farmers and NIB in irrigation management for improved rice production in Ahero and West Kano irrigation schemes.
- iii. Assess the constraints the local farmers encounter as they participate in irrigation management for improved rice production in the Ahero and West Kano rice irrigation schemes.

1.5 Justification for the Study

Irrigation is a human activity which is rooted in social interdependence and involves interaction of individuals organized in groups. Therefore, sociology, which studies human groups and group relations and behaviour, has a very important role to play in addressing irrigation related issues. Therefore, there was need to examine the sociological reasons for the low and ineffective participation of the farmers in rice irrigation management for improved rice production in AIS and WKIS.

Low rice production has had a negative impact on food security not only in AIS and WKIS but also in Kenya as a whole. For example, according to the National Cereals and Produce Board [NCPB], the national rice demands in Kenya stands at 300, 000 tonnes per year while the national rice production trails the demand at 110,000 tonnes per year. AIS and WKIS

produce approximately 75, 000 tonnes of this demand per year (NIB, 2016). The potential production tonnage is 115,000 tonnes per year if AIS and WKIS are fully operational (NIB, 2016). The country spends Kenya shillings 7 billion to import rice to meet the national deficit. This deficit is likely to increase in the near future given the annual increase in consumption of rice at 12% compared to wheat and maize at a mere 4% (Swallow et al., 2005). To reduce the deficit, and to revitalize and equip irrigation facilities in AIS and WKIS among other schemes in Western Kenya, the Kenya government recently set aside over 8 billion Kenya shillings for irrigation (Mwakilishi, 2013). The rice deficit and the huge import bill is therefore of national concern in the context of persistent food insecurity in Kenya. Therefore, there is need for a study to come up with an effective community participation policy and strategies will require all participants (the youth, women, and the old) to effectively participate in rice irrigation management in order to increase and sustain rice production in Kenya.

There is need for policy makers both at national and county levels to adopt policies that will empower farmers to effectively participate in rice management including provision for institutional changes and legal framework to back farmers' participation in rice management activities in Kenya. Many Kenyans, particularly small-scale farmers may use the findings to boost their participation in rice irrigation management thereby improving their rice production and livelihoods.

The findings may also be used by other scholars further to conduct research on intervention strategies in rice production vis-a-vis community participation strategies. This study will complement existing knowledge by finding ways of enhancing rice production through effective community participation in rice management.

1.6 Scope of the Study

The study was carried out in two major small scale rice irrigation schemes partially managed by the National Irrigation Board (NIB) in Kisumu County, Kenya namely: Ahero and West Kano rice irrigation schemes. The study mainly addressed the dynamics of the local rice farmers participation in rice management particularly forces responsible for lack of effective participation of the farmers in rice management for improved rice production in AIS and WKIS, Kisumu County, Kenya.

There was no control comparison to enable exclusion of other intervening factors that may have had an influence on rice production in the area of study. Similarly, economic productivity can be affected by broad economic changes beyond management transfer. These may include changes in prices, subsidies, and markets. Unfortunately, these factors were beyond the scope of this study but the study recommends further study on an irrigation scheme where IMT has not been implemented for comparison.

1.7 Theoretical Framework

The study applied participation theory by Sherry Arnstein (1969). The theory is implicitly and explicitly at the core of many approaches to participation. Although all societies do not develop in an evolutionary manner, for many practitioners, this theory remains the benchmark standard for describing and evaluating participatory activities. New approaches to participation by Hart et al. (1997), Wilcox (1999) and Burns et al., (1994) among others have further improved on Arnstein's theory of participation.

Participation theory by Arnstein (1969) represents a move from the global, spatial, top-down strategies that dominated early development initiatives to more locally sensitive strategies (Storey, 1999). Acknowledgement of the importance of participation grew out of the recognition that the world's poor and the voiceless had actually suffered in most development projects meant to benefit them (Arnstein, 1969). The dominance of the top-down approaches in development was largely as a result of modernization theory which was dominant in the 1960s. During this period, participation meant involvement of the community in the implementation of a project with the aim of increasing the acceptance and efficiency of use (Lane, 1995). According to Arnstein (1969) such involvement of the community in implementation of a project represent a low level participation that is reactionary and ignores the site- specific complexities of management needs. This implies that Arnstein (1969) recognises that the dynamics at the site of the project is important for the success of participating in the project developments. For example, there might be inadequacies of the community's socio-economic infrastructure and other difficulties in organizing representatives. Thus the site dynamic complexities should be considered the for project development to succeed.

In her participation theory, Arnstein (1969) establishes establishes several tenets of effective participation which are relevant to this study. This include her eight-rung ladder of

participation and some other key ideas of effective participation namely initiation and process, the role of stakeholder/ practitioner, working partnership, commitment, ownership, confidence and capacity. Wilcox (1996) and Burns et al., (1994) who have contributed to community participation discourse have acknowledged that Arnstein (1969) had seminal theoretical work on the subject and produced a typology for understanding the different levels of participation as shown in Fig 1.

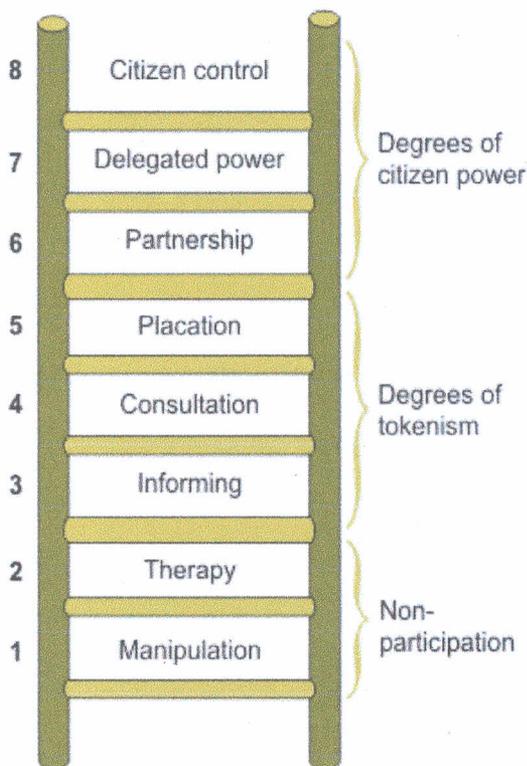


Figure 1.1: Arnstein's (1969) Ladder of Participation

In this typology, which is relevant and widely referred to in most participation discourse, Arnstein (1969) realises that there are different levels of participation that range from manipulation to citizen control. These levels of participation are further divided into three categories that are based on the extent to which community residents have the power to influence decisions that are made in development projects (Cornwall, 2008). In developing these categories, namely, non participation, tokenism and citizen power, Arnstein views participation from the perspective of community residents. According to Arnstein (1969), the sole measure of participation is power to make decisions. Seizing this control is the true aim of citizen engagement (Arnstein, 1969). The different rungs on Arnstein's ladder relate directly to the degree to which citizens can attain decision making power with complete citizen control being defined as the highest point. Arnstein's levels of participation involve

moving from the lower rungs labelled as manipulation and therapy through to information sharing, consultation and placation as shown in Figure 1.

According to Arnstein (1969), the lower rungs (manipulation and therapy) are associated with no participation by the citizens at all while at the informing level, there is a one way relationship in which the practitioner produces and delivers information for use by the citizen. It covers both passive access to information upon demand by citizen and active measures by the practitioner to disseminate this information to citizens. At the consultation level, there is a two way relationship in which citizens provide feedback to the practitioner. It is based on prior definition of the issue in which the citizen's views are being sought and requires the provision of information by the practitioner (Arnstein, 1969, Wilcox, 1996). The practitioner defines issues for consultation, sets the questions and manages the process, while citizens are invited to contribute their views and opinions. In placation, the citizens are encouraged to provide some additional ideas, advice and options but the practitioner has the right to make judgements (Wilcox, 1996).

Towards the upper rung, there is a relation based on partnership, delegated power and eventually citizen control with the practitioner. The citizens actively engage in defining the process and content of policy-making (Wilcox, 1996). The level acknowledges equal standing if not more for citizens in setting the agenda, proposing policy options and shaping the policy dialogue-although the responsibility for final decision and policy formulation rests with the stakeholder (the government or government agency).

Arnstein model provides a basis for understanding community residents' perception of the forms and purpose of participation that happens in providing quality irrigation management for improved rice production. There are two extremes in her ladder of participation which are very useful in measuring the level of farmer's involvement in rice irrigation management in rice schemes such as AIS and WKIS. The model provides useful information for analyzing participatory relationships and constraints experienced by the farmers as they participated in management. At the lower extremes is passive participation where there is very little transfer of decision making while at the upper level there is active participation which involves real decision making power by the citizens such as the rice farmers.

Arnstein (1969) further emphasizes that participation does not just happen but is initiated. It is introduced to the subjects. The practitioner should manage the process over time and allow

others who are involved more control over what happens with time. Many problems in participation processes develop because of inadequate preparation by the promoting organization (Wilcox, 1996). This implies that the local farmers in AIS and WKIS need to have been prepared to participate in rice management. However, Arnstein (1969) does not give or suggest the exact period preparation should take.

According to Arnstein (1969) and Wilcox (1996), the practitioner is the individual who plans and manages participation while the stakeholder is anyone who has a stake in what happens or the beneficiary. Arnstein (1969) argues that sometimes the practitioner may help or hinder development of the project depending on what is at stake. It may be difficult for the practitioner to control both access to funds and other resources and play a neutral role in facilitating a participation process (Arnstein, 1969). Many organizations are unwilling to allow people to participate because they fear loss of control (Arnstein, 1969; Wilcox, 1999). Such initiators may just provide information and not allow for active participation. This implies that, it may be difficult for the practitioner like NIB in AIS and WKIS to control both access to funds and other resources and play a neutral role in facilitating participation management process.

According to Arnstein (1969), a community can come together formally or informally to achieve a common purpose. The community members do not have to be equal in skills, funds or even confidence, but they should trust each other and share some commitment. However, building trust and commitment takes time (Wilcox, 1996). People get committed when they want to achieve something and feel they can achieve it. Otherwise, they become apathetic. People are most likely to be committed to carry something through if they have a stake in the idea (Arnstein, 1969; Wilcox, 1996). This implies that the dynamics of the farmers can influence their participation in project development or not. For example, the level of interest may depend on what the locals perceive as value of the intervention or project that is being implemented in their midst. If they judge that the project is having no value, they may not actively participate. If the farmers see that the stakes are high, they will actively participate. In this case, Arnstein (1969) model is rational. Farmers can make choices based on choices that result in the most optimal level of benefit for them.

The practitioner should allow stakeholders to get involved and have control over what happens at all levels of participation in a project. However, according to Wilcox (1996), this

is only possible if the stakeholders have control over information, skills and money needed for the project. Arnstein (1969) and Wilcox (1999) argue that participation has no meaning unless the participants involved have significant control over decisions that concern the organization to which they belong. In investigating the socio-economic characteristics of the farmers on the extent of their participation in rice management, this study in AIS and WKIS aimed at finding out if the local farmers had the power to initiate actions on their own thereby influencing planning, implementation and benefits as stressed by Arnstein (1969).

In AIS and WKIS, farmers had been allowed to participate in rice irrigation management and according to Arnstein (1969) perspective, these local rice farmers should have power in the management process but it is also interesting to find out if the local rice farmers in the two schemes were constrained in anyway in terms of capacity or skills (initiating process), commitment, power, working partnership, ownership, resources, confidence dependency or the dynamics of the community as illustrated in some of Arnstein (1969) tenets.

One of the major weakness of Arnstein's theory is that he ignores several aspects of user involvement by failing to show the process of participation. Many processes of participation involve tackling difficult projects and setting up new forms of organizations (Wilcox, 1999). It is therefore unrealistic for one to expect individuals or groups to suddenly develop the capacity to make complex decisions and become involved in projects promptly.

In addition, according to Wilcox (1999), Arnstein's ladder of participation is an oversimplification of the process and implies that user empowerment should be the sole aim of participation. Arnstein is vague about the methods adopted to involve users and sees no relationship between the aims of an involvement exercise, users who participate and the methods adopted to involve them. The use of a ladder also implies that more control is always better than less control which is a contentious issue. Similarly, as Burns et al (1994) argue, involvement is not the same thing as empowerment. A community member can be involved in a project due to fear or inflated expectations that may lead to burn-out and disillusionment.

According to Stewart and Taylor (1995), power is a positive-sum game, so that power can be achieved by some without necessarily removing it from others. Determining which issues the community are allowed to be involved in is central to understanding participation and empowerment. Control of the agenda for discussion is a covert dimension of power which is

highly important, but often forgotten in practice. Studies have shown that operational issues tend to get on agenda , whilst the strategic issues are decided elsewhere (Stewart & Taylor, 1995). Perhaps the principal weakness of the ladder models is their failure to acknowledge the difference sphere of decision-making in which their levels of participation can occur.

According to Burns et al. (1994) perspective, both the farmers and NIB can be involved in the management process. Involvement is different from empowerment and power is not always transferred in a participative process. According to the perspective of Stewart and Taylor (1995), the farmers can still achieve power without necessarily claiming it from NIB.

Studies of community participation have been done in the field of urban regeneration where MacFarlane (1993) and McArthur et al. (1996) highlighted the barriers to effective participation. Failure to truly empower the community results in the community becoming increasingly disenchanted and disinterested in engaging with the process. Skelcher (1993) and Hart et al. (1997) studies on community participation in tourism found that success of community participation in tourism requires involvement of all local people because they know what is best for their community. Kelly and Vlaenderen (1996) too have done studies on Community Participation on Primary Health Care (PHC) in South Africa and found that involving the community makes the community more willing to bring their patients for treatment; Jeruto & Kiprop, (2011) undertook a study on students participation in school management in Kenya, they also found that involving students in decision-making improved their performance and reduced strikes in Kenya Secondary schools. However, these studies are not related to community participation in rice irrigation. None of these studies have applied Arnstein (1969) typology of participation. There was therefore need, to study the dynamics of community participation in rice irrigation management for improved rice production in schemes such as AIS and WKIS based on Arnstein (1969) Participation typology.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Agriculture is the mainstay of the majority of the population in Sub-Saharan Africa. However, the occurrence of erratic rain has created uncertainty for agricultural production and emphasizes the need for irrigation. It is widely acknowledged that irrigated agriculture play a major role in improved productivity and more so if the local farmers are allowed to actively participate in the irrigation process including management such as rice schemes (Hussain and Hanjira, 2004; Smith, 2004).

The thematic areas in literature review included: the influence of socio-economic characteristics of the farmers on the extent of their participation in rice management; the nature of participatory relationships in rice irrigation management and finally, the constraints encountered by farmers as they participate in irrigation management in order to increase rice production.

2.2 Influence of Socio-Economic Characteristics of the Farmers on the Extent of their Participation in Rice Irrigation Management

There is a continuing debate on implication of community participation amongst policy makers, social scientists, development workers and local people involved in community participation in developing countries (Rahnema, 1990). Rahnema (1990) is critical of the use of the term "community participation" and suggests that it has become something of a "buzz-word" which is misappropriately used to legitimize any and all community development projects. For example, some projects have used community participation in management to simply mean involvement of the community in the implementation of a project with the purpose of increasing the acceptance and efficiency of use (Lane 1995, Suhardiman, 2013). Such scholars have not factored in the dimensions or forces related to community participation that can influence the farmers' involvement in irrigation management for improved rice production.

Management of many irrigation projects fail because the local culture and other socio-economic characteristics of the communities served by such projects are not taken into

account. (Iqbal, 2007; Sishuta, 2005). In their study in Bangladesh, Manzuri and Rao (2004) observed that communities should not just use an irrigation management design simply because it has worked elsewhere. In their view, the success of an irrigation management in an area should pay attention to local conditions. Indeed, as observed by Sonyolo et al., (2011), in their study of Tuang irrigation scheme in South Africa, it was observed that the strategies used should have a clear purpose and should not ignore individual communities' social and cultural variations and feelings. Omid et al (2012) made the same observations in an irrigation study carried out in Iran. In their study on rice irrigation management in Nigeria, Akinola and Ogunwale (1998) similarly noted that the socio- cultural and economic characteristics of a community are important as they can either inhibit or encourage farmers' participation in community action groups including in rice scheme management.

Erhabor (1982) and Tarfa (1990), whose studies were both focused on Nigeria, identified the major socio-economic characteristics that should be put into consideration when examining factors that can influence participation in irrigation agriculture. These are listed as: gender, age, level of education, duration of involvement with irrigation farming, farm size, and farm income or benefits. These two scholars stressed that the characteristics mentioned should not be ignored because some of them, if not all, may dictate the success or failure of rice irrigation management thereby affecting rice production in irrigation schemes. Accordingly, this study reviews literature on the link between the six socio-economic characteristics of farmers and their participation in rice irrigation management.

2.2.1 Gender and Participation in Rice Management

Several studies have been done on the implications that the socio-economic characteristics of rice farmers have on the level of their participation in irrigation management in different schemes in both developed and developing countries. These studies have indicated that the link between gender and participation in the management of irrigated rice farming is varied. For instance, Rajbhandari (2008) found that women's participation in rice management in Nepal was very minimal especially in connection to WUA management. Nonetheless, the study by de Brauw et al (2008) in China did not observe any significant differences between male and female rice farmers in irrigation management. In Africa, Adeoti (2009) study in Ghana and Gebregziabher et al., (2009) study in Ethiopia show that irrigation farming has been categorized as men's work. Similar findings have been reported by Braimer and Filmua

(2011) in irrigation schemes in Ghana. Gebregziabher et al., (2009) study in Ethiopia and Hamada and Samad (2011) report on Mwea in Kenya. In all these studies, minimal participation of women is reported. Braimer and Filma (2011) found that women most projects do not factor in any gender dimension during their design and implementation. Yet studies by Gueye (2014) in Bukina Faso and Kiseto (2014) in the Kwamadebe rice irrigation scheme in Kondo District, Tanzania have shown that the low participation of women in irrigation management has retarded the progress of irrigation schemes including rice production.

However, the studies have not addressed the reasons for the marginalization of women in management and the implication of the underrepresentation of women on rice production. In contrast, this current study has investigated the link between gender and participation in rice irrigation management and its impact in rice production in AIS and WKIS in Kisumu County, Kenya.

2.2.2 Age and Participation in Rice Management

The link between the ages of farmers and the extent of their participation in irrigation management activities has been contradictory. This is due to the fact that the socio-economic characteristics such as age are not perceived similarly in all contexts. For example, Chandran and Chadracherry (2004) study in Kerala rice scheme in India, observed no significant implications on age in rice irrigation management. All adult farmers participated in rice management regardless of their ages. However, Zarafshani et al. (2008) and Omid et al. (2012) in their studies in two different rice irrigation schemes within Iran, observed varied significant influence of age on farmers' level of participation in rice irrigation management. While the youth aged 35 years and below actively participated in Doroodzan rice scheme in Iran, the same age group only passively participated in rice management in Dez rice scheme in the same country. This finding shows that even within one country, there can be various socio-economic differences and feelings governed by the socio-cultural contexts of that community which can influence the youth to either participate or not participate in rice irrigation management and this may have varied effects on rice production.

Three different studies in different areas in South Africa such Sinyolo et al., (2011) in Tugela, KwaZulu, Natal; Sishuta (2005) in Tyhefu scheme in Natal and; Kamara et al., (2002) in Arabie in Northern Province, have all shown low level of the youth involvement in rice

irrigation management in South Africa. In the study by Sishuta (2005), the youth were found not to be interested in rice farming due to the perception that the South African communities had developed during the apartheid system, a system that never existed in Kenya. Sishuta (2005) found that the youth were more interested in wage employment and sports.

In the Mwea rice irrigation scheme in Kenya, the youth, 35 years and below, became actively involved in rice management immediately after IMT was adopted in 1998 but the implementation of IMT was through a revolt (Kabutha & Mutero, 2002). There was some improvement in rice production but the impact was however short-lived as reported by Muchai (2000a). Muchai (2000a) have not attempted to explain why the success was short-lived.

In contrast, a number of other studies in other African contexts have shown low involvement of youth in agricultural activities including rice irrigation management. Moreover, these empirical studies are mainly concentrated on the role of the youth in irrigation management but they are silent on the role of other age brackets such as the 36 years and above in irrigation management in schemes such as AIS and WKIS. Indeed, according to Arnstein's perspective, the best situation is that in which all youth and adult farmers are involved in rice irrigation management.

2.2.3 Farmers' Educational Attainment and Participation in Rice Management

Education is one of the primary drivers of community participation particularly regarding community mobilization, effective communication, and the provision of leadership, among others. In their study of the Doroodzan rice irrigation scheme in Iran, Azizi and Zamani (2009) found that highly educated people participate to a larger extent in rice management than their less educated colleagues. The findings concur with Karamjavan's (2014) study of Zonoic irrigation network in Iran. These findings further corroborate with the findings of Analgo et al. (2014) in the Kpong irrigation scheme in Ghana, and those of Sahoo (2013) in Odisha, India where the majority of the farmers who participated in irrigation management were literate and well educated. However, these studies were done in large scale rice irrigation schemes where, according to Tarfa (1990), technical knowledge and skill was a key determinant for participation in rice irrigation management. In his study in Nigeria, Tarfa (1990) found that farmers with high literacy had greater access to irrigation management knowledge, unlike illiterate farmers. The findings of a study in India by Pandey and Suresh

(2007) also concurred with Tarfa's findings and additionally found that the domination of the local elite was advantageous in enhancing communication with external agencies and resource mobilization among others.

Low educational attainment was also blamed for limiting access to information and in understanding the commercial farming concepts that are critical for sustaining high production levels in large scale rice irrigation schemes in sub-Saharan Africa (Shah et al., 2002). However, available literature is mainly on the implication of education on large scale rice farms. The studies have not investigated the influence of education on small scale rice irrigation management in schemes such as AIS and WKIS. Educational factors may be critical areas of focus for those working to improve local participation in small-scale rice irrigation management. There is need, therefore, to find out the implication of farmers' education levels for participation in small-scale rice irrigation management for sustainable rice production such as in AIS and WKIS.

2.2.4 Farm Size and Participation in Rice Irrigation Management

From studies by done Arum et al., (2012) in Tamil Nadu in India and Adeoti (2009) in rice scheme in Ghana, it emerged that farmers with large farm sizes participated in farm management activities more than their counterparts with small farm sizes. This is because large scale farmers benefit more in terms of the profits from rice production. Farmers with tiny plots are forced to pursue a "fox strategy" of depending on a variety of sources to earn a livelihood (Chambers, 1983).

According to Adeoti (2009) study in Ghana, farm size information had the potential to influence the rate of participation and to determine the rate of production. Shah et al., (2002) also argue that farmer participation has been relatively smooth, effortless and successful where farm sizes are large (10-50 acres), rice irrigation is central to a dynamic, high performing agriculture with plenty of profit and where farmers have had experience in rice farming for a long time. Shah et al., (2002) explained this by pointing out that managing small scale farms is very difficult because such farms, though small, consist of several farmers who are involved in management unlike large scale farms where very few farmers are involved in management.

However, there are some small scale rice farms that have been successful such as some rice schemes in South Africa (Sishuta, 2005) and White Nile (Samad, 2001). However studies carried out by Mphahlele et al (2000) and Ngqaleni and Makhura (1996) in South Africa, studies by Abernethy et al., (2000) in Niger and Manzungu et al., (1999) in Zimbabwe established that the smaller the plot, the stronger the tendency for men to seek urban jobs outside of farming while women cultivate the plots. When male farmers migrate to urban areas in search of jobs, women participate more in rice cultivation, but they have very little control over rice resources such as land. Available information reveals that farm sizes in AIS and WKIS are small ranging from 1 to 4 acres (KNBS, 2010; Swallow et al., 2005). It was therefore relevant for this research to determine whether these farm sizes encouraged or discouraged rice farmers in these schemes to be involved in the management of irrigation activities. The nature of such involvement may partly explain why rice production in these schemes has been relatively modest, averaging between 2-3 tonnes per hectare (NIB, 2013).

2.2.5 Years of Farming Experience and Participation in Rice irrigation Management

According to Nyangito and Odhiambo (2004), permanent residency and land ownership are also essential to level of community involvement in the management of rice in the schemes. From their study, Nyangito and Odhiambo (2004) found that long stay in a farming area enhances what they call group synergy and cohesion. These group factors are some of the key components of effective participation and cooperation in rice irrigation management.

Lahiff's (2003) study in a rice irrigation scheme in Mozambique found that long stay in a farming community improves farmers' incentives to make long term development investments on their land. Lahiff's (2003) finding concurs with a study by Manzungu et al. (1996) in Zimbabwe and that by Bembridge (2000) in South Africa where they also found that long term stay in a farming area encourages co-operation and teamwork among farmers. Further, Lahiff (2003) study in a rice scheme in Mozambique found that prolonged reliance on irrigated farming for their livelihood modified the smallholder farmers' behaviour causing them to participate effectively in rice management resulting in improved rice production. However, AIS and WKIS started as settlement schemes where the settled farmers were restricted to a certain number of acres to use for rice production. It was therefore of interest to this study to find out the relationship between the length of rice irrigation farming experience and farmers' participation in rice management in AIS and WKIS.

2.2.6 Income from Rice Farming and Participation in Rice irrigation Management

Monetary incentives in rice production vary. Farmers who benefit more from income earned from irrigation schemes participate more actively in irrigation management activities than their counterparts who get fewer benefits. Analgo et al., (2014) in a study of Kpong irrigation scheme in Ghana observed that the benefits derived from rice irrigation schemes served as a powerful incentive for farmers to actively participate in irrigation management. This finding concurs with Gebregziabher et al., (2009) study of Tigray, Ethiopia which found that greater incomes made farmers to actively participate in rice production including management. Maleza and Nishimura's (2007) study in Bohol, Philippines also concur with the Gebregziabher et al (2009) study where more income earned from rice, encouraged such farmers to actively participate in management although the case of Bohol is of a large scale rice scheme while that of Ethiopia, though small scale, but is found in a different cultural contexts from that of AIS and WKIS.

According to Shah et al. (2002), more monetary benefits tend to accrue to farmers with large acreage holdings. Accordingly, such farmers tend to participate more in irrigation management unlike farmers with small farm sizes (Arum et al., 2012) who may resort to other off farm activities if the benefits in rice farming is very low. Farmers with large farm sizes have apparently invested more resources on irrigated rice cultivation and are thus keen on maximizing their substantial investments such as in the case of Bohol (Maleza & Nishimura, 2007).

In AIS and WKIS, the farmers have been allocated between 1 and 4 acres of land for rice growing (KNBS, 2010; Swallow et al., 2005) totalling 2168 acres for AIS and 2230 acres for WKIS. The two rice growing schemes did not improve production when changes took place in irrigation management from 2004 (Thairu, 2010; Njagi, 2009). Production fluctuated between 2-3 tonnes per hectare which was insignificant (NIB, 2013, KNBS, 2010). This contrasts with production levels in other developing countries that are reported to be successful because they were producing between 4-6 tonnes per hectare (Chackacherry, 2012).

Because production levels in rice paddies in AIS and WKIS have continued to be inconsistent and low, there was need to find out whether farm incomes or benefits from rice production discouraged active involvement of farmers in irrigation management activities. This study

therefore attempted to establish the relationship between the income from rice farms and the extent of farmers' participation in irrigation management activities in AIS and WKIS.

Thairu's (2010) and Njagi's (2009) studies in AIS and WKIS among other rice schemes in Kenya, focused more on the changes on management transfer and its effect on productivity levels based on secondary data, thereby excluding analysis at the household level. More quantitative data at the household level would have provided information on why households engage (or do not engage) in rice farming including rice management. Lack of household information limited their analysis. Thairu (2010) and Njagi (2009) studies also did not address the influence of farmers' socio-economic characteristics on their rice production including management in AIS and WKIS. This study therefore attempted to establish the influence of farmers' socio-economic characteristics on their extent of participation in rice irrigation management activities in AIS and WKIS of Kisumu County.

2.3 Participatory Relationships between the Farmers and NIB in Irrigation Management

Participatory irrigation management refers to the increased involvement of water users in irrigation management. PIM consists more of a behavioural or attitudinal change than a reform process per se (FAO, 2007). Thus, while the IMT concept intends to replace the role of government agencies, PIM seeks to strengthen the relationship between water users and government agencies by increasing farmers' participation in management on one hand and reducing government agencies' involvement in irrigation management on the other hand. Chitere and Mutiso (1991) stress that participation is an evolutionary process whereby beneficiaries have the power to influence the direction and execution of development projects as active participants and not just mere recipients of projects benefits.

However, according to White (2003), there are possibilities that the participation process can be stage managed and abused by more powerful external forces in pursuit of both their covert and overt interests. Sinclair (2011) reported that some policy framework for community participation in rice irrigation management focus more on "ceremonial" rather than actual participation. Nyong'o (2007) also indicates that a vast majority of community participation strategies exist merely on paper rather than in practice. IMT significance should therefore not only be measured through IMT outcome and impacts but also through participatory relationships among the participants and government agencies.

The concept of community participation is constructed on the premise of involving all beneficiaries of development at all levels in the process of project development including rice irrigation management. The hallmark of participation is therefore to incorporate beneficiaries to collaborate in development projects and be involved in decision-making and governance (Peter, 2004). Chitere and Mutiso (1991) stress that participation is an evolutionary process whereby beneficiaries have the power to influence the direction and execution of development projects as active participants and not just mere recipients of projects benefits. However, the available literature does not adequately explain how the beneficiaries are incorporated in rice irrigation management in schemes such as AIS and WKIS.

Wester (2004) suggests that the impacts and outcome should also be linked to participatory relationships between the irrigation agency and the beneficiary of IMT. In his study in Lerma-Chapale rice irrigation scheme in Mexico, Wester (2004) found that the government agency did not allow for the active participation of the local community in rice irrigation management. The government agency perceived the proposed management transfer as a potential threat to its bureaucratic power and existence. Suhardiman (2013) further observes that when the IMT was being proposed, international donors perceived the irrigation agency both as a government agent incapable of managing the irrigation system and as a reform agent responsible for the formulation and implementation of IMT. As an incapable government agent, the agency's role in management has to be reduced and paralleled by the empowerment of WUAs (Suhardiman, 2008; 2013). As a reform agent, the agency is responsible for the organizational development of the WUAs (Apthorpe, 1986).

IMT is to be implemented not only by the very agency whose power and authority will be reduced by the policy, but also by the very agency which was perceived as incapable of managing irrigation systems in the first place (Suhardiman, 2008). According to a study by Suhardiman (2013) in Indonesia, the irrigation agency perceived the proposed management transfer to be a potential threat to its bureaucratic power, interest, resources and existence. And from the agency's perspective, the farmers' increased role and involvement in system management could potentially reduce the agency's decision-making authority and power.

Apthorpe (1986, p 380) reports that the irrigation agency's reservation or resistance towards IMT is often camouflaged in the language of "lack of capabilities of the communities or lack of political will". However, the studies in Mexico and Indonesia have not addressed the

participatory relationship between government agencies such as NIB and WUAs in rice irrigation management in schemes such as AIS and WKIS and whether such relationships had an implication on rice production for the two schemes.

Further, a study by Kolade (1980) in Nigeria indicated that for community participation on rice growing and its management to be successful, there should be close co-operation between all categories of participants involved in the rice management. The participants include all male and female farmers. This is also supported by one of Arnstein's (1969) where she stresses that involving all citizen in active participation is more effective. There are empirical studies on how rice irrigation management as a joint responsibility among household members at the household level has had a positive impact on rice production. Studies in rice schemes by de Brauw et al., (2008) in China; Tewari (2001) in Natal, South Africa; Greiser and Rawlings (1996) in Egypt were found to have improved rice production due to increased involvement of all male household heads together with their wives in irrigation activities including rice management. However, these studies have been done in areas outside sub-Saharan Africa with socio-cultural contexts that markedly differ from those in Kenyan schemes such as AIS and WKIS.

Nonetheless, a study done in Mwea rice irrigation scheme by Kabutha and Mutero (2012) points out that despite the transfer of management to the local community in the scheme, all signs indicate that NIB had no plan to surrender all the management aspects of the scheme to the farmers. Even after the revolt for transfer of management in Mwea, the only major change that took place was the transfer of NIB manager. All other activities remained as before. In spite of this study, the available literature does not explain how the rice farmers interacted with NIB as they both participated in rice management in rice schemes such as AIS and WKIS. This study, therefore, attempted to contribute to the debate by bringing to light the nature of participatory relationships between the farmers at the household level and between WUAs and NIB as they participated in rice management at the scheme level and its implication on rice production in AIS and WKIS.

2.4 Constraints Faced by Farmers in rice Irrigation Management

Community participation in rice irrigation management has been seen as a step forward compared with the top-down and supply driven approach used in the past (FAO, 2000). However, community participation strategy has its own limitations or constraints. Some

literature reviewed have not supported the assumption that participation or bottom-up approaches offer an automatic or effective solution to convectional problems. Various participation strategies or bottom-up approaches have been developed and applied worldwide in response to the perception that top-down and supply-driven approaches are the reason behind low rice production and unsustainable food security (Manzuri & Rao, 2004).

Undoubtedly, the concept of PIM is based on laudable ideologies such as democratization, decentralization, debureaucratization and above all, the empowerment of water users who are the ultimate beneficiaries of an irrigation system (Vermillion, 2003). However in some major irrigation schemes found in the states of India such as Andhra Pradesh, Tamil Nadu and Orissa among others, rice farmers have been faced with several constraints. For example study by Ananda and Crase (2006) in Orissa, India found that the Water Associations and committees that are formed to assist in management exist only on paper and always become dysfunctional after a short period. This is due to the fact that, when these WUAs are formed, the socio-economic heterogeneity of the community is not put into consideration (Manzuri & Rao, 2004). Ananda and Crase (2006) further reports that election of officials in the WUAs is discriminative and not fair. This finding concurs with study by Braimah and Filmua (2011) in Nepal where female farmers were found to be marginalized with respect to rice management. This lack of fairness has resulted in a lack of faith amongst the water users who doubt the credibility of office bearers or leaders in Orissa (Ananda and Crase, 2006). In the case of Andhra Pradesh and Tamil Nadu (Arun et al., 2012), water users have little knowledge about PIM programme such as the functions of the WUAs, rights and the duties and responsibilities of WUAs. Farmers are extremely reluctant to pay the increased water rates among other constraints.

There are several studies and reports in Africa including in Kenya that show that there was a low and ineffective participation of rice farmers in management after the transfer of management. For instance, a study by Sonyolo et al., (2011) in rice irrigation homelands in South Africa revealed that the farms experienced a decline in rice production when the locals were left to manage the rice farms on their own. Another study by Nkhoma and Mulwafu (2004) in Malawi and a study sponsored by FAO (2000) in five rice irrigation schemes in Zimbabwe also found that rice production declined after IMT. Swallow et al. (2005) argues that the withdrawal of the government from irrigation management within Africa such as in Sudan, South Africa, Senegal, Tanzania and Kenya further led to the collapse of small scale

irrigation systems in these regions. The Mea rice irrigation scheme in Kenya showed some signs of success in the early periods of transfer (Muchai 2000a, 2000b) but over time, Mwea still has "unresolved issues with NIB" (Kabutha & Mutero, 2012 p. 207). According to Muchai, (2000a, p. 91), management transfer left Mwea farmers rejoicing but "replacing the transfer has proven to be a tall order". The demands of running the scheme after the transfer of management are far greater than the monetary cost (Muchai, 2000a). However, the studies have not shed light on the constraints that the farmers encountered as they participated in rice irrigation management for sustainable rice production in schemes such as AIS and WKIS.

For community participation in irrigation to succeed, Nkhoma and Mulwafu (2004) argue that there must be preparedness. Preparedness involves readiness in terms of the human and financial capacity. In their study in Malawi, Nkhoma and Mulwafu (2004) observed that the farmers took long to prepare for the transfer of rice irrigation management. The preparation involved training the farmers and rehabilitating the rice schemes. Although the schemes have been faced with several other challenges, at least a majority of the farmers are reported to have had some training in rice irrigation management (Nkhoma & Mulwafu, 2004).

According to Burns et al. (1994), many problems in participation processes arise from inadequate preparation within the promoting organization. The practitioner should manage the process over time but eventually allow the beneficiaries to gain more control over what happens. However, Njagi (2009) points out that sometimes the government may have their hidden agendas which may be stronger than the stated objectives known to the farmers. In his analysis of the impacts of changes in irrigation management in many developing countries including Africa, Vermillion (2003) states that the governments were reducing their roles in irrigation management to reduce their expenditures on irrigation. The donor agencies including the World Bank and IMF had insisted that developing countries should reduce their spending on projects such as irrigation schemes (Vermillion, 1997). Vermillion (2003) also indicates that the ownership of irrigation infrastructure transfer is rarely entirely left to the new management authority such as the WUAs. There was need to find out the extent to which NIB prepared local rice farmers for management in schemes such as AIS and WKIS.

There is an additional cultural problem dating from colonial rule. This is with respect to centralized authority which has become an established way of doing things in many parts of Kenya including rural rice irrigation schemes (Nyon'go, 2007). Many rural households still

believe that recognized authorities should spearhead development activities. Correspondingly, an atmosphere of passivity and dependence still prevails in many rural communities. Such rural households have become accustomed to petitioning those in authority or donors with external resources to do something on their behalf (Nyon'go, 2007). The result is that many households spend a lot of time waiting for development to happen through the efforts of others and point accusing fingers when it does not take place (Bergdall, 2000; Nyong'o, 2007). However, studies have not shown whether farmers in AIS and WKIS were passive and dependent and thus could not actively be involved in rice management.

Another challenge that faces rice irrigation farmers is lack of both individual and financial capacity. According to Bergdall (2000), it is only possible for farmers to participate in development activities when they are given the management responsibility. Manzuri & Rao (2004) observed that even with the inclusion of farmers' representatives in some committees, rarely do some of these representatives have any real power in decision making. Power depends on who has the information, money, skills and confidence (Arnstein, 1969). But when the farmers' level of education is low, it might be difficult for such members to participate actively. In a study by Azizi and Zamani (2009) on large scale schemes in Iran, only farmers who had very high skillful knowledge actively participated in rice management. This finding concurs with the Sahoo (2012) study in India and the Analgo et al. (2014) study in the Kpong rice scheme in Ghana where farmers who were well educated actively participated in rice management. However, these studies were done on large scale rice schemes where high skills and knowledge were a necessity. Available literature, does not adequately explain the implication of inadequacy or adequacy of human and financial capacity in small scale rice farms such as are found in AIS and WKIS.

Furthermore, it has also been observed that the overall performance of some schemes is poor due to the poor relations between farmers and various stakeholders and institutions. There is little group cohesion, few shared goals and inadequate marketing strategies (Shah et al., 2002). The use of participation should have a clear purpose because it is not a goal in itself but a means to achieve an objective which, in this study, is the enhancement of rice production in AIS and WKIS.

The use of farmers' representatives in irrigation management activities poses other challenges. According to Bergdall (2000), choosing representatives for community

representation is sometimes not done democratically, and this can discourage community participation in management. In a study by Gebregziabher (2009) in Ethiopia, there was an imbalance in the representation of one gender in the WUA. This concurs with Rajbhandari (2008) finding in Nepal. According to Bergdall (2000), excluding female farmers from active participation is tragic and is associated with household conflicts which may discourage female farmers from participating effectively in their family farm. This leads to low rice production. According to Bergdall (2000), women bring much needed common sense to planning and execution. This study therefore, investigated the constraints that arise from low involvement of female farmers in the management of rice irrigation activities in AIS and WKIS.

Empirical studies by Thairu (2010) and Njagi (2009) in AIS and WKIS found that rice farmers passively participated in rice management and this had an influence on rice production. Cheserek et al., (2012) also assessed farmer's challenges in rice production in AIS and WKIS but none of these studies covered the constraints that the local rice farmers experienced in management and subsequently in rice production. Besides, while Thairu's (2010) and Njagi 's (2009) studies in the two schemes have heavily relied on secondary data for their findings, Cheserek et al. (2012) study only collected data using quantitative tools such as questionnaires and observation checklists. No other qualitative data collection methods or analysis were used in their study. The use of multiple data generation strategies was meant to improve the validity of the study in AIS and WKIS.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design, the study area, population and sample determination; data collection instruments utilized, fieldwork procedures and experiences. The data management procedures, data analysis and presentation techniques and ethical considerations are also presented.

3.2 Research Design

This study adopted cross-sectional, descriptive research design. Cross-sectional studies represent a subcategory included within the class of descriptive designs (Creswell, 2003; Yin, 2003). Cross-sectional studies are those that are carried out at one point in time or over a short duration (Bernard, 2006). This design was found appropriate for the study since it is less expensive. This is because it facilitates the collection of a snapshot of the features of a particular phenomenon within a specific time (Bernard, 2006). Using both quantitative and qualitative data collection methods, the respondents were contacted within a period of two months so as to investigate the influence of their socio-economic and demographic characteristics on the level of their participation. The investigation was also undertaken to examine the nature of participatory relationships among the farmers and NIB in rice irrigation management and to assess the constraints that the farmers encountered as they participated in irrigation management in AIS and WKIS.

3.3 Study Area

The study area for this research was AIS and WKIS, the only schemes that grow paddy rice in Kisumu County. AIS in Ombeyi Location, Miwani Division of Nyando sub-County, Kisumu County, Kenya, is located in the Kano plains between Nandi Escarpment and Nyabondo Plateau (NIB, 2013). AIS was started as pilot project to explore the feasibility of irrigation in the Kano Plains. Construction of the scheme started in 1966 and operations started in 1969 (NIB, 2013). AIS use Nyando river water for irrigation and also use basin type of irrigation. AIS has a gazetted rice farm land of 4176 acres and only 2168 acres of paddy fields are under irrigation (NIB, 2016).

WKIS which fall in Kawino as well as Kombura locations in Kadibo Division of Nyando sub-County, Kisumu County, is also located in the Kano plains between Nandi Escarpment and Nyabondo Plateau. Construction of the scheme started in 1974 and started operation in 1976. West Kano Irrigation scheme is near the shore of Lake Victoria so water is abstracted by pumping from the Lake Victoria and for irrigation. WKIS has a gazetted rice farmland of 4396 acres but only 2,230 acres of paddy fields are under irrigation. The two schemes are located within the wide alluvial plain with fertile black cotton soil which has encouraged the growth of rice in this region.

The rice farmers in AIS and WKIS work in partnership with NIB whose manager is stationed in AIS. The two schemes are situated within areas that are characterized by more or else similar socio-cultural conditions, and the intent of the study was to ascertain whether these had an influence on the level of participation in irrigation management. Most of the households in the study area depend on rice production as a source of income (Mambala, 2007; FAO, 2010). However, there has been a marked decrease of rice production with the introduction of irrigation management transfer in AIS and WKIS in 2004 (Thairu, 2010). And despite this decrease, very little is known in terms of the dynamics that prevents these rice farmers in AIS and WKIS from effectively participating in rice management for improved rice production.

Figure 3 shows map of Ahero and West Kano irrigation schemes in Kisumu county, Kenya.

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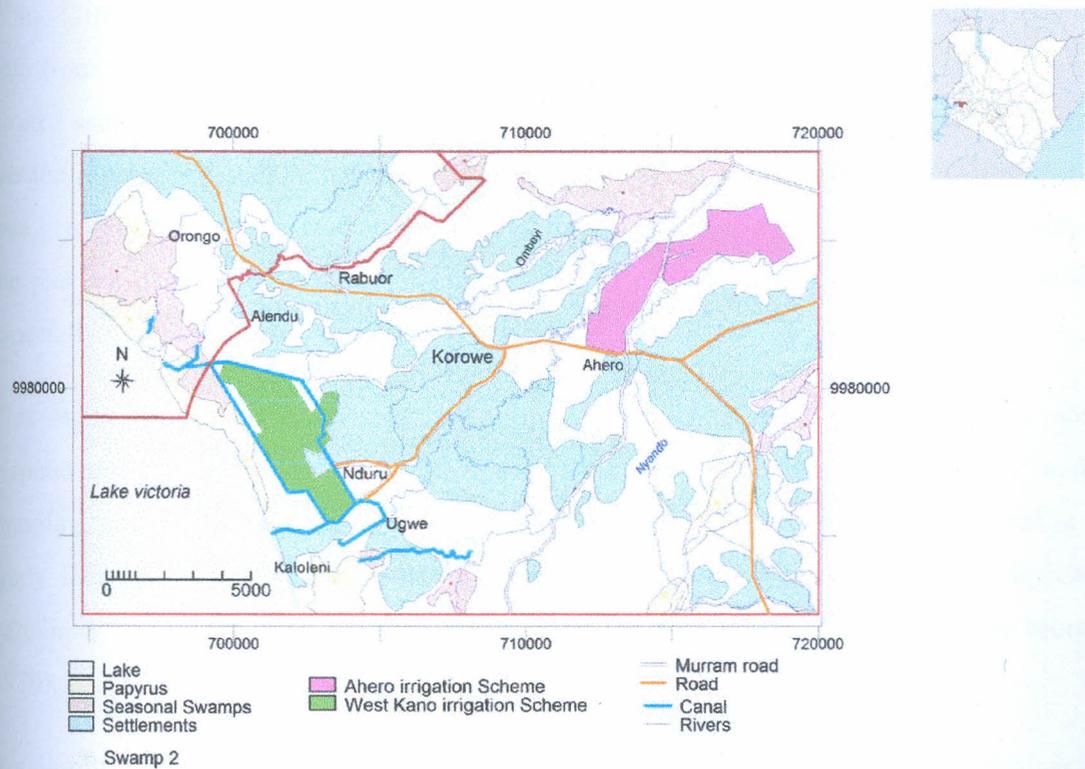


Figure 3.1: Map of Ahero and West Kano rice irrigation schemes in Kisumu County.

3.4 Study Population

In order to meet the research objectives, it was necessary to define the study population. According to the NIB (2013), the total number of farmers in AIS is 579 while WKIS has 609. For this reason, the study population for this research was all the local farmers (1,188) in AIS and WKIS combined. In addition, the objectives of this study could not be met without the views of key informants from NIB, WUAs, cooperatives and revolving fund committees. The total number of NIB executive officials found in AIS and WKIS were 14 members, WUA officials in AIS were 10 while in WKIS there were 8 officials. The cooperatives and revolving fund officials totaled 24 members, 12 from each scheme (NIB, 2013). These key informants were vital in providing clarifications and information on issues regarding community participation in rice irrigation management and the inherent constraints that the farmers experienced as they participated in rice irrigation management in AIS and WKIS.

3.5 Sampling Procedures and Sample Size

White (2000) observed that in most cases, it is difficult and sometimes impossible to collect data from every member of the total population, hence the need to confine the study to a limited section of the population (a sample). The use of a sample enables the researcher to use the resources available for the study more effectively. Consequently, the quality of the data generated and how it is managed may be improved. More so, by making use of samples, the practice of research becomes less expensive, less time consuming and more practical especially when the research population is large (Babbie, 2010).

This study used both probability and non- probability sampling techniques to obtain respondents for collecting quantitative and qualitative data namely systematic random sampling and purposive sampling. For quantitative data, the size of the sample used in the study factored in the desired level of precision, the confidence level and the degree of variability in the attributes being measured (Orodho & Kombo, 2002; Krejcie & Morgan, 1970).

To simplify the process of determining the sample size for a finite population, Krejcie and Morgan (1970) created a table using sample size formula for finite population. Using Krejcie and Morgan (1970) table, the sample size for a population in AIS and WKIS which totaled 1188 was calculated to be 300. Israel (2003) points out that sometimes the sample can be increased by between 10% and 30% to reduce the sample error and improve the quality of data collected. This sample was therefore scaled up to 352 respondents. The computed sample size was proportionately distributed to each scheme based on the individual scheme population of Ahero (579) and West Kano (609). The number of participants from each scheme was determined by their number relative to the entire population times the sample size as shown below:

$$\text{e.g. Sample size for AIS} = 579/1188 \times 352 = 172$$

$$\text{Sample size for WKIS} = 609/1188 \times 352 = 180$$

The study employed systematic random sampling to select the respondents from AIS and WKIS. Systematic random sampling is a method of selecting sample members from a larger population based on a random starting point, and a fixed periodic interval (William, 2006; Benard, 2006). Usually, every "nth" member is selected from the total population for

inclusion in the sample. Systematic random sampling is handy method when a random number is difficult to apply or when counting every “nth” item is easier (Benard, 2006). Systematic random sampling gives the assurance that the population will be evenly sampled (William, 2006).

The respective registers of farmer from AIS and WKIS with a known number of farmers were used to calculate the sampling interval. The sampling interval was determined by dividing the total population in each scheme by the sample size for each scheme as shown:

$$\text{AIS: } 579/172= 4. \quad \text{WKIS: } 609/180= 4$$

For each scheme, every 4th respondent was then selected with the first respondent being randomly selected between respondents 1 and 4 for each scheme.

For qualitative data, the study used purposive sampling to get respondents. In this study, purposive sampling is a method where participants are selected based on their knowledge ability about the transfer of rice irrigation management to farmers since 2004. Further, the technique is advantageous as it saves time, money, effort and ensures the exclusion of irrelevant elements from the sample (Bernard, 2006). Purposive sampling was used to select the key informants and focus group discussion participants as explained in 3.6

3.6 Data Collection Methods

The study utilized both quantitative and qualitative data collection methods. These were self administered semi- structured questionnaires, focus group discussions, key informant interviews and non-participant observation. These methods were used for triangulation purposes in order to ensure validity of the study. The use of variety methods enabled a greater understanding of the relationship between the farmers' socio-economic characteristics and their level of participation in rice management; the nature of participatory relationships in rice management as well as the constraints the farmers experienced while participating in rice management in the two schemes. The varied methods additionally ensured that the limitations of one type of data collection method were balanced by the strengths of another (Bernard, 2006; Turner, 2010). The use of multiple methods was also significant in increasing the accuracy of data collected.

The study was carried out in two phases and the researcher was assisted by six (6) research assistants who were trained on how to collect data for this study. Phase one (1) took one month and mainly dealt with collecting data using semi-structured questionnaires which were self administered to the sampled respondents by the researcher and 6 research assistants in AIS and WKIS. Phase two also took another one month and it was mainly used to collect data from the purposively sampled key informants and focus group discussants from the two schemes.

3.6.1 Semi-structured Questionnaires

The semi-structured questionnaires were self administered to 352 respondents at household level in AIS and WKIS. The semi-structured questionnaire included both closed-ended and open-ended questions. The semi-structured questionnaires were used to collect data on the influence that farmers' socio-economic characteristics have on their participation in irrigation management, some variables connected to participatory relationships between the community and NIB and the constraints experienced by farmers as they participate in irrigation management for improved rice production in AIS and WKIS (Appendix VI).

3.6.2 Focus Group Discussions

A focus group discussion is a carefully planned data collection technique meant to obtain perceptions on a defined area of interest in a permissive, non-threatening environment (Bernard, 2006; Kruger and Casey, 2000). Participants in the focus group discussions in this study were purposively selected from among the male and female farmers from each farming community from AIS and WKIS. Only members who were willing and able to attend focus group discussions in an agreed upon venue and time participated in the study. Each scheme had 2 focus group discussions whereby the male and female farmers were separated according to gender. By making the groups homogeneous, it was possible for each male or female group to be comfortable, discuss more freely and get rich information that the interviews did not capture. The study conducted 4 focus group discussions, two each per scheme, and made up of 9 discussants each. Using FGD guide, these groups were provided the opportunity to give their perceptions and opinions on the socio-economic characteristics of the farmers and their level of participation; the nature of participatory relationship between and among the farmers and the NIB in rice irrigation management and the constraints experienced by the farmers as they participated in rice irrigation management. The

discussants also gave information on rice production before and after the transfer of rice irrigation management in the two schemes. Besides steering the discussion, the researcher recorded the discussions and wrote down notes on important incidents and comments made by participants on the study area (Appendix IV).

3.6.3 Key Informant Interviews

Key informant interviews are interviews conducted with persons the researcher identifies as knowledgeable about the phenomena in question (Bernard, 2006). Key informant interviews provide more information and deeper insight into what is going on around them (Nachmias & Nachmias, 2006). The interview guides were tailor-made for each category of key Informants. The study conducted 10 key informant interviews involving the executive officials who occupied positions of responsibility in the management of the two schemes at the time of the study. These were: 4 NIB executive officials (2 each per scheme), 2 executive officials from revolving funds, 2 executive WUA officials and 2 executive cooperatives officials (one each from Ahero and West Kano rice irrigation schemes). Tailor-made key informant interview guides were used for each category.

The interview guide for the NIB informants included information on the changes in rice irrigation management transfer; management activities for farmers and NIB; whether the farmers and NIB were actually performing their roles and responsibilities in management; and any existing constraints among others (Appendix II). The interview guide for the rice farmers' revolving fund and cooperative informants included information on source of funds for their operations in the schemes, services they provide to the farmers, benefits and challenges they experience among others (Appendix I & III). The interview guide for WUA informants on the other hand, sought information related to its roles and responsibilities; the participatory relationships with NIB; and governance constraints such as imbalanced representation with respect to gender in WUAs among others (Appendix XIV).

3.6.4 Non- Participant Observation

Data collected through observation describes the observed phenomena as they occur in their natural settings. Observational methods of data collection are suitable for investigating phenomena that researchers can observe directly (Nachmias and Nachmias, 2006). Direct observations were made in this study to gain an understanding of the involvement of the farmers in irrigation management in AIS and WKIS. The observations were conducted by the

researcher on several occasions and in several different areas within the two schemes. For example, observation was made any time the researcher went to interview key informants in the two schemes and on days the researcher attended FGDs within the schemes. On one occasion, the researcher attended a workshop and observed who was participating in such workshops to determine gender proportions. The researcher observed the various constraints that were tangible such as water pumping equipment, the state of the research centre and store where rice was kept after milling among others. An observation checklist was also used to gather background information about the facilities found in the schemes (Appendix VIII).

3.7 Data Analysis and Presentation

The data that was collected for this study was analyzed using a mixed method data analysis process. This included the use of Statistical Package for Social Sciences (SPSS) version 15 to run the data (Hopkins, 2002). The researcher used mixed method data analysis so that the limitation of one method could be complimented by the other methods. The quantitative data namely numerical variables were analyzed using descriptive statistics (frequencies, percentages and averages). Both chi-square and regression tests were used as parametric measures to find out the association between a number of variables such as age, gender, level of education, farm size, experience, income from rice and the extent of participation in irrigation management which was the dependent variable. But where regression analysis was not possible due to use of binary variables like sex (male and female), Cramer's measure of association published by Cramer (1946) was used. Cramer's value (V) is a measure of association between two dichomous variables giving a value from 0 (corresponding to no association between the variables) to 1 (showing complete association).

The study used frequencies and percentages because of their ability to distribute the respondents according to the various values of the study variables. The quantitative data was presented using tables, charts and graphs.

Qualitative data analysis seeks to make general statements on how categories or themes of data are related (Nachmias & Nachmias, 2006). The qualitative data was analyzed using open coding whereby themes and patterns were identified (Ritchie & Lewis, 2003; Bernard, 2006). Themes and patterns were derived from responses given by key informants, FGDs and from open-ended responses from the Household Survey Questionnaire. After that, the data was classified into categories some of which were further re-examined to establish their linkages.

The qualitative data was presented using direct quotations, narratives/ verbatim reports and analyzed reports.

3.8 Validity and Reliability

According to Markel et. al (2011) and Shenton (2004) the concept of validity in research deals with the question of how the findings of the study adequately represent reality. The content Validity of this study was measured by experts. Furthermore, the researcher ensured the validity of the study by using randomization and multiple data generation strategies that included semi-structured questionnaires, focus group discussions and key informant interviews. Data analysis was also done using both qualitative and quantitative methods for triangulation purposes. These strategies were implemented in a free atmosphere which encouraged the open sharing of ideas, views and opinions. The study used cross-sectional descriptive research design which was carried out within two months. As such, extraneous factors which could have influenced the subjects were reduced.

Joppe (2000) defines reliability as the extent to which results are consistent over time and accurately represent the total population under study. According to Krefting (1991), the concept of reliability is concerned with whether the study would yield the same results if it were to be repeated by another researcher (Babbie, 2010; Shenton, 2004). To create an effective survey and test reliability, the researcher pretested and post tested the questionnaire after a one week interval using a group of 10 respondents, 5 each from AIS and WKIS respectively. The scores from the two tests were correlated in order to evaluate the test for stability over time. The obtained correlation coefficient of 0.7 indicated an acceptable reliability of the scores which implies that this study would yield acceptable similar results if it were to be repeated by another researcher.

Besides pre-testing and post testing, the researcher also made sure that the data collection process was systematic, and that data was recorded accurately and kept securely as part of an "audit trail" that can enhance the reliability of the results of this study (Babbie, 2010). In addition, the researcher followed a systematic coding and recording technique in analysing data that could adequately guide a different researcher in carrying out a similar analysis.

3.9 Ethical Considerations

Ethical issues were considered and adhered to simultaneously when carrying out this study. Researchers have the responsibility of safeguarding the rights and safety of the people involved in their studies (White, 2000). This responsibility is clearly articulated in literature as part of research ethics and includes issues regarding consent, confidentiality, privacy and anonymity (Babbie, 2010; White, 2000).

Before going to the field, the Maseno University Ethics Review Committee reviewed the proposal and issued a certificate for the same. In AIS, the National Irrigation Board also gave a consent letter for the research. Once the respondents were identified, the consent of all participants was secured by fully explaining the purpose of the study, potential risks and benefits; and the fact that their participation would be voluntary. Participants were also informed about their right to withdraw consent of participation at any time without a penalty. In addition, the participants were informed that while they would not personally experience benefits from participating in the study immediately, there was a possibility that they could benefit later from the study findings as farmers and other stakeholders. The participants were reminded that all the information they provided would be kept confidential and also that the personal interviews would remain confidential. Each farmer who agreed to participate was given a written Consent Form to sign. The form was formulated in English and translated into Kiswahili and Dholuo for respondents who did not understand English (see Appendix IV). The researcher undertook measures to avail the report to key stakeholders including the farmers from the AIS and WKIS, various organizations and policy makers from both National and County Governments in Kenya.

CHAPTER FOUR

THE INFLUENCE OF SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMERS ON THEIR EXTENT OF PARTICIPATION IN RICE IRRIGATION MANAGEMENT

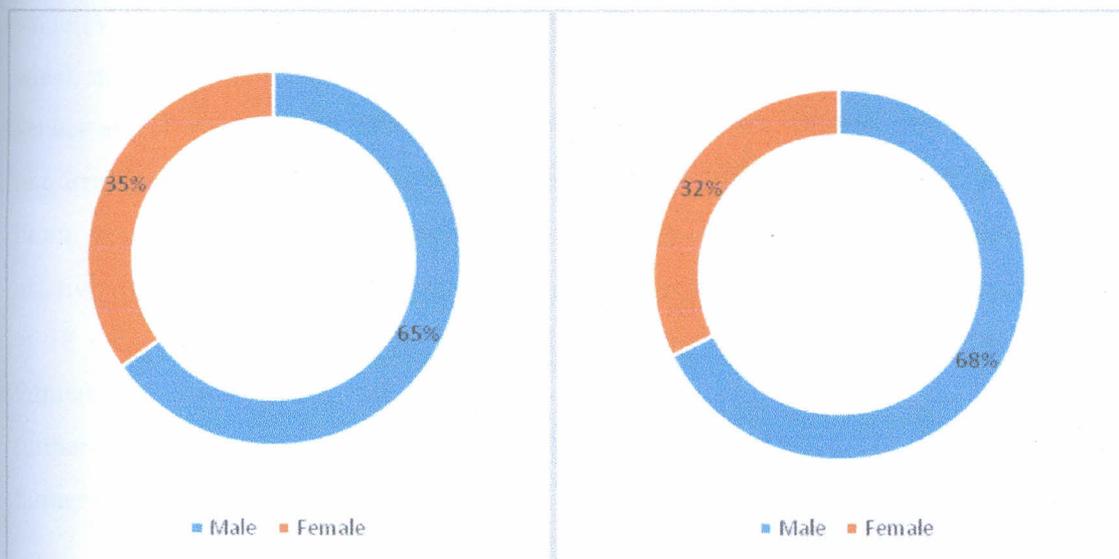
4.1 Introduction

The chapter presents the findings and discusses the influence of socio-economic characteristics of the farmers on the extent of their participation in rice irrigation management in AIS and WKIS in Kisumu County. Three hundred and fifty two (352) farmers were interviewed for the study. This consisted of 172 respondents from the AIS and 180 respondents from WKIS. The socio-economic factors included in the analysis were mainly the ones related to on-farm activities in a rural setting. Key among these were gender and age of the farmers, their level of education, size of the rice farms they owned and cultivated, years of experience in rice irrigation farming and income they obtained from rice farms in AIS and WKIS. The section further presents the rate of rice production as community participated in rice management in AIS and WKIS.

4.2 Influence of Gender on Extent of Participation in Rice Irrigation Management

AIS and WKIS involve both male and female farmers in irrigated rice cultivation. It was noted that in both schemes (AIS and WKIS), there was a higher percentage of male rice farmers engaged in rice growing (65%, and 68%, respectively) than female rice farmers (35% and 32% respectively). This is outlined in Figure 4.1.

Figure 4.1: Distribution of respondents by gender



Ahero Irrigation Scheme

West Kano Irrigation Scheme

Source: Field survey data (2016)

Gender was cross tabulated with participation in rice irrigation management to establish whether there was a relationship. The results of the cross tabulation are reflected in Table 4.1.

Table 4.1: Relationship between farmers' gender and extent of participation in rice irrigation management in AIS and WKIS

Gender	Ahero Irrigation Scheme					West Kano Irrigation Scheme				
	Extent of Participation				Total	Extent of Participation				Total
	Active		Passive			Active		Passive		
F	%	F	%		F	%	F	%		
Male	64	57.1	48	42.9	112	80	65.5	42	34.4	122
Female	18	30.0	42	70.0	60	16	27.6	42	72.4	58
Total	82		90		172	96		84		180

$$\chi^2 = 11.538. Df=1, < p 0.05, V=0.259 \quad \chi^2 = 22.792. Df=1, p < 0.05, V=0.356$$

Source: Field survey data (2016)

As the results in Table 4.1 reveal, the calculated chi-square statistics for both AIS and WKIS showed that there was a significant association between gender and the extent of participation

in rice irrigation management. To further determine the strength of the relationship, Cramer's value (V) was calculated and the obtained results was 0.259 for AIS and 0.356 for WKIS, which according to Cramer shows some light to moderate relationship between farmers' gender and their participation in rice irrigation management. Male actively participated in rice irrigation management in both schemes while female participation was very minimal. From the table and in both schemes, the proportions of female farmers who are inactive/passive are considerably larger than for male farmers. It was also observed that out of 18 executive members of the WUAs in both AIS and WKIS only 16% were female farmers (2 female farmers from AIS and 1 female farmer from WKIS). The findings were further confirmed by responses from female discussants in WKIS. For instance, a female farmer remarked:

"I work on our farm with my husband but when it comes to management issues concerning the farm, it is my husband who plans and make decisions. If I am not happy, I let him know but the final decision is taken by my husband. I only make decision associated with washing, cooking, child care and going to market" (Female discussant from WKIS).

Such findings confirm the socio-cultural implications that male farmers still had more control over decision making in the rice schemes while female farmers passively participated in such management. Female farmers were merely told what was planned but were not actively involved in planning or management process. In two workshops organized for the farmers in AIS and WKIS on different occasions and attended by the researcher, it was also observed that while over 65% and 55% male farmers in AIS and WKIS respectively attended the workshops, only 10% and 01% of the female farmers in AIS and WKIS respectively attended the workshops. The findings contradict those of de Brauw et al. (2008) who did a study in a rice scheme in China and found that it did not matter whether one was a male farmer or female farmer. All genders more or less participated actively in management and this improved rice production in this scheme in China. However, the study findings in AIS and WKIS concur with that of Rajbhandari's (2008) study in irrigation projects in Nepal and Gebregziabher et al., (2009) study in the case of Tigray in Ethiopia where women were found to be less actively involved in irrigation management. Female farmers in AIS and WKIS were not actively participating in rice management but were passively participating.

Studies by Gueye (2014) in Bukina Faso and Kisetu (2014) in the Kwamadebe rice irrigation scheme in Kondoa District, Tanzania have shown that the low participation of women in

irrigation management has retarded the progress of irrigation schemes including rice production. However, these studies have not attempted to explain the reasons for the low participation of female farmers in irrigation management and its implication on rice production in schemes.

The key informant from WUA in AIS reported that rules to entry into leadership positions in rice management allowed the male farmers to participate actively in management but inhibited the majority of female farmers from doing the same. The report was further confirmed from WUA key informant from WKIS. For example, it was reported that, to qualify to be a member of the Executive, one must be a fully registered member of WUA and for one to be registered; one had to be a resident of the scheme. Residents were those rice farmers who had lived permanently in the scheme or stayed there for long. Very few women had stayed in the schemes since their inceptions and therefore, could not be registered as residents. Culturally, most male farmers were residents. Secondly, it was reported by the same key informants from WUAs in both AIS and WKIS that, for one to be in the Executive, one needed to know how to read and write because literacy was important for filling nomination forms and only those who were literate could represent the Executives in any meeting or workshop organized for the farmers in AIS and WKIS. Table 4.4 shows that while majority of those who could not read or write were female farmers (about 10% and 11% respectively), all male farmers in both schemes could read and write as shown in Table 4.1. When administering semi-structured questionnaires to the respondents, it was also observed and confirmed that some female farmers could not read and write. This observation was further supported by a female discussant in AIS who narrated:

"Most of us women are not educated. We cannot read and write so it is very difficult to join the management team. This position requires one to be able to read and write so that one can fill forms for nomination and if appointed as a member of the executive, be able to represent the executive in meeting or workshop" (Female discussant from AIS).

To further qualify to be nominated into the Executive Committee, a key informant from WUAs in AIS and another one in WKIS further reported that the candidate must attend the WUAs' monthly meetings regularly and respond to emergency meetings which sometimes required taking part in communal labour. They further reported that nominated members are also required to be regular croppers with good performance in rice production and they must also be farmers who pay water charges regularly. Any farmer who was able to score over

60% and above for the past 3 years in all the rules of entry was considered for nomination.

One WUA key informant from AIS reported that:

"Anybody who is not able to score an average 60% and above in all rules of entry combined is not qualified to be considered for nomination for executive membership in rice management. Other requirements include taking part in communal labour regularly since irrigation work is more of community work. He or she must be able to pay water charges for irrigation and be a regular cropper with good performance in rice production" (WUA key informant from AIS).

It was further reported by one male discussant in AIS that to be considered for the Executive post, one had to express interest and then apply for the position which was then submitted to an electoral committee. There was a critical vetting process to check the level of performance of individual farmers on the farming activities including regular attendance, payment of membership fees, literacy level, good conduct and extent of involvement in communal labour among others.

Another female discussant in WKIS explained why she had been disqualified from being considered for the Executive membership:

"I wanted to be part of the executive but was disqualified at the vetting stage because I was not attending meetings regularly due to long distance from my home to the meeting ground and also I have a sick child at home who I always take care of" (Female discussant from WKIS).

This implies that even without being a resident, female farmers could otherwise still be able to score 60 % and above from other requirements and therefore be eligible for inclusion into rice management. However, the findings show that female farmers also contributed directly to their exclusion from the Management Team. For example, another female farmer from AIS who was 65 year old gave her personal experience about the rules as follows:

"I do not want to be part of the executive because it is dominated by men. Some communal duties are too heavy for me at 65 years old and I do not have time to attend meetings where you do not even talk"(65 year old female discussant from AIS).

This implies that some female farmers were selective in the kind of management activities they wanted to do. Some were also too old to perform all duties. While 40 year old female farmer from AIS complained that meetings organized by WUA for management were a waste of time and money. She narrated that attending those meeting was a waste of time for many

women because women were not allowed to talk in the meeting. And even if a woman tried to talk, their ideas were never considered unless supported by a male farmer. She continued with her narration that:

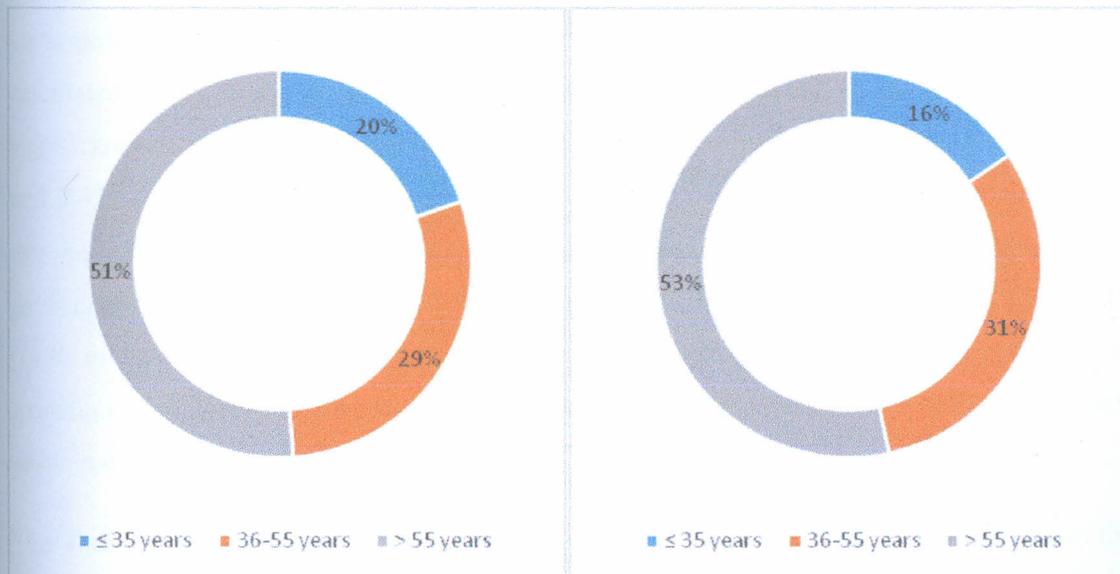
"Recently, I took some loan from Uwezo Fund to start my own tomatoes business. I cannot attend meetings which do not give direct benefit. My house may be auctioned if I do not work hard to repay loan"(40 year old female farmer from AIS).

This narrative implies that female farmers preferred activities where they were getting direct benefits like money. The findings of this study show that male farmers participated more actively in irrigation management than female farmers due to several factors. Besides the socio-cultural factors that limited women from being residents, the study also found that even though there was no discrimination during the nomination of the Management Team, the interpretation of rules for entry into the Executive was influenced by the norms of the community. The factors that hindered women from participating included social perceptions that tended to undermine the capabilities and opinion of women as mentioned in the narratives and key informant reports from both AIS and WKIS. Literacy levels, time constraints, women's domestic roles, geographical locations and direct benefits from rice farming also played a role. It was also evident that these factors either interacted with each other or worked separately to exclude women from participating in irrigation management. According to the perspective of Arnstein (1969), a desired change of community participation in rice irrigation can only be actualized through the collective actions of all participants including male and female farmers yet this was not the case in AIS and WKIS where it emerged that only male farmers participated actively in rice management in the two schemes.

4.3 Influence of Age on Extent of Participation in Rice Irrigation Management

The following three age groups were targeted by the researcher: Below 35-18 years (the youth); 36-55 years and 56 years and above. The majority of respondents in AIS (51.2%) and WKIS (53.3%) who were surveyed in this study as shown in Figure 4.2, were aged 56 years and above. The youth who were aged 35 years and below, were very few in rice irrigation farming. It seems that involvement in rice irrigation farming attracts more people outside the youth age bracket.

Figure 4.2: Distribution of respondents by age



Ahero Irrigation Scheme

West Kano Irrigation Scheme

Source: Field survey data (2016)

The next step was to establish the relationship between the age of the sampled farmers and the extent of their participation in rice irrigation management. Table 4.2 shows the results of the cross tabulation between the age of farmers and the extent of their participation in irrigation management.

Table 4-2: The Relationship between farmers' age and extent of participation in rice irrigation management in AIS and WKIS

Age Group in Years	Ahero Irrigation Scheme						West Kano Irrigation Scheme					
	Extent of participation Active		Passive		Total		Extent of participation Active		Passive		Total	
	F	%	F	%	F	%	F	%	f	%	F	%
Below 35	18	52.9	16	47.1	34	100	10	35.7	18	64	28	100
36 – 55	36	72.0	14	28.0	50	100	36	64.3	20	37	56	100
Over 56	78	88.6	10	11.4	88	100	72	75.0	24	25	96	100
Total	132		40		172		118		62		180	

$\chi^2=18.40$. Df=2, $p\leq 0.05$

R= 0.436, $R^2=0.190$, Df=170, $p\leq 0.05$

Calculated t=6.319; Critical t= 1.962

$\chi^2=14.88$. Df=2, $p\leq 0.05$

R=0.429, $R^2=0.184$, Df=178, $p\leq 0.05$

Calculated t=6.332; Critical t= 1.962

The calculated regression analysis for the link between farmers' age and the extent of their participation in irrigation management was cross tabulated. For both AIS and WKIS the t calculated; (6.319) and (6.332) were greater than the t critical (1.962) hence there was significant relationship between farmers' age and participation in rice management. $R = 0.436$ and 0.429 for AIS and WKIS respectively indicate a positive relationship between farmers' age and their participation in rice irrigation management. More of the older farmers participated actively in the rice irrigation management than their younger counterparts. $R^2 = 0.190$ in AIS indicate that farmers' age account for 19% of farmers' participation in rice irrigation management. In West Kano, farmers' age determined 18.4% of farmers' participation ($R^2 = 0.184$)

The findings reflected in Table 4.2 showed that farmers' age had an influence on their participation in rice irrigation management. The older the farmers, the more active they were involved in rice irrigation management. For example, rice farmers who were aged 56 years and above actively participated in rice irrigation management more than the youth who are aged 35 years and below and whose participation in rice irrigation management was found to be more passive in management.

The more active involvement of the older farmers can be attributed to their awareness of irrigation transfer and the fact that they had been in these schemes for a longer time hence had better experience. The more active involvement of farmers who were 56 years old and above in rice irrigation management in AIS and WKIS has implications for capacity building in areas such as leadership, project management, change management as well as future succession plans. One 70 year old male farmer discussant who has farmed in AIS for over 30 years raised some of the concerns this way:

"I am in the management because my son (youth) has refused to be involved in rice irrigation. At my age, there are some duties which are fatiguing and can only be done by them; but they are not willing. My son who is 30 years old prefers boda boda trade than rice farming. I have worked in this scheme for over 30 years"(70 year old discussant from AIS).

From the narrative, it was observed that the old who actively participated in rice irrigation management were also reluctant to take up some leadership positions because they felt that it was a tedious task. They did not want to burden themselves with extra duties although they were more aware of the changes in irrigation management than the other age groups. A 34 year old male youth discussant from AIS reported that most of the rice farms belong to their

parents who were reluctant to give them enough acres to farm on. He blamed the NIB for not allocating to the youth rice fields yet some rice farms were still uncultivated. He narrated:

"Most of us have resorted to boda boda or migrating to urban centres like Ahero or Kisumu to look for better livelihood because we do not have enough land for growing our own rice. I still rely on my parents rice farms which are becoming smaller and smaller with his increasing household members. There are plenty of uncultivated idle rice farms around AIS scheme which should be provided to us so that we can also actively participate in rice management"(34 year old male discussant from AIS).

Another youth discussant from WKIS narrated how his fellow youth mates had negative perceptions of agriculture in general and rice irrigation farming in particular. In his own words he narrated:

"We are normally active in rice farming activities when young and in primary schools. We help our parents in planting and weeding; but as soon as we reach secondary schools or tertiary, many of us show no interest in farming activities. My parents have planted rice for the last 40 years or more but they have remained poor, uneducated, and without proper skills in management. I did not do very well in K.C.S.E but I would rather hire motorbikes for business instead of regularly attending to rice activities which do not even belong to me or help my parents"(35year old male discussant from WKIS).

These narratives imply that the majority of the youth were not residents and thus did not own much of the rice farms. Most of the rice farms belonged to their parents who dictated how the land for rice could be divided among their sons. Besides being marginalized, the youth had a negative perception about rice farming. They believed that rice farming activities were meant for the poor and uneducated persons without skills in management. The youth therefore could not actively participate in rice growing including management.

Findings on the influence of age on rice irrigation management in other studies are varied. Chandran and Chackacherry (2004) observed no significant impact on participation with respect to age in Andhra Pradesh while Sonyolo et al., (2011) whose study was based in South Africa observed that the youth were very reluctant to take up active roles in agriculture including irrigation management due to the perception that African communities in South Africa developed concerning agriculture during apartheid rule in South Africa. In a study of Mwea irrigation scheme in Kenya, Kabutha and Mutero (2002) observed that the youth in the Mwea irrigation scheme were more active than their parents in irrigation management at the beginning of IMT due to the hardships they had experienced during the NIB centralized mode of management and this improved rice production for sometimes. Even though the success in

Mwea irrigation scheme was short-lived, the finding implies that active participation of the youth in rice management can lead to improved rice production but this was not the case in AIS and WKIS.

As narrated by a 70 year old discussant and the two youths from AIS and WKIS respectively, the youth in AIS and WKIS, were more involved in non-agricultural activities such as riding motorbikes or migrating to town in search of jobs. The youth also reported that they were not actively participating in rice farming because they did not have their own rice farms and even if they participated, the benefits did not directly help them since they were not residents of the scheme. The youth even wished that they could be given some rice fields which were lying idle around the schemes such as in AIS. Even during two meetings which were attended by the researcher, it was observed that the youth were very few. Out of the 45% of the farmers who attended a workshop meeting on 13th, July, 2015 in AIS, only 7 % of the youth attended the meeting.

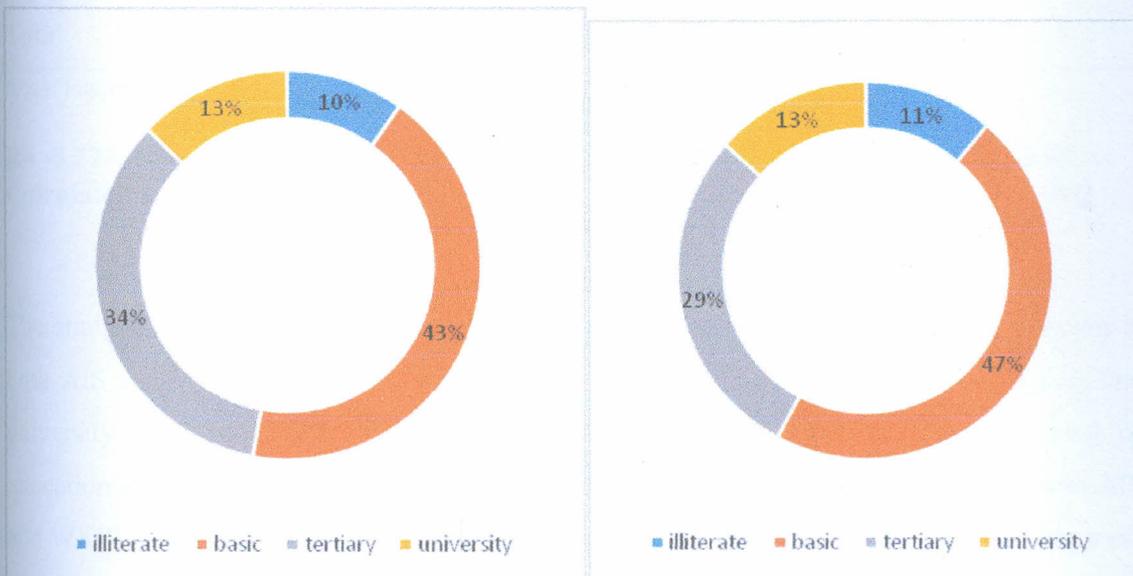
The findings show that the older farmers actively participated more than the youth in irrigation management to sustain rice production but these old farmers remained poor, were not educated and had no skills in management. For a long time, leadership has been in the hands of the elderly because of the trust and wisdom they provide. However, there is compelling evidence of an ageing farmer population in AIS and WKIS which must be addressed to facilitate the sustainability of rice management and production in the long term. The average ages of farmer in the two schemes was found to be 49 years. Thus, the youth population is strategic for the success of any effort to boost rice production. Leaving out the youth is therefore detrimental to future irrigation development in the two schemes. There is need to change the negative perception of the youth towards participation in irrigation including its management. The study found that the youth consider older farmers to be uneducated and unskilled, physical labourers who receive an extremely low economic return. The poor image of persons involved in agriculture especially in the rural communities needs to be changed so that all farmers, including the youth, actively participate in rice production. By the youth actively participating in rice management, rural employment will improve. The youths' energy and numbers provide tremendous opportunities for increasing rice productivity in AIS and WKIS. Anstein tenet stresses that all participants should share some commitment and have stake in all activities that they are participating in to ensure its success.

But in the case of AIS and WKIS, the youth were found not to be as committed as the older farmers in management and this was found to have an influence on rice production.

4.4 Influence of Education on Extent of Participation in Rice Irrigation Management

The respondents' level of education ranged from illiterate (those who could not read or write) to university education. The findings shown in Figure 4.3 and Table 4.3 confirm that 10% of sampled farmers in AIS and 11% in WKIS could not read or write and all they were all (100%) female farmers. This was further observed by the researcher when such female farmers were unable to read and write in the self administered semi-structured questionnaires provided to them for this research. Majority of farmers from AIS (43%) and WKIS (47%) had attained basic education while 34% and 29% of the farmers in AIS and WKIS respectively had attained tertiary education and majority of them were observed to be male farmers. In both schemes only 13% of the farmers had attained university education and only 4% of female farmers from both AIS and WKIS had attained university education.

Figure 4.3: Distribution of respondents' education status



Farmers' level of Education was further cross tabulated with their extent of participation in rice irrigation management to establish whether there was a relationship. The results of the cross tabulation are portrayed in Table 4.3. For both AIS and WKIS the t calculated; (-3.022) and (-3.517) respectively, were less than the t critical (1.962) hence there is significant relationship between farmers' level of education and participation in rice irrigation management. $R = -0.226$ and -0.255 for AIS and WKIS respectively indicate that most of the

farmers' with lower education level were more active in the rice irrigation management than their counterparts with higher levels of education. $R^2 = 0.051$ in AIS indicate that farmers' level of education accounted for 5.1 % farmers' participation in rice irrigation management. In WKIS, farmers' level of education accounted for 6.5% of smallholders' participation in the management ($R^2 = 0.065$). Farmer's participation in rice irrigation management decreased with increase in their level of education.

Table 4.3: The Relationship between farmers' level of education and extent of participation in rice irrigation management in AIS and WKIS

Education Level	Ahero Irrigation Scheme				Ahero Irrigation Scheme			
	Active		Passive		Active		Passive	
	f	%	F	%	F	%	f	%
Illiterate	5(5)	29.4	12(12)	70.6	6(6)	30	14(14)	70
Basic	40(14)	54.1	34(12)	45.9	40(13)	47.6	44(14)	52.4
Tertiary	42(15)	71.2	17(6)	28.8	38(12)	73	14(5)	27
University	15(5)	68.2	7(2)	31.8	16(5)	66.7	8((3)	33.3
Total	102(33)		70(32)		100(36)		80(32)	

Note: Figures in brackets e.g. (5) are female respondents

$R = -0.226$, $R^2 = 0.051$, $Df = 170$, $p \leq 0.05$
 Calculated $t = -3.022$; Critical $t = 1.962$

$R = -0.255$, $R^2 = 0.065$, $Df = 178$, $p \leq 0.05$
 Calculated $t = -3.517$; Critical $t = 1.962$

Source: Field survey data (2016)

The study found that the respondents who were illiterate and those with basic education in both AIS and WKIS participated more actively in management than those with tertiary and university level of education. A few respondents who had attained university level of education actively participated in irrigation management. Some male discussants in both AIS and WKIS reported that the few respondents who had university level of education who were participating actively had retired from white collar jobs in the civil service and thus preferred to work on their rice farms instead of doing nothing at home. Below is a relevant narrative from a retired civil servant discussant who is a farmer:

"I am University graduate who retired from the Civil Service 10 years ago. My pension is too small to cater for my family and since I own a 2-acre plot of rice, it can subsidize my pension"(65 years old retired university graduate farmer).

The above perspective implies that active participation in management decreased with increase in level of education except for a few retirees who only actively participated to improve their earning status. The finding in AIS and WKIS are not consistent with previous studies by Azizi and Zamani (2009) in a rice irrigation scheme in Iran or Pandey and Zuresh (2007) study in a rice irrigation scheme in India who found that highly educated people or the elite participated more significantly than their less educated counterparts. However, these empirical studies were from large scale rice irrigation schemes where technical skills were a critical requirement. In the Pandey and Zuresh (2007) study in India, the domination by the local elites was advantageous in terms of enhancing communication with external agencies and resource mobilization among others.

A male discussant farmer from AIS who had acquired basic education divulged that:

"Many of our educated children do not want to be associated with growing rice and that is why we as parents do involve ourselves even if we do not have enough confidence, ability and knowledge. Otherwise NIB will take over management if we do not involve ourselves"(55 year old male discussant from AIS).

A male discussant farmer from WKIS who had attained University education narrated:

"Majority of rice residents in these two rice schemes are same old poor farmers who lack knowledge and skill in management but actively participate. A few of us who are educated are normally reluctant to invest and actively participate in non-profit rice growing activities. We are active in other businesses" (A male graduate discussant from WKIS).

From such narratives, the study found that although the less educated farmers in AIS and WKIS participated actively, they generally lacked confidence in their ability to manage and improve on rice production. The highly educated believed that rice irrigation was non-profit making therefore, they did not actively participate. This is contrary to findings of Nyangito and Odhiambo (2004) who concluded that education is one of the key drivers of community participation particularly with respect to community mobilization, effective communications and provision of leadership. And where it is lacking; the community can hardly participate effectively. Some farmers in AIS and WKIS only participated to keep NIB away from management even though they did not have the capacity and knowledge in rice management. The finding contradicts one of Arnstein's (1969) tenets which states that the ability to

participate depends on people's knowledge, skills and confidence and this was lacking in AIS and WKIS.

Many female farmers had not attained both tertiary and university education as seen in Table 4.3. This was further confirmed in section 4.1 where some male and female discussants in both schemes reported that very few women in AIS and WKIS had attained tertiary and university level of education. Notably, many female farmers were found and observed to be illiterate therefore they could not participate actively in irrigation management including rice production in AIS and WKIS.

4.5 Influence of Farm Size on Extent of Participation in Rice Irrigation Management

The size of the farms used for purposes of growing rice was studied. The farms ranged from 1 acre to 4 acres. As outlined in Fig 4.4, most of the respondents in AIS (50%) and WKIS (46%) owned between 3 and 4 acres. Very few farmers (19% in AIS, and 24% in WKIS) owned 1 acre or less for rice growing. It was also established that rice was the primary source of income among the respondents. The expectation was that those with larger farms would participate more actively in rice irrigation management activities because they had invested more resources in their farms.

Figure 4.4: Distribution of farmers' farm sizes in AIS and WKIS



Source: Field survey data (2016)

The size of the farm owned by the respondents was cross tabulated with their participation in rice irrigation management to establish whether there was a relationship. The results are shown in Table 4.4. The *t* calculated; (7.076) for AIS and (6.287) for WKIS were greater than the *t* critical (1.962) hence there is a significant relationship between farm size and participation in rice irrigation management. *R* = 0.477 and 0.426 for AIS and WKIS respectively indicate a positive relationship between farm size and their participation in rice irrigation management. *R*² = 0.228 in AIS indicate that farmers' age account for 22.8% of farmers' participation in rice irrigation management. In WKIS, farm size accounted for 18.2% of the farmers' active participation in rice irrigation management (*R*² = 0.182). As observed elsewhere in this chapter, farmers' participation in rice irrigation management was also determined by other socio-economic characteristics of the smallholders.

Table 4.4: The Relationship between farmers' farm size owned and extent of participation in rice irrigation management

Farm Size in Acres	Ahero Irrigation Scheme					West Kano Irrigation Scheme					
	Extent of Participation					Extent of Participation					
	Active		Passive	Total		Active		Passive	Total		
	F	%	F	%	F	F	%	F	%	F	
1	12	37.5	20	62.5	32	20	45.5	24	55	44	
2	36	66.7	18	33.3	54	30	55.5	24	45	54	
3-4	72	83.7	14	16.3	86	64	78.0	18	22	82	
Total	120		52		172	114		66		180	
<i>χ</i> ² =10.574, Df=2, Not Significant <i>R</i> = 0.477, <i>R</i> ² =0.228, Df=170, <i>p</i> ≤0.05 Calculated <i>t</i> =7.076; Critical <i>t</i> = 1.962						<i>χ</i> ² =9.010, Df=2, Not Significant <i>R</i> =0.426, <i>R</i> ² =0.182, Df=178, <i>p</i> ≤0.05 Calculated <i>t</i> =6.287; Critical <i>t</i> = 1.962					

Source: Field survey data (2016)

The results demonstrate that for both AIS and WKIS, farm size influenced the extent of participation in irrigation management. Those with between 3-4 acres of rice farm actively participated in management unlike those with fewer acres of rice farms. The finding regarding the relationship between farm size and the extent of involvement in management of irrigation activities in AIS and WKIS concurred with earlier studies by Arun et al. (2012) in

Tamil Nadu and Adeoti (2009) in Ghana which found that participation of farmers in the activities of irrigation management increased as farm size increased. The major difference was that the study by Arun et.al was done in irrigation schemes with much larger farm sizes than the farms in AIS and WKIS where socio-cultural factors dictated the subdivision of farms to family members. The study in AIS and WKIS further found that one factor which threatened all the farm holdings was growing conflicts over access to rice farm land among family members. An informant from WUA in AIS explained the matter thus:

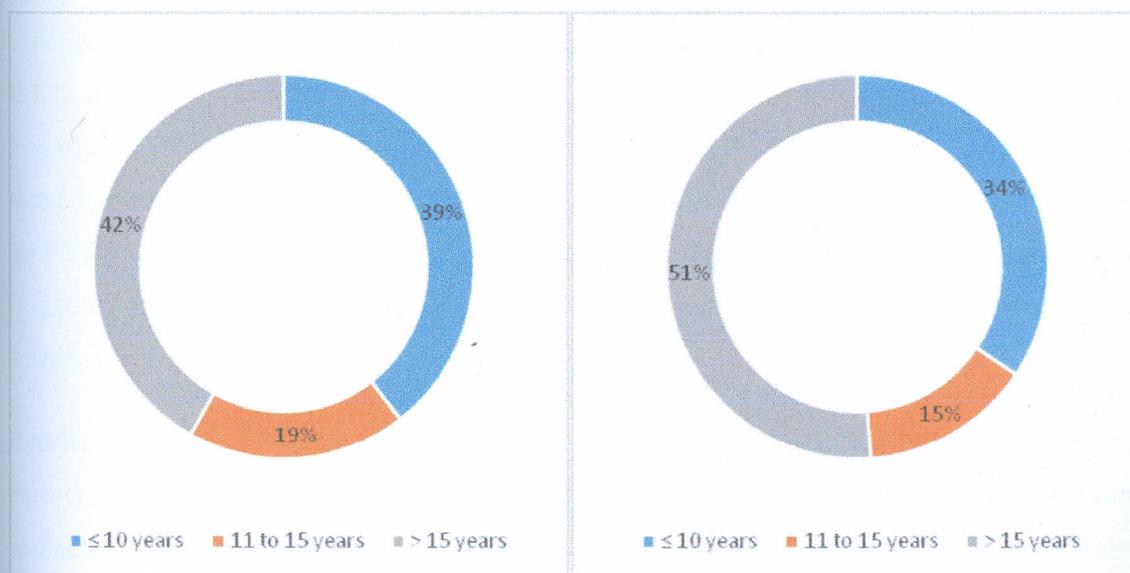
"If a household had many sons (married) the household head had to allocate them some rice farm though still under his name and without a title deed. The whole of last year, my family members could not cultivate rice because of conflicts arising as a result of the division of rice farm for my four married sons from my two different wives. Each wanted to have their own rice farm" (WUA key informant from AIS).

From the verbatim narratives, it was evident that division of rice farms was sometimes associated with many family conflicts which reduced their rate of commitment in rice irrigation process including management and this had influence in rice production. This contradicts one of Arnstein (1969) tenets which stress that all participants in any development process should show commitment but this was lacking in some household in AIS and WKIS due family conflicts.

4.6 Influence of Farming Experience and Extent of Participation in Rice Irrigation Management

The expectation here is that long experience in rice irrigation farming should be associated with active participation in the management of rice irrigation activities. Sustained involvement could also be because the farmers were gaining in rice production in terms of income. Figure 4.5 shows the distribution of the sampled farmers in AIS and WKIS. About 42% of farmers in AIS and 51% of farmers in WKIS had over 15 years of irrigated rice farming experience. Those with 10 or less years worth of rice farming experience were close to 40% in AIS and 34% in WKIS. Less than one-fifth (20%) of the farmers in both AIS and WKIS had experience ranging from between 11 and 15 years. The mean farming experience was 12 years.

Figure 4.5: Distribution of respondents' years of experience in rice irrigation farming in AIS and WKIS



Ahero Irrigation Scheme

West Kano Irrigation Scheme

Source: Field survey data (2016)

The farming experience of the respondents was cross tabulated by participation in rice irrigation management as shown in Table 4.5.

Table 4-5: The Relationship between farmers' year of experience in rice farming and participation in rice irrigation management

Experience (Years)	Ahero Irrigation Scheme				West Kano Irrigation Scheme							
	Active		Passive		Active		Passive		Total			
	f	%	F	%	F	%	F	%	F			
0-10	32	47.1	36	53.3	68	100	18	29.0	44	71	62	100
11-15	20	62.5	12	37.5	32	100	14	53.8	12	46	26	100
Over 15	60	83.3	12	16.7	72	100	82	89.1	10	11	92	100
Total	112		60		172	100	114		66		180	

$\chi^2=20.376$, Df. =2, $p\leq 0.05$
 $R=0.513$, $R^2=0.263$, Df=170, $p\leq 0.05$
 Calculated $t=7.798$; Critical $t=1.962$

$\chi^2=15.110$, Df. =2, $p\leq 0.05$
 $R=0.570$, $R^2=0.325$, Df=178, $p\leq 0.05$
 Calculated $t=9.260$; Critical $t=1.962$

Source: Field survey data (2016)

The t calculated; (7.798) and (9.260) for AIS and WKIS respectively were greater than the t critical (1.962) hence there is significant relationship between smallholders' farming experience and participation in rice irrigation management. $R = 0.513$ and 0.570 for AIS and WKIS respectively indicate that the most of the experienced farmers participated more in rice irrigation management. $R^2 = 0.263$ in AIS indicate that farmers' age account for 26.3% farmers' participation in rice irrigation management. In WKIS farming experience accounted for 32.5% ($R^2 = 0.325$). As observed previously in this chapter, farmers' participation in rice irrigation management was also determined by other socio-economic characteristics of the smallholders.

Results reported in Table 4.5 confirm a significant association between the two variables. Farmers with more experience in rice irrigation farming actively participated in rice management while farmers with less experienced passively participated in both AIS and WKIS. The study found that farmers with less experience were the same youthful farmers who had not stayed in these schemes for a long time and they owned very little of the rice farms and this had influence in rice production.

The findings reported in this study concur with those of Svendsen (2000) in the case of Nepal and those of Erhabor (1982) and Tarfa (1990) in Nigeria. The three studies found that farmers with more years of experience in rice farming participated more actively than those with fewer years of experience. A majority of farmers in AIS and WKIS who had more years of experience in rice irrigation farming participated more actively in rice management than those with few years of experience in rice farming. As mentioned in Anstein's perspective, participation does not just happen, but is a process that requires preparedness or experience which majority of farmers in AIS and WKIS had.

One of the male discussants from WKIS narrated that:

"My experience in irrigation farming for over 15 years has assisted me in rice management in the scheme. I have experience in farm operation management such as clearing drainage and field canals level desilting"(54 year old male discussant from WKIS).

This shows that increased years of rice irrigation farming improved the quality of participation in rice irrigation activities in the two rice irrigation schemes that were surveyed. However, in AIS and WKIS, experience in farming by the farmers had very minimal impact in rice production. The farmers with experience only participated in management activities

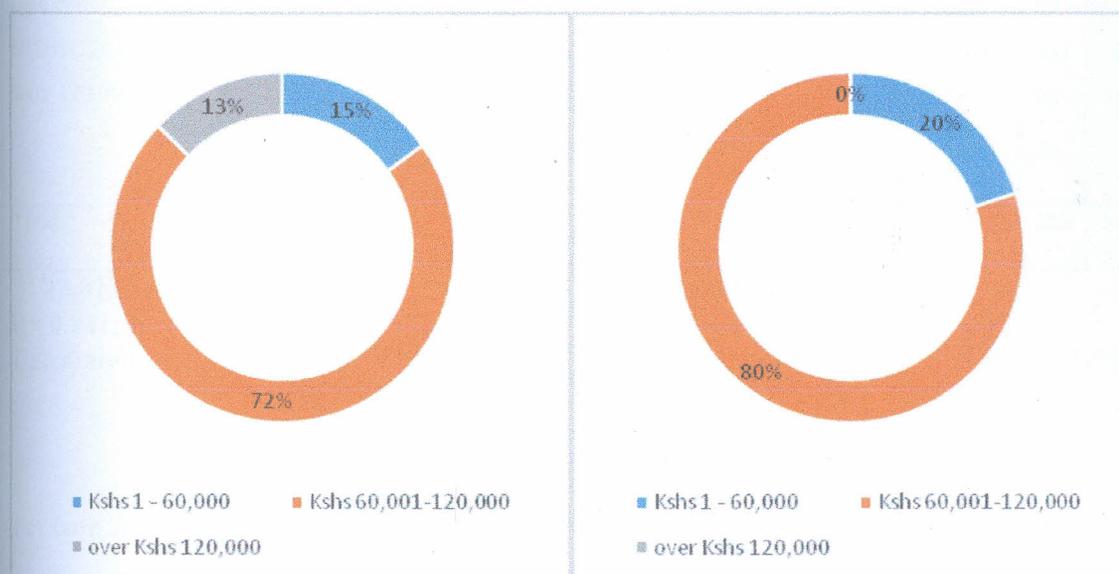
that were directly connected to their rice farms such as farm operation management like desilting or cleaning the canals. However, regardless of their long farming experience in rice farming activities, rice production did not improve as shown on Table 1.1

The study further found that those with more experience in rice farming activities who actively participated in management were the same age as those who were reported to be poor and made very little income from rice farming. Those with less experience in rice farming activities who passively participated were the same youth who owned very little of the rice farms and had negative perception about rice agriculture in general.

4.7 Influence of Income Earned from Rice on Farmers' Extent of Participation in Irrigation Management

The final variable that was considered relevant in influencing farmers' involvement in the management of rice irrigation activities was income accruing from rice farming. This variable is discussed below.

Figure 4.6: Distribution of income earned by farmers in AIS and WKIS



Ahero Irrigation Scheme

West Kano Irrigation Scheme

Source: Field survey data (2016)

Income earned from rice production was calculated based on annual harvest, with the earnings falling within the range of between Kshs 60,000.00 (and below); and a high Ksh 120,001.00 and above. These figures and the distribution of sampled farmers within them are

shown in Figure 4.6. From rice growing, households earn varying income levels annually. In both rice irrigation schemes, the modal annual income was between Ksh 60, 0001 and Ksh120, 000, representing 72% of the respondents surveyed in AIS and 80% of the farmers in WKIS. More revealing was that 13% of the farmers surveyed in AIS had annual income from rice farming above Ksh120, 000. Not a single farmer from the WKIS had an annual income of above Ksh 120,000 from rice cultivation.

Annual incomes from rice production (benefits) were cross tabulated with the extent of participation in rice irrigation management to establish whether there was a relationship. The results of the cross tabulation are outlined in Table 4.6.

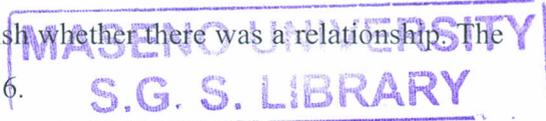


Table 4.6: The Relationship between farmers' income from rice and their extent of participation in rice irrigation management

Income From Rice (Kshs)	Ahero Irrigation Scheme						West Kano Irrigation Scheme					
	Active		Passive		Total		Active		Passive		Total	
	F	%	F	%	F	%	F	%	f	%	F	%
0-60,000	14	53.8	12	46.2	26	100	22	61.	14	38.9	36	100
60,001-120,000	94	75.8	30	24.0	124	100	92	64.	52	36.	144	100
Over 120,001	12	54.5	10	46.0	22	100	0.0	0.0	00	0.0	00	0.0
Total	120	69.8	52	30.2	172	100	114	63.3	66	36.7	180	100

$\chi^2=13.023, Df=2, p \leq 0.01$
 $R=0.241, R^2=0.058, Df=170, p \leq 0.05$
 Calculated $t=3.238$; Critical $t=1.962$

$\chi^2=6.047, Df=2, p \leq 0.05$
 $R=0.225, R^2=0.051, Df=178$
 Calculated $t=3.086$; Critical $t=1.962$

Source: Field survey data (2016)

For both AIS and WKIS the t calculated; (3.238) and (3.086) respectively, were less than the t critical (1.962) hence there is a significant relationship between farmers' income from rice and participation in rice irrigation management. $R = 0.241$ and 0.051 for AIS and WKIS respectively indicate that most of the farmers' with higher income from rice farming were active in the rice irrigation management. $R^2 = 0.058$ in AIS indicate that farmers' age account for 5.8 % farmers' participation in rice irrigation management. In WKIS farmers' income accounted for 5.1% of smallholders' participation in the management ($R^2 = 0.051$). As

observed elsewhere in this chapter, farmers' participation in rice irrigation management was also determined by other socio-economic characteristics of the smallholders.

The table shows that farmers with annual incomes of above Ksh60, 000 were more actively involved in rice irrigation management activities than their colleagues with lower annual incomes. The majority of the farmers (95%) in the two schemes relied on rice as one of their primary source of income. Rice farming therefore played an important role in improving their livelihood. Only 5% relied on other sources of income. This fact was further voiced by a male discussant from AIS as follows:

"After harvesting rice we only retain up to 50kg or less of rice for home consumption but sell the rest. Market for rice is a problem so sometimes we keep our paddy rice in the store for a long time and this really affect my family because we mainly rely on rice which is grown only once a year unlike other farmers who have other farms for maize or sugar cane. Sometimes, we look for alternative sources for our families' livelihood because rice produce is not enough yet it is grown only once a year"(Male discussant from AIS).

The above observation confirms that most of the rice produced by farmers in AIS and WKIS was for sale with a paltry amount of rice produced for domestic consumption. A majority of the respondents relied on rice for their livelihood. However, although rice takes only three months to mature, it is only grown once a year per farmer in the two schemes; a factor which was found to have an influence on the extent of respondents' participation in rice management. A key informant from the cooperatives in WKIS reported that there was no continuity in management and rice production because rice was not being produced continuously in the two schemes. Each rice farmer harvested rice only once a year and this had an influence not only on management but also rice production.

Another male discussant from AIS narrated:

"Rice is only grown once a year per block due to shortage of water. However, any time we harvest a lot of rice and get more profit, we are encouraged to actively participate in both management and production but when the production is low, farmers are demoralized"(male discussant from AIS).

This implies that farmers in the two schemes actively participated when the profits from rice were high but got demoralized when the profits were low. These finding concur with Maleza and Nishmura (2007) study in Bohol where they found that the benefits derived from any irrigation schemes served as a powerful incentive for farmers to participate in the management process. Farmers who were satisfied with the benefits in Bohol actively

participated in management. However, in both AIS and WKIS, very few farmers benefited from rice farming and this had an influence on their participation in rice management. Low benefits from rice production did not encourage active participation in rice irrigation management hence rice production in AIS and WKIS.

The verbatim narratives indicated that the way the farmers participated in rice irrigation management had a strong influence on rice production. Shah et al., (2002) argue that the participation process works well in situations where individual stakes and benefits are high including rice production. Where production is low, participation may be passive. In AIS and WKIS, individual stakes were very low. Very few farmers benefitted financially from rice farming. According to Arnstein (1969), people get committed when they feel that they can achieve something and get apathetic when they do not. Farmers in AIS and WKIS cannot be completely committed to rice production including management because the benefit from rice was low.

Although rice was found to be the main source of income thus the main source of benefit, it was reported that rice was only grown once a year. Growing rice once a year had implications for its management. Since rice was not grown continuously, there were times when the farms remained fallow without any farming activities. Thus, some of the farmers were not fully committed to rice management because, one harvest could not guarantee them food security or improve on their livelihood during the whole season. This encouraged the farmers to look for other ways of improving their livelihood which affected their level of participation in rice irrigation management for improved rice production.

The findings in AIS and WKIS are contrary to studies by Maleza and Nishimura (2007) in Bohol; Analgo et al (2014) in the Kpong rice scheme, Ghana which found that farmers are more likely to participate in the management of irrigation resources if they rely solely on such activities for their livelihood and when the number of available alternative livelihoods are low.

Moreover, literature documenting participation experience such as Shah et al., (2002) suggest that all or a majority of farmers involved in the successful management of rice schemes are full-time farmers, who derive a substantial proportion of their livelihoods from irrigated farming. This builds their stake in self-management and increases the time and resources that they commit to it. This is supported by one of Arnstein (1969) tenets which stress that for the

stakeholder to succeed; they should trust each other and share some commitment, time and resources needed for the project. It is therefore pertinent to note that farmers in AIS and WKIS were not involved in rice irrigation throughout the year, which partly explains their low commitment to the management of rice irrigation activities and this had an influence on rice production.

As a result of there being only one rice growing season in AIS and WKIS, farmers were only active participants in rice management once a year. Yet, according to Ruthenberg (1993), continuous rice irrigation and its management has the potential to improve rice production. Off-farm activities negatively influenced the farmers' level of participation in rice management thereby determining rice production levels in AIS and WKIS.

One male discussant in WKIS described this low commitment thus:

"We have been asking NIB to allow us to grow rice twice a year but they keep on talking of limited water. We tried growing tomatoes through irrigation but they were invaded by some pests. Some of us are engaged in boda-boda or in selling tomatoes"(male discussant from WKIS).

Besides the farming activities undertaken in the two rice irrigation schemes, it was observed in the narratives that other off-farm activities also contributed towards farmers' efforts in enhancing their livelihoods albeit indirectly. Sometimes, the rice farmers were engaged in off-farm activities such as boda-boda, selling tomatoes and offering wage labours on other rice farms to improve on their livelihood. Further, a key informant from WKIS reported that, sometimes, some farmers depended on relief food assistance and stipends from relatives who are employed in urban areas for regular upkeep and food.

4.8 Extent of rice Production as Community Participated in Management in AIS and WKIS

Besides comparing data on rice production before and after the introduction of IMT (2003-2016) as shown in Table 1.1, the study further examined the self-reported assessment of the respondents regarding the extent to which their rice production improved as they participated in rice management in AIS and WKIS and the results are found on Table 4.7

Table 4.7: Extent of rice production as community participated in rice management

Extent of rice improvement	Ahero Irrigation Scheme		West Kano Irrigation Scheme	
	F	Percent	F	Percent
Substantial	8	4.7	6	3.3
Moderate	48	27.9	38	21.1
Very little	116	67.4	136	75.5
Total	172	100.0	180	100.0

Source: Field survey data (2016)

A majority of farmers in AIS (67.4%) and WKIS (75.5%) indicated that their participation in rice management activities has resulted in very little improvement in rice production. Very few respondents in AIS (4.7%) and WKIS (3.3%) indicated that their participation had led to substantial improvement in their rice production. The reasons given by the farmers for not actively participating have been covered under constraints in chapter 5.

The Revolving Fund Official from AIS who was a key informant further explained that there was low and inconsistent rice production from the two schemes due to the fact that the farmers were not effectively participating in management. He further mentioned other factors that this study has considered as constraints in chapter 5.

In summary, evidence presented in this chapter has confirmed that all socio-economic characteristics of the farmers cross tabulated had influence on their extent of participation in rice irrigation management activities and rice production. These were: gender, age, farmers' level of education, farm size, years of rice irrigation farming experience and income/benefits from rice farming. The male, old farmers with low education, farm size ranging between 3-4, farmers with high experience in irrigation farming and farmers who earned from rice between ksh.60000- ksh.120, 001 actively participated in rice management. The youth and female farmers passively participated for varied reasons. These had influence on rice production in AIS and WKIS.

CHAPTER FIVE

THE NATURE OF PARTICIPATORY RELATIONSHIPS IN RICE IRRIGATION MANAGEMENT AND CONSTRAINTS ENCOUNTERED BY THE FARMERS AS THEY PARTICIPATE IN RICE IRRIGATION MANAGEMENT

5.1 Introduction

This chapter presents the findings and discussions with respect to the second and third objectives namely, the nature of participatory relationships in rice irrigation management and the constraints encountered by the farmers as they participate in rice irrigation management. The findings and discussions on participatory relationship at the household and scheme levels were based on computing averages from the two schemes while constraints were ranked according to the frequency in which they were mentioned by the respondents from the two schemes.

5.2 The nature of Participatory Relationships in Rice Irrigation Management

This section was divided into two: participatory relationships in rice irrigation management at the household level and the participatory relationships at the scheme level. At the household level, the findings and discussions of participatory relationship between the household members and their implication on rice production were presented while at the scheme level, the study presented the findings and discussions on participatory relationship in management between the WUA (farmers' representative) and the NIB and their implication on rice production in AIS and WKIS.

5.2.1 Intra-Household Participatory Relationships

At the household level, there was intra-household division of labour and responsibilities in rice production and, by extension, rice irrigation management. The responsibilities included: performing physical activities and control of resources as shown in Table 5.1. Both male and female farmers detailed the activities performed by all their children, sons and daughters (17 years and below) as shown in the table.

Results in Table 5.1 disclosed that about two-thirds of the respondents stated that within each household, male heads had more control over critical activities and resources such as decision making, finance and land related to rice farming, while wives had minimal control over the same activities and resources. Only 32% of wives were sometimes allowed to make decisions, while only 34% of wives owned land (residents) and another 34% controlled funds

at the household level. In contrast, approximately 60% of the respondents expressed the view that wives were mainly involved in physical activities such as fertilizer top-dressing, cutting, heaping, directing canal water, packaging and transporting rice to markets. Over 70% of the respondents stated that wives were mainly involved in weeding and transplanting seedlings. Finally, over 80% of wives' tasks were reported to include staking/drying, threshing and attending to domestic responsibilities. Note: The information on children was given by the respondents (farmers) and not the children themselves.

Table 5.1: Distribution of household member's roles in rice production activities

Roles	Husband		Wife		Son		Daughter	
	No.	%	No.	%	No.	%	No.	%
Control of finance	232	66	120	34	-	-	-	-
Decision making	228	65	112	32	12	3	-	-
Land ownership (residents)	232	66	120	34	-	-	-	-
Preparing the nursery bed	38	11	282	80	24	7	8	2
Transplanting seedlings	56	16	264	75	32	9	-	-
Fertilizers top dressing	130	37	222	63	-	-	-	-
Spraying	162	46	120	34	70	20	-	-
Directing water into canals	110	31	242	69	-	-	-	-
Weeding	106	30	246	70	-	-	-	-
Chasing away birds	42	12	0	0	310	88	-	-
Cutting	112	32	240	68	-	-	-	-
Heaping	124	35	228	65	-	-	-	-
Staking/drying	50	14	302	86	-	-	-	-
Threshing	0	0	292	83	14	4	46	13
Packaging	84	24	242	69	18	5	8	2
Transportation	116	33	214	61	22	6	-	-
Marketing	158	45	194	55	-	-	-	-
Domestic work e.g. cooking	0	0	274	78	8	2	70	20

Source: Field survey data (2016)

The study results confirmed that the intra-household participatory relationship that existed in the area of study replicated socio-cultural division of labour where a majority of men owned the means of production and participated more in rice irrigation management, while the

majority of women provided labour for rice production but could not participate in major management activities such as the control of finances, land or decision making.

Some female discussants in AIS reported that the financial control by the husband was evident in the report that any sales made from rice by wives had to be sanctioned by the husband for family expenses. A male discussant in WKIS further reported that in female-headed households, the eldest son had to be consulted even while the wife (his mother) was making these decisions in rice management. This further marginalized the wives or women in the decision-making process at the household level.

Woman discussants in WKIS narrated that:

"We can only make decisions on finance or rice farm after death of our husband but with consultations from our older sons or older male in-laws but my husband consults nobody in the family. He uses income from rice the way he prefers without considering my input in rice farming"(45 year old female discussant from WKIS).

The finding shows that some wives could only make decisions, own rice farm (resident) and control finance after the death of their husbands but even then, only in consultations with their older sons or older male in-laws. Husbands, on the other hand, rarely consulted or shared information with other members of the family. In another FGD in WKIS, a male discussant reported that, in the case of sickness, a wife could not use money earned from rice without first seeking permission from the husband. He retorted that:

"A wife is the husband's property so how can property control property. Women only have control over chicken, milk and utensils and have no say in money earned from rice"(62 year old male discussant from WKIS).

This kind of participatory relationship was found to be associated with some intra-household conflicts. For instance, this study found that many female (86% from AIS and 89%) farmers in the household in both schemes were not happy with the way the household income that was earned from rice was being spent by their husbands especially after the wives had worked hard on their rice farm. A female discussant from AIS mentioned that their husband used the income from rice to buy liquor and to marry other women. As a consequence, some women preferred working as wage laborers on other rice fields or participating in privately owned rice farms instead of working on the household rice farm. This dynamic was narrated by a female discussant in AIS in the following way:

"I worked so hard in our rice farm last year and we made a lot of profit but he ended up marrying another wife without even buying for me shoes. This time I am working on my own hired farm (*achung kenda* rice farm). We cannot trust these men. Let him farm alone or look for paid labour"(45 year old female discussant from AIS).

Another female discussant in WKIS narrated

" These men make us work so hard in the rice farm but when they are paid, they do not even give money for buying *sukuma* (kales) or milk. So we have resorted to actively work in other farms to earn some money for buying food among others" (40 year old female discussant from WKIS)

This implies that female farmers in the household needed to be appreciated for their work on the rice farm or be given some money to buy food for the family and when this was not provided by their male household heads, they became reluctant to work on the family rice farm. There was limited trust and commitment among female farmers. This finding does not conform to one of Arnstein (1969) tenets where she stresses that people are most likely to be committed to carry something through if they have a stake in it but become apathetic when they are unable to achieve something. Female farmers were not receiving any benefit from the family rice farms despite being involved in major physical activities in rice farming. There was disharmony in homes. As a result, female farmers in the household preferred working as wage labourers in other rice fields or working on privately owned or hired rice farms known as "*achung kenda*" for their own benefit. Such intra-family participatory relationship led to low rice production in AIS and WKIS.

The findings in AIS and WKIS concur with Norfolk (2010) study in a rice irrigation project in Northern Cameroon which also had intra-household conflicts over labour allocation, resource control, benefits and compensation. According to Norfolk (2010) finding, after some time, many wives left their family rice farms unattended and this affected rice production. In AIS and WKIS, many wives preferred working as wage labourers elsewhere and this had influence in rice production. When gender equality issues are not taken into account, at the household level, female farmers in the household can become worse off, both financially and in relationships with their husbands.

The study findings in AIS and WKIS contradict those of Greiser and Rawlins (1996) in rice schemes in Egypt and those of de Brauw et al., (2008) in China where there was improved rice production due to the increased involvement of all male household heads together with their wives in irrigation activities, including rice management. In these studies in Egypt and

China, there was intra-household income sharing arrangements between the male headed households and their wives after rice production. Both husbands and their wives were thus motivated to participate not only in the rice production process, but also in rice irrigation management and this positively influenced rice production. In another study by Gueye (2014) in a rice scheme in Burkina Faso, women obtained irrigated plots and managed them on an individual basis just like their male household heads. The productivity of the two members of the household was found to be higher than in households where irrigation process was controlled by male household heads only. The study by Gueye (2014) in Burkina Faso also supports the fact that working together as household members with shared benefit is more profitable. This was found to be lacking in AIS and WKIS.

From the narratives and reports, many women in AIS and WKIS were not motivated to invest their labour in household rice farms and this had an influence on their participation in rice production including management. The marginalization of women in terms of being residents, decision making and financial control certainly thwarted efforts at using the family as a tool for improving rice production. The non-recognition of women in rice production processes at the household level in AIS and WKIS introduced intra-household conflicts which discouraged many women from working on their family farms. This then had a negative influence on rice production in AIS and WKIS.

The parents also disclosed the a few areas where their children were assisting them in rice farming. This included preparing the nursery beds, chasing away birds, threshing and packaging. In an FGD in AIS and WKIS which separately involved male and female discussants, the findings confirmed that the main reason behind the participation of their children in rice production was to assist their parents/ guardians especially when there was inadequate labour. The parents admitted that children only participated during the weekends and holidays. Other children assisted in rice growing to raise funds for educational purposes to ease the burden from their parents. It was observed that, as the children approached youthful stage (from 18 years), they developed a negative perception towards irrigation agriculture and this made them not to participate actively in rice irrigation activities including rice management.

5.2.2 Participatory Relationships between WUAs and NIB in Rice Irrigation Management

This study further examined the nature of participatory relationship between WUAs, (the farmers' representatives) and the NIB in various rice irrigation management activities and decision making activities for improved rice production. There were rice management activities that the WUAs were supposed to be actively making decision on at the scheme level. For example, WUAs were meant to be actively involved in the decision making process of: farm operations, clearing of drainages and field canals, service road maintenance, social formation of farmers' representatives, farmers' welfare, level desalting, marketing, water control, control and access of other resources and the rehabilitation of irrigation system (Table 5.2).

Table 5.2: Decision making levels between WUAs and NIB in rice management

Decision-making levels in Management Activities	WUAs (Farmers Representative)		Government agent/NIB	
	Number	%	Number	%
Farm operation	274	78	78	22
Clearing drainage and field canals	226	64	126	36
Service road maintenance	116	33	236	67
Policy making decisions ^a	100	28	252	72
Association formation(e.g. WUAs)	250	71	102	29
Farmers' welfare	264	75	88	25
Level desilting	254	72	98	28
Marketing	194	55	158	45
Water control structure ^a	154	44	198	56
Control and access to resources ^a	116	33	236	67
Rehabilitation of irrigation system ^a	112	32	240	68

^a = Major Management activities

Source: Field Survey data (2016)

The results in Table 5.2 indicate clearly that a majority of WUA members actively made decisions on the following management activities: farm operation activities (78%), clearing drainage and field canals (64%), level desilting (72%), farmers welfare (75%) but passively

made decision in control and access to resources (33%), rehabilitation of irrigation system (32%), service road maintenance, policy making decision (28%) and water control (33%). These findings show that most of the farmers did not make decisions on the major high policy rice irrigation management activities which were also meant to be their responsibilities. WUA members only made decision on minor routine management activities as shown. This implies that they participated in the lower rungs of participation according to one of Arnstein's (1969) tenets. They were not involved in defining the process and or in creating the policy-making content and instead only concentrated on minor policy making strategies.

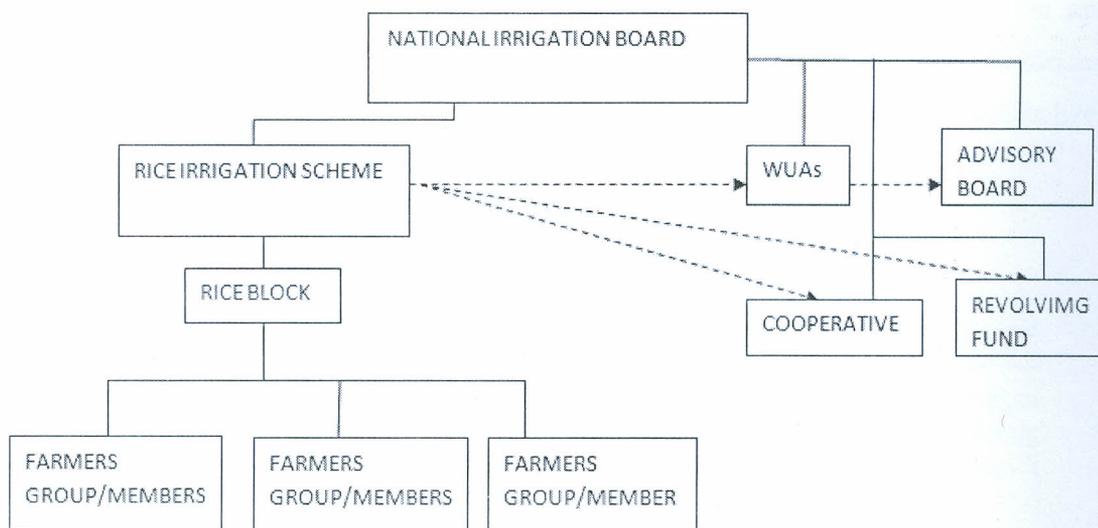
The finding implies that the farmers were actively participating in decision making management activities which were directly affecting their rice farms and not those management activities that were indirectly related to their rice farms or plots. For example, the farmers participated more in making decisions concerning clearing water field canals drainage and level desilting which were more connected to the proximity of their rice field because when left uncleared, they would render the farmers' plot degraded by water logging, leakage and growth of too many weeds which directly affected their rice production. Yet in IMT, the farmers were meant to participate in all rice management activities listed in Table 5.2.

A majority (71%) of the farmers were also found to be involved in making decisions concerning the formation of associations that represented them in rice irrigation management. These were WUA, Revolving Fund, Advisory Board and Cooperatives. While the WUA was the overall farmers' representative in management, the Advisory Board Committee mainly performed the advisory role functions which included the settlement of disputes among farmers and solving inheritance matters of rice farms among other welfare responsibilities. Revolving fund and cooperatives sought inputs such as funds or loans from other stakeholders or purchased inputs on behalf of their members. Only a few (29%) of respondents did not participate in the formation of these associations and committees.

The associations and committees were appointed from the farmers' groups and blocks to represent the farmers in the management of the schemes. The representatives or the executives of the associations were trained and developed by NIB. They therefore worked in collaboration with NIB. However, even with the inclusion of farmers' representatives in some committees in the two schemes, it was observed that, some of these representatives rarely had

power and confidence to make decisions independently. These associations sit at the bottom of the management structure with the Ministry of Water and Irrigation and NIB being responsible for the overall strategy since they are at the top of the hierarchy as shown in the organogram in Fig 5.1.

Figure 5.1: The Organogram of Farmers Associations and NIB:



Source: Author. 2016

Besides the well defined management activities for NIB as a reform irrigation agency, NIB still actively controlled major management activities meant for farmers/ WUAs in the following areas: service road maintenance (67%), policy-making decision (72%), water control structure (56%), control and access to resources (67%) and rehabilitation of irrigation system (68%). It was learnt that the NIB was participating in these major management tasks because the farmers were not prepared for most of these management activities. The NIB could not relinquish certain duties readily to the farmers because some of the farmers were illiterate and lacking in technical skills yet as a reform agent responsible for the formulation and implementation of IMT, the NIB needed to have prepared the farmers for all management activities. It was observed that the NIB did not prepare the farmers adequately. This finding concurs with Suhardiman (2013) study in Indonesia where the reform agent or the government agency that is equivalent to the NIB was responsible for the formulation and implementation of IMT in rice schemes in Indonesia but resisted change by not training or preparing the local community for IMT. However, the socio-cultural context of Indonesia is

quite different from that of Kenya, especially the AIS and WKIS in Kisumu County. According to the Nkhoma and Mulwafu (2004) study in a rice scheme in Malawi, aspects of IMT such as training the farmers and rehabilitation of the scheme were adopted in the mid-1990s but implemented in 2000. Although the scheme in Malawi is not a success story, the government agency in Malawi tried to make some reforms for management. Studies by Tewari and Khama (2005) and Nkhoma and Mulwafu (2004) noted that, for any irrigation scheme to be successful, farmers must be aware and prepared for all the rules and responsibilities in management and participate in all aspects of the management process including decision making. They further pointed out that farmers should not be marginalized in rice irrigation management activities as was found in AIS and WKIS.

A male discussant from AIS narrated that:

"We only participate in areas allocated for us by the government agency. We cannot use force to manage activities not given to us even if they are meant for us to manage. Besides, they (NIB) have not trained us in all our management tasks. We do not have enough training. Since 2004, we have only had 2 training sessions but many workshops showing how to control pesticides. We cannot trust NIB"(Male discussant from AIS).

This study found that there were conflicting participatory relationships between the farmers/WUA and the government agency, the NIB. A majority of the management activities meant for the WUA were still being done by the NIB, which reduced the involvement of the farmers in rice management. According to the findings, the community did not have the power to influence major decisions that were made in rice growing which implies that they were in the lower rung of management as compared to the NIB. From the findings, WUA's involvement was in the lower rungs, not because of their own making but due to NIB reluctance to prepare them for all rice management activities in the whole irrigation scheme. Arnstein's theory (1969) stresses that the practitioner should manage the process over time and allows the beneficiary more control over what happens. She adds that many problems in the participation processes arise because of inadequate preparation within the implementing organization. WUA which was meant to be representing farmers in ensuring equitable water distribution, and ensuring that the secondary and tertiary irrigation canals were cleaned regularly was just partially participating in its water management activities because of inadequate preparation and this had an implication on rice production in AIS and WKIS.

Both NIB and WUA did not trust each other, another finding which contradicts that of Chackacherry (2012) study on irrigation management in Andhra Pradesh and Salina and Humberto's (1994) study in Azua, where it was found that both the farmers and their government agents trusted and consulted one another freely and this had an influence on the rice production in those areas. However, one of Arnstein's tenets stresses that both the beneficiary and practitioner should trust each other as they participate in a project meant to benefit participants who in this case are rice farmers in AIS and WKIS. A key informant from the NIB argued that it could not relinquish certain management tasks to farmers due to farmers' weaknesses. He narrated that:

"Some of these farmers cannot be trusted, they are illiterate and cannot be involved in policy management activities but still insist that they should be included in decision making in the scheme"(NIB key informant).

It was reported by a WUA key informant from WKIS that some of the farmers had only attended two training sessions since 2004 and many workshops which were not connected to community participation in rice management and rice production. A male discussant in WKIS described NIB personnel as exploiters, liars, corrupt, uncooperative and stubborn. They also owned a lot of shares in the scheme, according to him. He asserted that:

"Some NIB personnel are very uncooperative and stubborn when you ask them about water issues. This is because they own and have a lot of shares in the scheme. They still control many facilities in the scheme. If we want water pump to be repaired as an emergency, they become stubborn and uncooperative. They have refused to allow us to actively make major decisions in rice irrigation management in WKIS"(Male discussant from WKIS).

This narrative was supported by a key informant from the Advisory Board in the AIS who reported that the NIB controlled a big capacity in the area of study in terms of technical expertise, facilities and political support while the farmers were still incompetent in many management activities. The researcher observed that many facilities belonged to NIB and the farmers had acquired only a few tractors from the County Government of Kisumu County.

These two narratives and reports imply that the NIB still had a lot of control in the management of these two rice schemes. It was observed that any time WUA personnel wanted to do anything in the scheme; they had to consult NIB personnel. For example when the researcher needed an office in which to hold FGDs and key informant interviews, the researcher was referred to go through NIB personnel to be allowed to use one of the rooms in

the schemes. It was also observed that the offices for NIB personnel were permanent and well kept while those of WUAs, the Revolving Fund, and Advisory Board committees were makeshifts or stores turned into offices. This indicated the permanency of NIB and the extent to which it still had control over many irrigation facilities and resources while the farmers had very few facilities or resources under their control. This finding concurs with those of Kabutha and Mutero (2012) in the Mwea irrigation scheme where even after the farmers had revolted for change, all signs indicated that the NIB was there to control major management activities. To confirm this, the Ministry of Water and Irrigation reconstituted a new NIB manager for farmers and only imagined that it was the individual officials the Mwea farmers revolted against. No wonder, Kabutha and Mutero (2012) refer to the "unresolved issues" in Mwea irrigation scheme which needed to be solved for the success of IMT.

These interpretations reveal the idea of the struggle for power between WUAs or farmers representatives and NIB. The farmers were unable to participate in making decisions in some of the major management activities because they were not adequately prepared to actively participate in such rice management activities. The WUA and NIB members did not trust each other. According to Suhardiman (2008), the formulation and implementation of IMT was to be done by a reform agent such as NIB. As a reform agent, NIB was responsible for the organizational development of WUAs including the empowerment of WUAs to actively participate in all its management tasks for sustainable rice production. However, increasing the power of WUAs meant reducing the power and authority of the NIB, an aspect which the NIB was not ready to accept. Both the WUA and NIB gave conflicting participatory relationships. Arnstein (1969) identified the partners involved in participation namely the practitioner and the stakeholder for example the NIB and the WUAs or farmers' representatives. The practitioner may help or hinder the development of the project (Arnstein, 1969). The practitioner is an individual who plans and manages participation processes while a stakeholder is anyone who has a stake in what happens. However, since the practitioner controls much of what happens in an organization, it may be difficult for the practitioner to control both access to funds and other resources and play a neutral role in facilitating a participation process (Arnstein, 1969). This implies that it may have been difficult for the NIB as the practitioner, to control both resources, have a big share in the two schemes and play a neutral role in facilitating community participation process. While the farmers tried to be actively involved in rice management through their WUAs, the NIB did not readily give

the power or authority they still had. As a result of such kind of power struggle in management, rice production in AIS and WKIS could not be sustained.

5.3 Constraints Encountered by the Farmers as they Participate in Rice Irrigation Management Activities

The respondents were asked to identify the constraints they encountered as they participated in rice irrigation management in AIS and WKIS in Kisumu County. A number of constraints were identified and ranked as shown in Table 5.3.

Table 5.3: Distribution of Constraints encountered by Farmers in AIS and WKISs

Constraints	AIS			WKIS			Combined		
	No	%	Rank	No	%	Rank	No	%	Rank
Lack of appropriate Institutional framework for WUAs	112	65	8	106	59	8	218	62	9
Unpreparedness and unempowerment	146	85	1	144	80	1	290	82	1
Dependency & Passivity	146	85	1	144	80	1	290	82	1
Cost of mechanization & Pumps	112	65	8	118	66	9	230	65	7
Imbalance Representation in WUAs & other committees	88	51	10	96	53	10	184	52	10
Land tenure issues	120	70	7	108	60	6	228	65	7
Involvement of NIB in management	136	79	4	120	67	4	256	73	4
Lack of credit facilities, input & markets	146	85	1	144	80	1	290	82	1
Inadequate Benefits from rice farms	126	73	6	118	66	5	244	69	5
Others	136	79	4	108	60	6	244	69	5

Source: Field survey data (2016)

The ranking runs from 1-9: In the top position are: Unpreparedness/Unempowerment; Dependency and Passivity; and Lack of credit, and input and output market. In the next place

is Inadequate Benefits from rice farming; this is followed by others. Constraints linked to land are the next, followed by costs associated with mechanization and irrigation pumps. Towards the bottom is lack of appropriate institutional framework for WUAs or farmers' representatives in rice irrigation management; and the related imbalanced representation in WUAs.

The data in this table was further portrayed graphically in Figure 4. Further the above highlighted constraints are discussed in detail below.

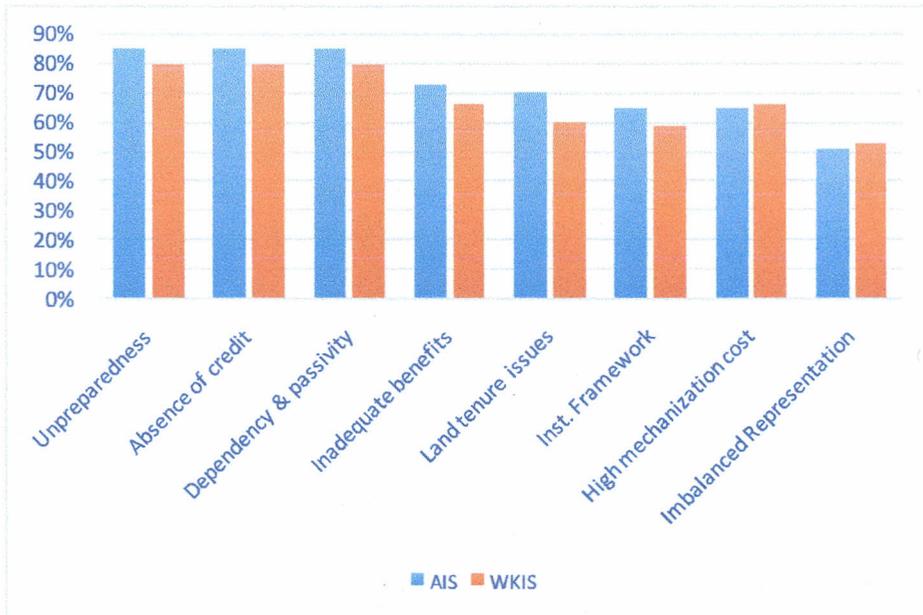


Figure 5.2: Graphic Representation of Constraints Encountered by Farmers

5.3.1 Unpreparedness and Unempowerment

Most of the farmers in AIS (85%) and WKIS (80%) did not feel empowered or sufficiently prepared to make simple day-to-day decisions affecting the management of the schemes such as water control, road maintenance or policy making decisions. It was reported that they had to keep referring issues to NIB. The rest of the farmers who constituted no more than 20% in AIS and 20% in WKIS reported being prepared for the management issues which included changes in irrigation management although a male discussant in AIS scheme narrated that:

"Only a few of us are actively involved in management activities which directly benefit us such as revolving fund and advisory management activities"(male discussant from AIS).

A study by Nkhoma and Mulwafu (2004) on two rice irrigation schemes (Domasi & Likangala) in Malawi is relevant in assessing the lack of empowerment and preparedness reported here in the case of AIS and WKIS. In the two rice irrigation schemes in Malawi, the two scholars found that the farmers were trained and therefore prepared for the transfer of irrigation management. It is, however; still important to point out that training is not a sufficient condition for empowerment. For example, another study sponsored by FAO (2000) in the Principe rice irrigation scheme in Zimbabwe, found that even after two years of training for the transfer of management, some farmers still felt that they were being "weaned" too early. Moreover, in the case of AIS, a farmer in a discussion group remarked that:

"We do not feel empowered enough to make simple day-to-day decisions affecting the management of the schemes. We have only attended two training sessions since 2009 so, we have left almost everything for NIB to manage"(Male discussant from AIS).

The reactions by farmers in AIS and WKIS imply that preparedness requires time. However, according to Arnstein's (1969) perspective, passive participation in rice irrigation management arises because of inadequate preparation within the promoting organization such as the NIB. The farmers in AIS and WKIS were not prepared in terms of human and financial capacity. They had only attended very few sessions of training in rice management.

The variation in preparedness of the farmers in AIS and WKIS also demonstrated the aspect of whether there was a genuine transfer of management or manipulation which is a tenet in Arnstein (1969) theory. Almost 14 years after the transfer of management to farmers in AIS and WKIS, the study found that there was inadequate community preparedness. The farmers or their representatives kept on referring management matters to the NIB because they were not competent in some of the management activities. For example, a key informant reported that it was not uncommon to find infrastructural challenges being blamed on the NIB even where local efforts could be mobilized for minor repairs such as water pumps or flooded canals. Lack of management capacity decision-making powers, in turn, aggravated over-dependency syndrome and created some apathy thereby reducing interest among the farming communities concerning rice production.

5.3.2 Dependency and Passivity

As results in Table 6.1 reveal, 85% and 80% of the farmers in AIS and WKIS respectively, indicated that an atmosphere of passivity and dependency still prevailed in the two rice schemes. A male discussant from WKIS made this informative remark:

"Everything used to be done for us by NIB except for weeding, harvesting, moving irrigation water in our farms and finally being paid from the harvest from our farm. The abrupt withdrawal has left us without enough confidence so we still want help from NIB"(Male discussant from WKIS).

Clearly, the abrupt withdrawal of the government through the NIB left the farmers still dependent and passive in a sector where they were supposed to be active and independent. The remarks of the key informant quoted above confirmed that many farmers still expected most of the irrigation activities to be done for them by the NIB. Although the farmers were supposed to be the major stakeholders in management as per IMT policy, the farmers or their representatives were not ready to perform all their management duties including payment of water bills due to the farmers' dependency and passivity. A male discussant from AIS narrated:

"We have not learnt many management strategies. NIB should continue monitoring water for irrigation so that they repair water pumps without involving us"(male discussant from AIS).

This finding in AIS and WKIS about the dependency and lack of initiative (passivity) on the part of the rice farmers supports those of other studies. Examples are a study done by Sonyolo et al., (2011) in former homeland rice irrigation schemes in South Africa was found to have had long history of dependency on state agencies or their parastatal. This finding concurs with Samad (2001) study in the White Nile pump irrigation schemes in Sudan, Kolawole (1995) study in a rice irrigation scheme in South Chad, and Bergall (2000) study in rice irrigation scheme in Tanzania. In addition to the long history of dependency, the farmers in the White Nile irrigations and South Chad were reported to have faced great difficulties in organizing themselves to take up management activities previously performed by the various state agencies. Like in AIS and WKIS, the study by Kolawole (1995) in South Chad also found that, the farmers did not readily accept their involvement in management due to passivity in management. It is no wonder that the NIB still controlled major management activities in AIS and WKIS and used the excuse that the farmers were illiterate and lacking in

technical skills. It was further reported by a key informant in AIS that many households in AIS spend a lot of time waiting for development to happen through the efforts of others and point accusing fingers at other players when no external support is received. Arnstein (1969) points out that participation has no meaning unless the participants involved have significant control over decisions concerning the organization to which they belong. Many farmers in AIS and WKIS were still dependent and passive in a sector which had been transferred to them to manage. This kind of situation had negative effect on rice production in the two schemes.

5.3.3 Lack of credit facilities, other Inputs and Markets

A large percentage of the respondents in AIS (85%) and WKIS (80%) indicated that they lacked credit and input for rice production and processing. Such lack of credit has serious implications for rice farming. A study by Maluleke (2000) of 66 households from the Sepitsi and Veeplaats farms of Arabie-Olifan in South Africa has relevant lessons for farmers in AIS and WKIS. Mululeke's study found that farmers with access to credit produced and sold more rice than farmers who did not receive credit. Since the findings of this study confirms that many farmers in AIS and WKIS lacked credit facilities and the inability to access loans, it is logical to conclude that such circumstances limited these farmers' active participation in rice production and processing.

The above conclusion is reinforced by Arnstein's (1969) tenet that stresses that participation has no meaning unless the participants involved have meaningful access to and control over resources and decisions concerning activities and projects in which they are involved in. The participants should also be actively engaged in resource mobilization in preparation for the self-sustainability of projects in the long-term (Arnstein, 1969) such as rice schemes. Without access to meaningful credit, the farmers cannot afford the inputs needed for increased rice production and marketing. It will be recalled that AIS and WKIS farmers also complained of lack of markets for their excess rice. Access to markets requires information and transportation. Both require availability of funds. Lack of access to credit therefore denies farmers access to effective markets.

5.3.4 Inadequate benefits or income from rice farming

The constraint of insufficient benefits or income from rice farming was identified by sizeable proportions of farmers in AIS (79%) and WKIS (67%). They indicated obtaining insufficient incomes from rice farming and that this had negative implications on their participation in rice irrigation management. Literature documenting IMT experience suggests that all or a majority of farmers in successful IMT cases were full-time farmers deriving a substantial proportion of their livelihood from irrigated farming (Shah et al., 2002).

Full-time farming builds their status in self-management and enhances their commitment of time and resources towards irrigation management. In AIS and WKIS where farms were small, farmers were compelled to pursue a fox strategy of depending on a variety of sources to earn a livelihood, a perspective stressed by Chambers, (1983). For example, in these two schemes, rice was only grown once a year, the farms ranged from 1-4 acres and a majority of the farmers earned less than Ksh 60,000 per harvest. The male discussants in both AIS and WKIS reported that due to minimal benefits from rice cultivation, many farmers resorted to other off-farm activities to improve their livelihoods. This had a negative influence on farmers' participation in rice irrigation management and rice production in AIS and WKIS.

5.3.5 Insecure Land Tenure

Still many of the respondents in AIS (70%) and WKIS (60%) indicated that they could not access and control resources in the rice schemes. These proportions are relatively smaller than for the other constraints so far discussed in this study. The findings show that over 60% of the respondents had limited access to and control over resources including the use of credit facilities, access to loans and farm inputs for rice production. Many farmers in AIS and WKIS also lacked title-deeds. Accordingly, they regarded themselves as "outsiders" who most likely weakened their loyalty and commitment to irrigation management. A male discussant who had been denied loan on several occasions narrated:

"I have been a resident for this scheme for over 30 years but anytime I ask for Loan from KCB bank among others, I am told to produce the title for my plot. This scheme has only one title and the government has refused to subdivide and give us individual titles. This has really discouraged us from actively participating in rice growing including its management"(male discussant from AIS).

The narrative confirms that all rice farmers in the two schemes did not have title deeds for their rice farms. Historically, these schemes started as settlement schemes for the landless (Kabutha & Mutero, 2012). However, the settlers who used these scheme for rice growing felt that since they had stayed in these schemes for over 50 years, they could own them and be given title deeds. An NIB key informant from AIS reported that there was only one title deed for all rice farms in AIS and WKIS owned and kept by the NIB and this was confirmed by a male discussant in WKIS who further said:

"We do not have titles for our rice farms yet we have been in these schemes for over 50 years. We cannot even get loans from the bank yet revolving fund and our cooperatives do not have enough funds for buying inputs or loan"(Male discussant from WKIS).

A study conducted in by Gabra (2001) in a rice scheme in Nigeria showed that for IMT to work, it is important to assign clear water and land rights. Insecure land tenure limits farmers' incentives to make long term development investments on their rice land (Gabra, 2001). The inability to offer land as collateral for obtaining credit is another disadvantage. Shah et al., (2002) point out that, often, the lack of clarity among the plot-holders about their precise rights with respect to their plots seems more problematic than the absence of ownership. Arnstein (1969) stressed that participation has no meaning unless the participants involved have meaningful access to and control over resources and decisions concerning the organization to which they belong. Arnstein (1969) further indicated that the participants should also be actively engaged in resource mobilization in preparation for the self-sustainability of the irrigation scheme projects in the long term. These conditions were missing in both AIS and WKIS in Kisumu County, Kenya.

5.3.6 High Cost of Mmechanization and Pumps

Approximately 65% and 66% of the farmers in AIS and WKIS respectively indicated that there were high cost involved in rice mechanization and that pumping water for irrigation was also very costly. It was observed that most of the income earned from rice was spent on paying for water which costed about ksh 3500 Kenyan shillings per acre per year. Part of this money was used for pump repair. Rice farms were prepared for farming using tractors which costed about ksh 2000 Kenyan shillings per acre per year. A male discussant in AIS narrated that:

"We are not making any profit in rice production. A lot of money, about Ksh 3500 is paid for electricity and repairing water pump when it breaks. About Ksh 2000 is spent on ploughing land. We are longing for gravity flow of water which will require very little pumping if necessary"(A male discussant from AIS).

A key NIB informant from AIS reported that during the time of the NIB management, the scheme had enough machinery and equipment to handle all operations. But after the takeover by the farmers, it has been difficult to even repair the old machines or buy new ones due to financial constraints. A female discussant narrated:

"The county government promised to assist us with facilities such as tractors. We have been waiting but to no avail. NIB should provide water freely"(female discussant from WKIS).

The finding reported above shows that running the scheme is an expensive undertaking. There were funds needed to meet the cost of fertilizers, land preparation, pest control, gunny bags for rice storing and payment of farmers. The efforts to get credit from commercial banks were generally unsuccessful. Many discussants in both AIS and WKIS reported that market outlets for rice were limited. Due to lack of markets, the harvested rice was sometimes kept in the store for a very long time.

A WUA key informant from AIS further reported that after the withdrawal of NIB management, hiring farm machinery and equipment at affordable rates was slow and varied. The rental rates were also high. As a result, the rising cost of production not only eroded the margin from irrigated farming but also increased working capital requirements and this affected rice production in AIS and WKIS. According to Arnstein (1969), power depends on who has money, skills and information. Consequently, since the farmers in AIS and WKIS did not have enough working capital, this limited their power of decision making and eventually negatively affected their management and rice production.

5.3.7 Lack of Appropriate Institutional Framework for WUAs

Respondents in AIS (65%) and WKIS (59%) noted that there was a lack of appropriate institutional framework to facilitate the functions of WUAs or farmers' representatives in rice irrigation management. The farmers were represented by the WUA among other sub-committees but according to the findings, a majority of the farmers indicated that the WUAs

lacked appropriate institutional framework for farmers' participation in rice irrigation management. This was further supported by a male discussant from AIS who observed that:

"Our WUA is not effective. We are not aware of the functions, rules and regulations of our WUA. It is manipulated by NIB. Our WUA keep on referring matters to NIB"(Male discussant from AIS).

This was further confirmed by a key informant from WUA who reported that there were some major management tasks where NIB still had more control than WUA. He reported that the NIB had the authority to register or deregister the WUAs. One WUA field officer entrusted with the maintenance of a water-course in management carried out his duty to the satisfaction of NIB and not WUA executives.

Another WUA key informant from AIS reported that the scheme management structure had been formulated under the guidelines set by NIB and resembled similar ones in other rice irrigation schemes. This finding further indicated that the socio-cultural contexts of the area of study were not considered when WUAs as the farmers' representatives was being established.

The finding implies that the WUAs did not have as much authority and power in rice irrigation management as the NIB. This finding contradicts the study by Gabra (2001) in Nigeria where it was found that the WUAs were organized into self-supporting, self-regulating, self-governing and self-sustaining groups with all necessary institutional and legal frameworks in their operations. The government agency was responsible for organizational development of the WUAs and empowered the WUAs through training.

The study finding in AIS and WKIS were similar to those of Mollinga (2001) in Punjab and Kamataka rice schemes in India where it was found that WUAs lacked the legal right to manage the rice schemes while farmers also did not understand the activities of WUAs. These studies did not examine the implications of the lack of legal rights for WUAs in rice production. In AIS and WKIS, the lack of legal frameworks for the WUA not only limited the extent of their participation in rice management but also limited rice production among their members. The WUAs in AIS and WKIS were not empowered and as such, they solicited NIB assistance in most of their management activities. Such dependence had an influence on rice production. Accordingly the WUAs only participated in the lower rungs of management (tokenism) because they could not make some major decisions on their own without

consulting the NIB, finding supported by one of Arnstein tenets where she stresses that at the lower rungs, there can be a one way relationship in which the practitioner produces and delivers information for use by the citizen since the citizen cannot make decisions. The WUAs lacked any legal rights to make decisions.

5.3.8 Disproportionate gender representation in WUA and other Ccommittees

Just a little over 50% of the respondents in both AIS and WKIS indicated that there was an imbalanced representation in communities and that there were gender disparities in the various associations and committees in rice irrigation schemes. Comparatively, this constraint, ranked low even though it was important. Female discussants from both schemes reported that there were unfair and corrupt ways of representations leading to squabbles and misuse of funds among other constraints. It was further reported by discussants in AIS that governance challenges were affecting elections and representations in associations, a fact that easily led to apathy particularly when one clan or gender dominated certain positions in a particular committee or board.

As mentioned earlier, women were found to be underrepresented in WUAs in the two rice schemes in Kisumu County. This situation is contrary to the informed view of Gueye (2014) that have shown that low participation of women in irrigation management have retarded the progress of irrigation including production. Empirical studies by Greiser and Rawlins (1969) in a rice scheme in Egypt and those of de Brauw et al. (2008) in China, show that the joint responsibility in rice irrigation management positively influences rice production and, in turn food security. Gender disparities that existed in rice irrigation management activities in AIS and WKIS had influence on rice production.

5.3.9 Other constraints

Other constraints mentioned in focus group discussions in both schemes revolved around lack of commitment, lack of unity of purpose, and inadequate motivation. It is worth noting that for commitment to develop there is need for tangible benefits that result from one's participation in rural development such as a rice irrigation scheme (Makadhu, 1993; Mambala, 2007). Without a sense of belonging by persons who are involved in a project, individuals have a tendency to take advantage of one another, leading to corruption and apathy.

According to Chaskin et al. (2001), the farmers should see themselves as stakeholders in issues regarding the whole community in the scheme and must be ready to get involved in addressing the constraints that may arise from time to time. Little motivation among farmers can also cause low participation in rice irrigation management (Gebregziabher, 2009). This may subsequently lead to low rice production in areas of operation. It should be noted that sometimes farmers may not be able to solve problems due to lack of capacity as seen in the rice management in AIS and WKIS.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter provides a summary of the findings made in the preceding chapters. This study investigated the influence of farmers' socio economic characteristics on the extent of their participation in rice irrigation management; examined the nature of participatory relationships in rice irrigation management and assessed the constraints the community encountered while participating in rice irrigation management for improved rice production in AIS and WKIS. The summary and conclusions in this chapter are derived from the findings and discussions. The inferences made from this study are then used to come up with the recommendations and suggestions for further research.

6.2 Summary of Findings

The first objective, concerning the influence of farmers' socio-economic characteristics on the extent of their participation in rice irrigation management is summarized below:

All the six socio-economic characteristics of the sampled farmers in this study namely, gender, age, farmers' level of education, rice farm size, years of rice irrigation farming experience and income earned from rice farming had a significant influence on the extent of the farmers' participation in rice irrigation management.

To begin with, active participation was more common among the following: male farmers; older farmers especially those aged 56 years and above; farmers with low level of education; farmers who had been in irrigated rice cultivation for 15 years and above; and farmers who earned an annual income from rice production ranging between Ksh. 60,001 and 120,001. Rice production was found to be low because many farmers were not actively participating in rice irrigation management in the two schemes.

Active participation increased with age. The youth did not actively participate in rice management because some believed that rice farming was uneconomical enterprise while others argued that they did not have their own rice farms yet there were plenty of gazzeted rice farms in AIS and WKIS lying idle or uncultivated. A majority of the youth did not own

any rice farms (they were not residents) in these two schemes. They worked more on their parents' rice farms and made very little income. Many preferred the *boda boda* (motor bike taxi) trade. Yet the study found that the elderly could not perform all management activities and this affected rice production.

There was disproportionate gender representation in rice management not only due to social-cultural perceptions that were found to undermine the capabilities and opinion of women in this community, but also due to other rules of entry into leadership position in rice irrigation management that made it impossible for women to participate in management in these schemes. For example, the literacy level was low among many female farmers. Due to many domestic roles, many female farmers could not get enough time to regularly attend meetings which were also held far away from their homesteads. Women too did not prioritize participating in rice management. Some preferred selling tomatoes or attending women group meetings where they got some income or table banking loans for their own use.

The second objective was to examine the nature of participatory relationships among the farmers at the household level and between WUAs and the NIB at the scheme level. There were interesting findings related to participatory relationships among the farmers at the household level and between the farmers or their WUAs and NIB officials in rice irrigation management. At the household level, men had more control over critical activities and resources such as decision making, finance and the land related to rice farming. In contrast, many of the respondents reported that women (wives) were mainly involved in manual labour activities such as transplanting seedlings, fertilizer top-dressing, weeding and cutting, heaping, irrigating, packaging and transporting rice to the markets. The study found that even though women actively participated in manual labour rice activities, they did not benefit from the proceeds of rice production at all. Their husbands dictated how income earned from rice was to be used. They did not even share rice income with their wives. Such participatory relationships led to mistrust and low commitment of women with respect to participation in their own family rice farms. As a consequence, some preferred working as wage labourers on other rice fields or participated in privately owned rice farms known as "*achung kenda*" rice farms instead of working on the household rice farm. This led to low rice production in AIS and WKIS.

At the scheme level, the study revealed that the NIB commanded high policy management activities which were meant for the WUAs. WUAs only actively participated in management activities which were directly affecting their own rice farms. NIB officials perceived the farmers to be poorly educated and incapable of handling these major management tasks. While WUA described NIB personnel as exploiters, liars, corrupt, uncooperative, stubborn. Relations between NIB and WUA and other farmers' organizations were characterized by suspicion, tension and conflict and this had an influence not only in management but also in rice production in AIS and WKIS.

The third objective was to assess the constraints the farmers experienced as they participated in rice management and rice production. The study found that the farmers experienced a lot of constraints while participating in rice irrigation management and, by extension, rice production in both AIS and WKIS. Key among the constraints were lack of training that resulted in unpreparedness and lack of empowerment; dependency and passivity that denied farmers the capacity for taking initiative leading to near monopoly of critical decisions on irrigation activities by the NIB; lack of access to credit that denied farmers access to critical farm inputs and reliable markets for their rice;; low financial returns from rice farming; and additional costs associated with mechanization and irrigation pumps. Additional constraints were lack of appropriate institutional frameworks for WUAs or farmers organizations in rice irrigation management and the related imbalanced or disproportionate gender representation in WUA.

6.3 Conclusions

A majority of the old farmers with less education actively participated in rice management yet their income from rice was low. There was very little involvement of the youth and women. While some of the youth were unwilling to engage in rice farming because they found it to be uneconomical enterprise, majority of the youth did not own any rice farm. Instead, the youth preferred *boda boda* trade or looked for employment elsewhere. However, there is compelling evidence of an aging farmer's population in the two schemes which must be addressed to facilitate sustainability of rice production in the long term.

Low benefits from family rice farms made the majority of female farmers to prefer working as wage labourers in other rice field or participated in privately owned rice farms (*achung kenda*). Relations between farmers and the NIB were characterized by conflicts. NIB still

controlled decision making within the scheme to a great extent, and not the WUAs. Although very little training had been offered to the farmers, the farmers showed very little interest in training on management.

Key among the constraints experienced included inadequate training that resulted in unpreparedness and lack of empowerment; dependency and passivity that denied the rice farmers the capacity for taking initiative and thus allowing involvement of NIB in major management activities; lack of access to critical farm inputs; low financial returns which people to look for alternative income earning activities elsewhere; lack of appropriate institutional framework for WUAs and disproportionate gender representation in the WUAs.

6.4 Recommendations

First, involving the farmers in rice irrigation management for sustainable rice production requires that their management capacity be improved. For example, it was observed that while the majority of men had attained basic education, very many had no technical and managerial skills in management. Majority of women could not read and write. It is therefore recommended that more capacity training be provided to all rice farmers especially women and youth to enhance their participation in rice irrigation management for improved rice production. There is also need to improve the image that people have concerning rice irrigation. Greater awareness of the benefits of rice irrigation as a career needs to be created amongst the youth.

Second, the roles and responsibilities of the NIB and WUAs should be incorporated into policy discussions. This should include a review of the Irrigation Act which forms the basis for the formation of the scheme management structures so that community participation is embedded within the legislative framework. The Irrigation Act should be revised to give adequate space and legal backing to all rice farmers' associations including defining and harmonizing roles and responsibilities of all the stakeholders in rice irrigation management. There should be sensitization seminars or workshops organized at the county level by the Ministry of Agriculture, with the support of the national government aimed at improving relations between WUAs and the NIB.

Third, farmers need to have greater access to credit. This will allow them to afford crucial farm inputs and explore viable markets for the extra rice they are able to produce. Rice

irrigation farmers in the two schemes should strengthen their revolving fund and or cooperatives through which they can access soft loans and provide collective security for the funds that they borrow.

6.5 Suggestions for Further Research

The finding from this study recommends the following areas for further investigation:

First, a further investigation to be carried out in the area of study on how the youth and female farmers can actively participate in management and rice production in AIS and WKIS.

Second, a further investigation on why, as a reform agent, the NIB did not succeed in fulfilling its duties such as in formulating and implementing the irrigation management transfer to the farmers in AIS and WKIS in Kisumu County, Kenya.

Third, a similar study should be done on rice irrigation schemes in Kenya which have not adopted IMT strategy for comparison purposes.

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