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Capacity Building in Participatory Monitoring and Evaluation on Sustainability of Food Security Irrigation Projects

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Abstract: health-related problems and even death among animals and human beings. Agriculture is the main food source; thus, many interventions are made such as that of irrigation by the local county and national government initiated through the National Irrigation Board (NIB). Despite the irrigation projects food insufficiency still persists, therefore their sustainability is questionable. One such approach to improving the sustainability of irrigation projects is participatory monitoring and evaluation which leads to ownership and then higher sustainability. In the study, the objective was to asses if taking corrective action after participatory monitoring and evaluation (PME) influence project sustainability. The study used a descriptive survey and correlation designs to collect data from 316 respondents selected using stratification sand purposeful with strict randomization. Questionnaires were administered and interviews were conducted on selected sample respondents on appointed dates. Data were analyzed using SPSS version 25.0 to get descriptive statistics, correlations coefficients were obtained to test association and degree of strength. Testing of the hypothesis was done using linear regression. The study findings were that a large number of respondents were between ages 31 to 40 years and most were female with their highest level of education being primary school. The influence of PME capacity building on the dependent variable and irrigation projects sustainability found that the farmers were not taken for exposure visits and project officers were not accountable for money use. Age, gender, and education level have very minimal influence on PME capacity building. PME capacity building had a weak positive influence of r = 0.290 and it explained only 8.4% of irrigation projects sustainability in Kitui County. The study recommends that to improve project capacity building: project revenue must be controlled on use, farmers must be taken for exposure visits to learn from successors, project officers should be accountable for funds use, and project guidelines should be improved to increase sustainability. Implementation of these recommendations will reduce the loss of Arid and Semi-Srid Lands (ASALs) and attain higher and longer sustainability in food projects, thus, reducing the recurrence rate of food shortage, improve and hasten the implementation of irrigation projects, show the need to involve primary stakeholders in project monitoring and appraisal for sustainability, better and efficient decisions by policymakers to increase chances of project's success.

Keywords: Food security, Participatory monitoring and evaluation, irrigation, taking corrective action, capacity building, sustainability, funds management, projects

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1. Introduction

The problem of the food supply is linked to many issues, but looking at the way things are currently in the world, agriculture and people's food consumption patterns must be improved. Improvement of rural areas can result in more food being produced to feed people (UN, 2013).

Climate change is creating more risks and leaving many people hungry. In 2013, the United Nations (UN) advised that thoughtful modification of the worldwide food and farming system is necessary if we are to feed the current 925 million people and the additional two billion people estimated by the year 2050. The UN Sustainable Development Goals SDGs are many. However, this study looked at three of them which are the second, sixth, and the seventeenth on the extent of their attainment. The second goal of the SDGs is Zero hunger meaning to end hunger, achieve food security, improved nutrition and promote

sustainable agriculture. If everyone cooperates it can be achieved by the year 2030. Among many approaches advocated on is to use irrigation (UNDP, 2015). Access to clean water and improving sanitation form the sixth SDG. Water insufficiency affects more than 40% of people globally, thus, a need to protect water sources (UNDP, 2015). Moreover, this is the same water needed for irrigation.

Revived global partnership for sustainable development is the seventeenth SDG goal. There is a need to work together and involve all affected to end climate change. The SDGs are big challenges. UNDP (2015) aired a view that all nations need to work together as it is the case for stakeholders in irrigation projects to achieve their goals. The frequent food insecurity and emergency food requirements noted in the horn of Africa is a glaring reminder that inadequate attention has been given to mitigating the real causes of susceptibility in the arid and semi-arid lands (ASALs) of the African region. One such ASAL is Kitui County in Kenya.

Thousands of residents in Mwingi, Kitui East and Lower Yatta parts of Kitui County were in need of relief food following massive crop failure in 2013 (OCHA, 2013). Over 80% of their crops failed due to insufficient rainfall. The Kitui County government responded to this food insecurity where it unveiled a Kitui Marshall Plan to fast-track development in the region (KCG, 2015). More earth dams, sand dams, and boreholes were dug so that residents have access to water for domestic, livestock, irrigation, and tree planting uses (CIDP, 2014). Food in small quantities is also purchased from neighbouring counties which are also ASAL, hence, not a reliable source because they face the same challenges of insufficient rains. The County government allocated Sh320 million for water and irrigation projects in the financial year 2015-2016 (FEWS, 2015). The national government of Kenya having noted this challenge of poor rains by using the National Irrigation Board NIB it set up six irrigation projects which are facing many and varied operational challenges. Despite their set-up food insufficiency is still high thus a concern on the degree of their sustainability. The rainfall is irregular and undependable in March to May thus irrigation is a major food source to the County (Kitui County, 2015)

1.1. Statement of the problem

Food insufficiency in Kitui County of Kenyan republic is regularly noted with much food aid and supplementation to curb a worsening situation. Many interventions are in place to increase food production. One such intervention is the NIB irrigation projects. However, some projects are less productive while some others are not operational hence, the concern whether food irrigation projects are sustainable. Capacity building in participatory monitoring and evaluation (PME) is one tool that if used in these projects will increase the chances of more food production.

Since farmers with capacity can do PME, data collection, analysis, and then taking corrective action where projects sustainability is expected to be higher. Since there are other factors that affect food production including climate change, rainfall patterns, agricultural food diseases, supply chain among others, this study focuses on the influence of PME capacity building on the sustainability of the food irrigation projects. Hence, if farmers will participate in PME irrigation projects problems will easily be identified and actions can be taken, thus, improving project sustainability by increasing food production and reducing hunger by some significant degree.

1.2. Objective and limitations of the study

The study aimed to find out the influence of PME capacity building on the sustainability of irrigation projects in Kitui County. The research question drawn from the objective is:

What is the influence of PME capacity building on the sustainability of irrigation projects in Kitui County?

Implementation of the study recommendations will reduce loss of lives in ASALs, attainment of higher food projects sustainability, thus, longer food supply will reduce recurrence rate of food shortage, improve and hasten implementation of irrigation projects, show need to involve primary stakeholders in project monitoring and appraisal for sustainability, better and efficient decisions can be made by policymakers to increase chances of projects success.

The study limitations were that some respondents would have given their questionnaires to other people to answer on their behalf, thus the researcher administered the questionnaires personally. Respondents would have given limited information; hence, they were given assurance of privacy and confidentiality by the researcher and assured confidentiality using a covering letter. Local farmers would not be able to read English, so a translator was used. A guide was used to assist the researcher in data collection for he was unfamiliar to rural Kitui County.

1.3. Theories

The study is informed by the four theories as given as follows: utilization-focused evaluation theory by Patton (1999), which proposed that evaluation is done with the aim of utilizing results by intended users. It outlines the utilization process, inclusive while focusing on how to get and use the PME results to improve and learn or capacity building, and then take collective actions. The Social learning theory by Albert Bandura (1977), which proposed observational learning or modelling that people learn by watching other people perform a certain behaviour like irrigation which explains how farmers learn new irrigation tactics by watching the experts around them and successful farmers met in exposure visits, thus, eventually imitating them.

The stakeholder theory argues that there are many parties who form stakeholders, including financiers, communities, governmental bodies, political groups, and even competitors to name a few where all have the capacity to affect the project. They affect projects positively and negatively, so their concerns should be looked into the participation theory by (Miles, 2012), which proposed that when the local beneficiaries are involved in PME they get to know the world of evaluation and learn on what the project entails. In PME farmers are involve and they create meaning from what they see and do and what needs to be done to attain the project goals.

1.4. Knowledge gaps

The UN case studies and SDGs discussed above indicates that community participation of local farmers, capacity building through education and training, data collection and analysis for monitoring, evaluation, and utilization are critical for project success and sustainability, thus, this

study aimed to assess if such is done in irrigation projects in Kitui County.

2. Literature Review

This section has literature on UN SDGs, UN case studies and theories guiding the study.

2.1. The UN sustainable development goals (SDGs)

Pushed by a need to improve human wellbeing the UN has many SDGs and the second SDGs is Zero hunger to all, achieve food security, improved nutrition and promote sustainable agriculture. So far globally in the past 20 years, hunger has fallen by almost half. Many countries are better at feeding their people. An extra mile to finish hunger and malnutrition for all is best. It's not a mean task but it better to help nearly one in every nine people on earth who go to bed hungry every night. If all nations work well it can be achieved by the year 2030 (UNDP, 2015).

The sixth SDG is clean water and sanitation. Water insufficiency affects more than 40% of people globally, moreover, it is still growing due to climate change. If no action is taken by the year 2050 at least one in every four people globally will face recurrent water deficiencies. Protecting wetlands and better water-treatment methods are needed for achieving this goal (UNDP, 2015). SDG goal 17 is a global partnership for sustainable development. About 193 nations have accepted to work together to attain all the other SDGs because they are big challenges (UNDP, 2015).

The Food and Agriculture Organisation (FAO), a world food body advises that without speedy steps in reducing and eradicating hunger and malnutrition by the year 2030, then the SDGs will not be realized. The fight to end hunger and poverty ought to be fought in rural areas, which is where about 80% of the world's starving and unfortunate people live. Focused political will investe in the key agents, namely smallholders, indigenous communities, rural women, farmers, and youth is key (Silva, 2015).

2.2 Case studies by UNECE

In a project by the Ministry of Health of the Republic of Serbia, one of the key challenges noted was the will of the local and national stakeholders to actively participate in the project. The use of regular communication and meetings with stakeholders helped the involvement of all relevant groups (Djurasinovic, 2018). Stakeholder participation is crucial. Also, in a UN city project in Belgium, it was noted that capacity building to cities helped to improve control of their city projects (Wolputte, 2018). In Italy, Potenza region for good decision making, community engagement was recommended achieved through enhancing capacities. It also advised that for easy implementation, a united relationship between public authorities and locals must use a bottom-up method for the community's ownership and better follow-up (Attolico, 2018).

In another UN case study in Armenia in Goris town that was declared a touristic centre in 2011 and the transportation zone between Armenia and Iran, the town has a high potential for economic growth but capacity-building and awareness creation on ICTs opportunities were desired. Lack of data was noted during the design of the Goris smart city profile (Nune, 2018). So, participation of stakeholders, capacity building, and data collection (PME) is a UN city project to achieve needed goals for any project.

Even in Kazakhstan under the Batumi Initiative funded by the UN on International Center for Green Technology, it was committed to capacity-building for green growth. Thus, even in PME, capacity building is needed. It was recommended to do the monitoring of projects, capacity building, training programmes, and international organizations to co-operate (Aliya, 2018). Even Krejzar (2018) notes that to create a platform on forest discussions and nature conservation will promote the transfer of knowledge and capacity building, which is the concern of this paper. Capacity building was the main element of the project to guarantee long term sustainability and relevance of created web portal, also a bottom-up approach strategy which involves locals in Georgia in a global forest watch (Gigia, 2018). A case study of a project on gender empowerment in Ethiopia recommends that institutional capacity building ought to be continuous. Also, simplified manuals provision and guidelines for capacity building activities so as to change attitudes about gender matters (Ekaterina, 2019).

In a programme in Cabo Delgado and Nampula in Mozambique to help promote inclusive economic growth for local communities by capacity building of local institutions through training, it was recommended that the programme be inclusive so that women can participate and fully benefit from opportunities available in the sector (Wong, 2019).

The government of Indonesia as part of the overall plan to improve energy access by moving its people from kerosene to liquid petroleum gas use. Initial outcomes found that the efforts to distribute the clean cookstoves work well when paired with community-based training and awareness-raising crusades even for increasing agricultural production (Messerli and Murniningtyas, 2019).

3. Research Methodology

Fig 1. Displays the research flow of this study. The study was based on a mixed-mode approach composed of description survey design to describe what happens in the irrigation projects and correlation designs where the influence of the independent variables was assessed by correlating with the dependent variable. The designs used were relevant to this study because the purpose was to describe and asses the influence of the independent variable on the dependent variable. Data was collected from the respondents in the irrigation projects in order to fulfil the study objectives (William and Trochim, 2006). The researcher collected information using questionnaires and interview schedules from samples selected using strict randomization.

The target population included the NIB managers in Kitui county, co-operative managers, government extension officers, and farmers as implementers of irrigation projects in Kitui county. Kitui county has six NIB irrigation projects from where the respondents were selected. Stratification was done at the project level. The targeted population in the study were 6 NIB project managers, 12 Co-operative project managers, six extension officers and 1340 farmers from Kitui county in Kenya (Maithia, 2015).

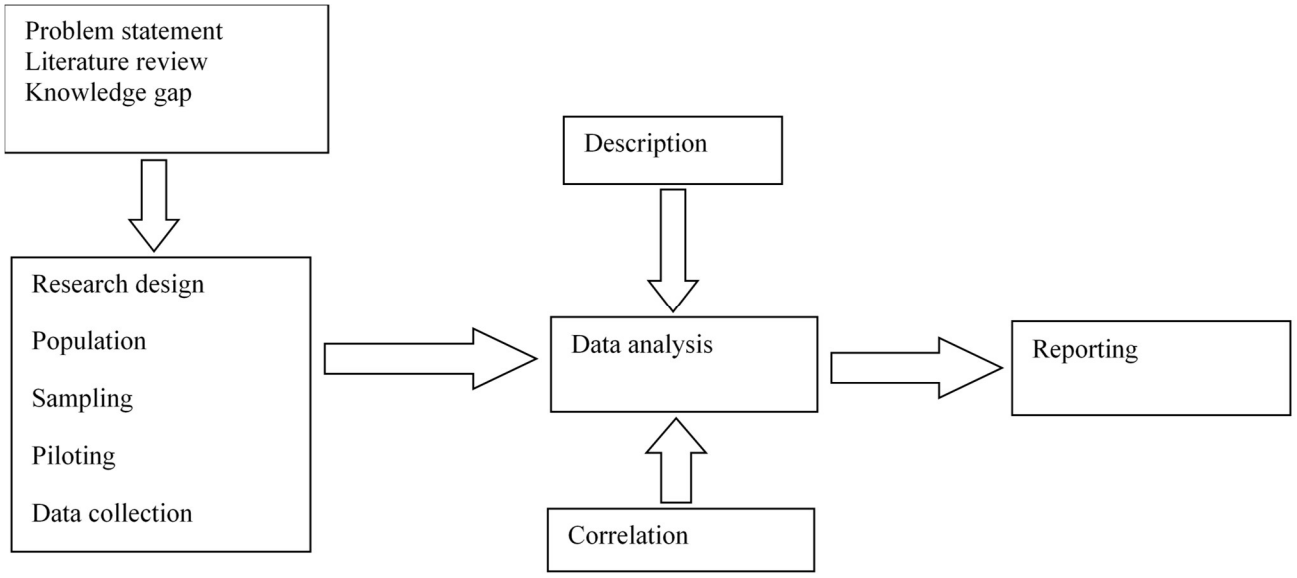

Fig. 1. Research design

3.1. Sampling procedure and sample size

Part of the accessible population was picked as the sample for the study. The sample size was chosen using stratified and purposeful sampling designs with randomization. Krejcie and Morgan (1970) table was used as a guide to determine 300 farmers from the target projects of a population of 1340 while the other 24 respondents were selected purposefully as shown in Table 1.

Table 1. Methods for Sample selection

Category of respondents	Target population	Sample techniques	Proposed sample size
Cooperative project manager	12	Purposive	12
Government ext. officers	6	Purposive	6
Farmers	1340	Stratified	300
NIB project managers	6	Purposive	6
Total	**1364**		**324**

3.2. Research instruments

Questionnaires were employed as tools to collect both quantitative and qualitative data from primary and secondary sources. Research opinions data were collected easily in a short time using structured closed and open-ended questions due to close-ended items (Kombo and Tromp, 2006). Interview schedules were used for NIB managers, extension officers, and co-operative managers. Irrigation documents from the county gave information on irrigation projects. Survey and interview questions were developed from the World Bank key concepts in PME. Piloting of instruments was done before the actual study according to Mugenda and Mugenda (1999) and Connely (2008), where 10% of the sample was used which were 2 co-operative managers, one agricultural extension officer, 30 farmers and 1 NIB project manager from Mwingi West Sub-county. Instruments validity including content, construct, and face validity was measured through a pilot study (Mugenda and Mugenda, 2013). Instruments reliability was measured by using the split-half method and ensured by using the pilot written down and the study was done at the same time of the day for consistency. When using split-half method instruments were numbered and divided into two halves, odds and evens and then Pearson's correlation (r) scores between the two halves was calculated which was then transformed into an appropriate reliability estimate for the entire test by applying Spearman-Brown prophecy formula shown in Eq. (1).

$$\mathrm{Rx} = \frac{2r}{1+r} \quad (1)$$

In Eq. (1) above Rx is the estimated reliability of the entire test and r is the Pearson correlation between the two halves. Hence, reliability was determined as 0.9 according to Frankel and Wallen, (2000), thus, an alpha above 0.7 is acceptable.

3.3. Data Collection procedure

Data collection was done after getting an introductory letter from the University of Nairobi and a research authorization from the National Commission for Science, Technology and Innovation (NACOSTI). Area chiefs were also met after getting a permit for authorization where after a meeting with county irrigation officers was held. The officers then organized a meeting with the farmers using each irrigation project chairperson. On this date, questionnaires were administered and interviews conducted in order to collect data. Maximum responses advice was followed as reported by Wisemans and McDonald (1980). A covering letter was attached for guaranteeing participant's confidentiality. Questionnaires were answered with help from research assistants and

interpreters. Hereafter, data collection instruments were examined for completeness, comprehensiveness, consistency and reliability.

3.4. Data analysis techniques and presentation

Data is presented using tables containing means, percentages, correlation, linear regression, and frequencies to improve understanding (Kombo and Tromp, 2006). Qualitative data were summarized and interpretations were made. The results were analyzed using the Statistical Programme for Social Sciences (SPSS) version 25.0. Data were obtained on PME capacity building and sustainability, then a correlation coefficient was obtained and the degree of correlation was identified. Hypothesis below was tested using a linear regression model:

3.5. Hypothesis

H_0: PME capacity building has no influence on the sustainability of irrigation projects in Kitui county.

H_1: PME capacity building has an influence on the sustainability of irrigation projects in Kitui county.

Qualitative data analysis was considered by focusing on suggestions, thus, inferences were made from views that were gathered, summarized, and then organized into an interim report which was matched with quantitative information.

3.6. Ethical issues

To ensure the upholding of ethics, an introductory letter from the University of Nairobi was obtained for the study and research authorization from NACOSTI. The researcher ensured that no discomfort was caused emotionally or psychologically to the respondents during data collection to which they participated voluntarily and after consent. Hence, the information collected was kept confidential.

4. Results

The results of the KS-test and SW-test are shown in Table 2. The test of normality which shows whether the data follows a specified distribution or not was conducted using the Kolmogorov-Smirnov test statistic (KS-test) and Shapiro-Wilk test (SW-test). First, it was hypothesized that H0 sample population is not normal. The null hypothesis is normally rejected if the values of SW-test lie between zero and one. The values of the KS test statistic for PME capacity building = 0.525 and SW statistic is 0.372 which is between 0 and 1 and $p < 0.05$, thus, the null hypothesis is rejected.

The sample was picked from a normal population. In the application of the central limit theorem, the sample of this study was 316 respondents that were relatively large, thus, the normality of the data cannot be questioned (Alam, 2010). The study used the Shapiro-Wilk test (SW) that has the ability to bring out deviation from normality caused by either skewness or kurtosis or both (Rizali and Wah, 2011). The study found that the researcher set out to interview a total of 324 respondents but accessed 316 who were in 6 different project areas giving (97.5%) response rate. The respondents whose age were grouped revealed that the majority (56.3%) of the respondents were between 31 and 40 years of age. This was followed by those with an age of 51 years and above which made up 32.9% of the respondents. On gender and level of education**,** (62.7%) were females and (37.3%) were males. A total of 60.4% had primary school education as their highest level of education. This was then followed by 38.9% who had secondary school education as their highest level of education.

Table 2. Kolmogorov-Smirnov and Shapiro-Wilk tests

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
PME capacity building	0.525	95	0.000	0.372	95	0.000

Table 3 shows the test of collinearity. Multi collinearity testing was examined using the Variance Inflation Factor (VIF) and tolerance tests before doing correlation and regression. The values of VIF is 1.515 which is within the range of less than ten VIF (Meyers, 1990). The tolerance rate is 0.660 which is within range because if the value is less than 0.1 there is a presence of multicollinearity (MacKinnon, 2007). Furthermore, Garson (2008) points out that multicollinearity problems are absent if variables have a correlation of less than 0.8

Table 3. Test of collinearity

	Coefficients Collinearity Statistics		
Item	Tolerance	VIF	R
PME capacity building	0.660	1.515	0.290

4.1. Analysis of Sustainability of the irrigation project

Table 4 shows the sustainability of the irrigation project which was the dependent variable of this study. There are ten indicators. The analysis uses mean scores (MS) and standard deviation (S. Dev) on the responses to statements on the sustainability of irrigation projects. In the analysis, MS = 1 implies that the farmers strongly disagreed with the statement, whereas, MS = 5 implies that the farmers strongly agreed with the statement about the sustainability of the irrigation project. Farmers largely agreed with these two statements; the project is accepted locally (MS =4.03 S. Dev =.977), and the project is in line with local County policies (MS = 3.77 S. Dev =1.303). They were negatively skewed on the statements; the project has trained members as officials (MS=2.21 S. Dev = 1.335), and the project does raise money locally for its use till now (M = 2.22 S. Dev = 1.406) among others.

If the local farmers accept the projects locally and participate then projects are in line with county policies, thus, they are simple to operate and food security will improve. However, if the farmers are not trained to be officials and projects do not raise money for farmers to improve their lives then obviously, they will not engage in the projects, thus, food security would be low.

Table 4. Sustainability of irrigation project

Activity	N	Mean Score (MS)	Std. deviation (S. Dev)
The project is accepted locally	316	4.03	0.977
The project is in line with local County policies	316	3.77	1.303
The project is simple to run and operate	315	3.34	1.324
Local farmers are running the project	316	3.21	1.499
Farmers technically know how to run the project	316	3.09	1.308
The project has existed for over 5 years	315	2.78	1.637
There is a sustainability plan of action in use	316	2.63	1.436
The project is integrated into local leadership system	316	2.62	1.463
The projects have spoiled our rivers	316	2.34	1.522
The project has improved farmer's lives	316	2.34	1.481
The project does raise money locally	316	2.22	1.406
The project has trained members as officials	316	2.21	1.335

4.2. Analysis of PME capacity building influence on the sustainability of irrigation projects

Table 5 shows the PME capacity building MS. PME capacity building was measured using ten indicators and MS and S. Dev, Correlation coefficients and inferential analysis were done on how PME capacity building influences the sustainability of irrigation projects. The mean was calculated, therefore, If MS=1 implies that the respondents strongly disagreed with the statement, whereas when MS=5 implies that the respondents strongly agreed with the statement about PME capacity building. If project revenue is not controlled to ensure allocation for training farmers, then farmers' capacity is not improved. Moreover, exposure visits to learn from successful farmers were not done, project offices are not accountable on how funds are used especially for capacity building among farmers, members skills were not improved. The management and PME and project guidelines were not made better by farmers themselves because they did not have the capacity, thus, food security and production will be negatively affected. To make matters worse if the project does not generate income for farmers and lack of PME learning centres for farmers to learn, then project sustainability will greatly suffer which would reduce food production.

Table 5. PME capacity building Mean Scores

Activity	N	Mean Score (MS)	Std Deviation (S. Dev)
Project obstacles were identified	315	2.87	1.594
There were PME learning centres	315	2.67	1.452
Legal frameworks were supportive	315	2.41	1.497
Members skills were improved	315	2.28	1.439
Income generation was done by the project	315	2.26	1.273
There were skilled members in doing PME	315	2.26	1.331
Project policy/guidelines were improved	315	2.11	1.116
Project officers were accountable	315	1.96	1.112
Members were taken for exposure visits	315	1.90	1.409
Project revenue control on use was done	315	1.69	1.006

4.3. Correlation analysis of PME capacity building and Sustainability of irrigation projects

Table 6 shows the correlation between PME capacity building and the sustainability of the projects. The research study used Pearson's product-moment correlation to assess the relationship between PME capacity building indicators and project sustainability of irrigation project indicators. Correlation values range from +1 to -1, a correlation of +1 indicates that correlation is positive and perfect while a correlation of -1 indicates that the correlation is negative and perfect. When (r) values are ranging from 0.81 to 1

they are considered very strong; 0.61 to 0.8 they are considered strong; 0.41 to 0.6 they are considered moderate; 0.21 to 0. 4 they are considered weak and 0 to 0.2 indicates very weak or no relationship. There was a weak positive relationship (r=0.290, p=0.000) between PME capacity building and the sustainability of irrigation projects in Kitui county. This due to poor capacity building that can be improved.

Table 6. Correlation for PME capacity building and Sustainability of the projects

	PME capacity building	Sustainability of projects
Pearson Correlation	1	0.290
Sig. (2-tailed)		0.000
N	316	316

4.4. Inferential analysis of respondent characteristics and PME capacity building

Table 7 shows the symmetric measures of respondent characteristics and capacity building. In this section, the relationship between respondent characteristics and PME capacity building of respondents was collated and analyzed. The findings show no relationship between age (r =- 0.013), gender (r = 0.036), highest level of education (r = -0.089) of respondents and PME capacity building.

Table 7 also shows the regression analysis of PME capacity building and sustainability of irrigation projects in Kitui County. r = 0.290 which shows that PME capacity building has a weak influence on the sustainability of irrigation projects in Kitui county. Also, r2 = 0.084 implies that PME capacity building is responsible for 8.4% of the sustainability of irrigation projects in Kitui county. A test of significance at p = 0.05 showed that PME capacity building (p = 0.000) was significant.

Table 7. Symmetric Measures of respondent characteristics and capacity building

Attribute	Pearson's R	Asymp. Std. Error	Approx. T	Approx. Sig.	No. of cases
Age group by PME capacity building	-0.013	0.058	-0.226	0.821	316
Gender by PME capacity building	0.036	0.057	0.639	0.523	316
Education and PME capacity building	0.089	0.052	1.575	0.116	316

The hypothesis below was tested using a simple linear regression model so as to conclude it. The hypothesis **H_0:** PME capacity building has no influence on the sustainability of irrigation projects in Kitui County. **H_1:** PME capacity building has an influence on the sustainability of irrigation projects in Kitui county.

The null hypothesis was examined using linear regression model:

$$Y = a + \beta_1 X_1 + e \quad (2)$$

Y = sustainability of irrigation projects in Kitui county, a = constant, β_1 = Beta coefficient, X_1 = PME capacity building, and e = error term.

5. Discussion

Inferential analysis with demographic information found that there was a very weak relationship between age, gender, and education with PME capacity building because mainly females with low education were the majority. On correlation analysis using Pearson product-moment correlation shows that there was a weak positive relationship of r = 0.290 between PME capacity building and the sustainability of irrigation projects in Kitui county. This minimal influence is because PME capacity building was given insignificant attention and poorly done. On testing of hypothesis using linear regression: PME capacity building explained 8.4% of sustainability of irrigation projects in Kitui county meaning there are other factors which affect sustainability. Therefore, the null hypothesis was rejected since PME capacity building has an influence on the sustainability of irrigation projects.

6. Conclusions

On the distribution of respondents who participated in the study, they were categorized using age, gender, and level of education. The study concludes that the majority of the respondents were between the ages of 31 and 40 years old, followed by those with and age of 51 years and above. A large number of respondents interviewed were females. Many of the respondents had a low primary school level education, whereas a small percentage of the respondents had secondary school level education. Age, gender, and education level have very minimal influence on PME capacity building. In the case of how PME capacity building influences the sustainability of irrigation projects, the study found that PME capacity building has a weak positive influence of r = 0.290 and it is responsible for only 8.4% of sustainability of irrigation projects in Kitui county.

The study recommendations are as follows: To improve irrigation practices, PME capacity building must be improved as follows: project obstacles should be identified, then PME learning centres must be created, creation of a legal framework that supports PME, members skills must be improved before or when doing the project, the project should endeavour to generate income locally so as to be beneficial to farmers to obtain sustainability. The

project should train its members in doing PME, Project guidelines must be understood and even improved as the need arises when better ideas are availed. Moreover, project officers should be local and accountable for what they do with project funds, members should be taken for exposure visits to learn from successful irrigation farmers. Finally, control project revenue must be used and embraced all through. For theory, it was found that PME capacity building had a weak influence on the sustainability of irrigation projects. Other factors influence sustainability since PME capacity building is only responsible for 8.4%, thus, the other factors should be investigated.

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