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DETERMINANTS OF THE SUSTAINABILITY OF ALPHIA PLUS WATER PROJECTS IN PUBLIC PRIMARY SCHOOLS IN MANGA SUB-COUNTY NYAMIRA COUNTY, KENYA

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Abstract: **Project Sustainability is a desire of every community, private agency or Government as a means of ensuring that positive gains are delivered to the target communities in long term. This phenomenon was brought to focus in this study based on water projects that aim at improving the quality of life of community water users. The implementation of such projects is always easier but their sustainability possesses a challenge. The purpose of this study was determinants of the sustainability of Aphia Plus water projects in Public Primary Schools, in Manga Sub-county. The study sought to answer the following specific objectives : to assess the influence of training in public primary schools, to determine the influence of technology used in extraction of water in public primary schools and to determine the influence of capital contribution has on the sustainability of Aphia Plus water in Public primary schools. The study adopted a descriptive research. The study was based on Public Primary schools in Manga Sub County. The target population was 200 teachers and pupils from all Public Primary schools in Manga Sub County. The sample size of the study was 60 respondents using simple random sampling technique. The primary data was edited, coded and descriptively analyzed using the Statistical Package for Social Sciences (SPSS) and presented in as percentages and frequency tables. The study established that sustainability of various types of water supply infrastructure is dependent upon the degree to which the technologyused corresponds to the needs of the local community and the community's ability to maintain and repair it over time. Considering the non-functional state of most manual hand pumps in the county, it is apparent that efforts need to be made to ameliorate the situation. The study established that solar system is one of the technology used in extraction sustainability of water in public primary schools. The study determined that the factors responsible for the non-functioning of boreholes range from extreme low yields, inability to raise funds to acquire spare parts, to lack of access to spare parts. To sustain access to potable water, access to spare parts needs to be improved. The study established that in rural community water supply, most national policies require a capital contribution from the users, either in-kind labor and local materials or, if in cash, in the region of five percent of the capital cost. This is rarely recovered however, and so improved services are by default a gift albeit often with some community participation in construction from the government or NGO to the community. The study recommended that Community training and education on technology used must be done for any Alphia plus water project if it is to be sustainable. These trainings need to be frequent and an analysis on the education level of the schools should first be made in order to establish the most suitable language mode of training to use so as to assure effective transfer of knowledge from the trainer to the trainee. The study established that Project sustainability is of paramount importance for any project and especially for Alphia Plus water project and for that matter, schools should be made aware of the need of water projects to serve not only their pupils but also future generations, hence take the necessary measures to ensure this. Thestudy established that project location is equally important and schools should be involved in identification of the site for the project in order to encourage ownership in terms of protection and cleanliness of the site.**

Keywords: **Determinants of the Sustainability of Alphia Plus Water Projects in Public Primary Schools.**

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LIST OF ABBREVIATIONS AND ACRONYMS

NGO	Non – Governmental organizations
AWPs	AphiaPlus Water Projects
PPS	Public Primary Schools
MSC	Manga sub-county
NC	Nyamira County

1. INTRODUCTION

Background of the Study:

According to Sean, (2007) projects are designed and implemented to meet specific goals and achieve desired change. A project as a set of coordinated activities with a specific start and finish time, pursuing a specific goal with constraints on time, scope and resources. Some projects require that their activities be sustained over time to ensure continued flow of outputs and hence achievement of the desired change which could be social, cultural or economic. Implementation of most projects may be successful but their sustainability may be a challenge. According to Hurtton et al (2007) water is the most important natural resource, indispensable for life and at the same time the backbone for growth and prosperity for mankind. The General Assembly of the United Nations drew critical attention to the importance of water to sustainable development and poverty alleviation by declaring 2003 The International year of Fresh water with one of its aims being to reassert the Millennium Development Goals target for water of reducing by half the proportion of people without the access to safe drinking water and stop the unsustainable exploitation of water resources.

Water is a natural resource that is necessary for sustenance of life, ecological systems and a key resource to social and economic development. Governments, Non-governmental organizations, local and international organizations from all over the world have implemented water projects to promote safe rural water supply and sanitation over the years. However in most project areas there is lack of sustainability of these water infrastructures and water supply systems as most of the communities don't own the projects, Harvey and Reed, (2007).

Despite there being a universal recognition for the importance of safe water in poverty alleviation and socio-economic development globally, the access to safe drinking water remains low and this are attributed to many water supply systems not being sustainable. Smith and Marin (2005) states that worldwide, about two million people struggle daily for access to safe and sufficient water. In the entire world, Africa is the region that suffers most from inadequate access to water supply with only 62% of its population having access to potable water supply. Furthermore, 55 of the countries in the world whose domestic water supply is below 50 liters per capita per day, 35 of them are in Africa, Yahaya(2004). The Republic of Kenya in 2007 estimated that piped water coverage provided by Ministry of Water and Irrigation in 2007 stood at 47% nationally.

According to Nerubucha, (2011), Kenya is a water scarce country and it is therefore important to ensure that water resources are continuously monitored, assessed and evaluated in order to plan for water security. It is important to understand the climate and identify trends. It is clear that the water resources are unevenly distributed spatially in the country and hence the need for proper management Whittington, (2012). Failure to adequately manage water resources imposes huge costs on Kenya's economy as observed by Kinoti, (2010). According to the Ministry of Water and Irrigation, there are approximately 680 piped water systems that provide over 740,000 water connections throughout the nation. Additional 350 community run water schemes exist in the country. A great percentage of these connections are however inactive due to poor management and maintenance Republic of Kenya, (2007)

Water projects failure possess a problem that can be self-perpetuating. Vanloon, (2002) in their study on Water Evaluation and Planning System in Kitui, points out that bad experience on unsuccessful water projects in the past alienate people and make them likely to be hostile towards future initiatives. Projects implemented with funding limited to short term goals undermine capabilities of a local institution to sustain itself in long term. Hence in the case of water projects, community participation, their education and training on the technology used and how to use the water system and location of the water project are paramount for sustainability.

According to Harvey and Reed, (2007).)among the 24 million rural dwellers in Kenya about 10 million have access to improved water supply either through piped water or point source systems. Of those with access 30% of them are served by community based water supply schemes which are developed by self-help groups through donor support and government institutions. The groups study further reveals that most of these community based water supply schemes are inactive yet the government has continued to establish more water projects with little regard to rehabilitation of non-functioning ones. Community water projects in Manga Sub- County presents a typical case of rural community with water projects previously developed either through self-help groups with donor support or Government institutions like Municipal council of Nyamira CDF or largely by the external institutions through influential people from the community. Most of these water projects are deep dug boreholes, hand pumps, piped water or springs and are run by community project committees/ leaders.

Some projects mostly under the support of Manga Sub county have been reported to be successful and this has largely been enhanced through strategies integrated before completion of projects such as: Effective mobilization of communities through sensitization and training to achieve ownership; Collaboration with various stakeholders local government, local leaders, politicians and target communities; Application of appropriate technologies, Gender considerations that empower women to handle community projects; Capacity building and sensitivity to social-cultural factors in the communities. However the situation in the region still possess question of sustainability as most of the projects do not operate to full potential and some have broken down and not rehabilitated. It's due to this scenario that this study intends to assess the factors influencing sustainability of Aphia Plus water projects in public Primary Schools after external support is withdrawn, Uphoff, (2002).

According to Mwaniki and Kirimi (2005), Government Ministries and various organizations have carried out surveys to determine the school Water projects in Kenya. The surveys are conducted at various times and revealed that the burden to provide water at school frequently fell on the pupils as they often had to travel to fetch water resulting into stress affecting attendance and performance (Mwaniki, 2005). The findings of this study looked encouraging, however they are likely to mislead because the schools surveyed are those that had been part of a projects for three years and this study was to find out the sustainability of the program.

In Kenya, the school population has continued to grow since 2003 and there has been no corresponding expansion of physical facilities. According to (Mwaniki, 2005) on the water projects in schools, majority of schools were categorized as dangerous with Nairobi province being hardest hit with an average of 414 pupils /latrine in the worst schools. However, Nairobi Province has continued to perform better in KCPE examinations compared to others whose water projects were better yet literature support the relationship between water projects and performance. It is therefore important to have more studies to segregate the schools as rural, urban, private or public so as to inform proper policy review and resource allocation to school water projects.

Statement of the Problem:

The proportion of people without access to water and sanitation by the year 2015 have been important in galvanizing global attention and support for water and sanitation. However such efforts that focus on expansion of new services run the risk of undermining the functional sustainability by encouraging rapid construction of infrastructure rather than long term, critically needed investments in operation and maintenance. What is urgently needed to stem the trend of disrepair and accelerate the progress in achieving MDGs, is a coherent focus on sustainability Elimelech, (2009). Ngetich, (2009) argues that most water projects did not function to full capacity and recommended for more study to be done on the influence of project location on sustainability of water projects, Kainda, (2012) established that school's contribution and awareness were paramount to water projects sustainability but recommended for further studies in other parts of the country on factors influencing the sustainability of Aphia Water Projects in order to bring a generalization of the findings.

Schools are places where children actively stay for most of the day time and therefore for healthy and conducive learning environment, children need safe water for drinking and hand washing, and safe and friendly-to-use sanitation facilities. Improved health and quality learning is not possible without adequate water and sanitation facilities in schools. School children who have no access to safe water and sanitation have more chances to suffer from water and sanitation related diseases.Lack of safe water and sanitation facilities turn schools into unsafe places where diseases are transmitted

with mutually reinforcing negative impacts on the children, their families, communities and overall development including academic performance. Limited or poor quality toilets as well as inaccessibility to clean and adequate water in many schools in Kenya increase girls' vulnerability to sexual harassment on their way to and from the toilet, force them out of school to search for water or jeopardize their special needs during menstrual periods, hence there should be more water projects in the area and around all the schools in Nyamira County.

According to Rimbera, (2012), lack of project sustainability due to low level of community awareness, approaches used by developers and lack of proper feasibility study but these Wawire, (2007) point out community participation, project location, training on technology used and community capital contribution as factors leading to lack of sustainability. There being water projects that are not functioning and others that need rehabilitation shortly after establishment in Manga Sub-county, the researcher believes that this study will be of value in addressing the influence that schools participation, education and training on technology used and capital contribution as well as project location have on the sustainability of Aphia Plus water projects in Manga Sub County. Therefore this study intends to fill the knowledge gap on determinants of sustainability of water projects in Kenya with reference to Nyamira County.

Objectives of the Study:

The study was guided by the following objectives:

1. To assess the influence of training of the sustainability of Aphia Plus Water in public primary schools in Nyamira county.

2. To determine the influence of technology used in extraction sustainability of water in public primary schools in Nyamira county.

3. To determine the influence that school's capital contribution has on the sustainability of Aphia plus Water Project in Manga Sub-county

Research Questions:

The study answered the following research questions:

1. To what extent does training influence the sustainability of APhia Plus water in public primary schools in Nyamira County?

2. What is the influence of technology used in extraction of sustainability of water in public primary schools in Nyamira County?

3. How does the school's capital contribution influence on sustainability of Aphia Plus Water Project in Manga Sub-county?

2. LITERATURE REVIEW

Introduction:

This chapter will discuss the literature related to the determinants of sustainability of water projects in different parts of the world cascading down to Nyamira County. It includes findings of related studies undertaken by other researchers. Literature for this study will be reviewed under three themes; influence of training of the sustainability of Aphia Plus Water in public primary schools in Nyamira county, influence of technology used in extraction sustainability of water in public primary schools in Nyamira county and influence that school's capital contribution has on the sustainability of Aphia Plus Water Project in Nyamira County.

Alphia Plus Water Projects in Public Primary Schools:

In Kenya, the introduction of Free Primary Education (FPE) in 2003 resulted in a rapid increase in the number of children in primary schools, placing severe strain on school infrastructure and facilities which were already inadequate. The school population rose from 5.9 million pupils in 2002 to 7.2 million in 2003, to 8.2 million pupils in 2007. Kenya has over 18,000 public primary schools and a large number of non-formal schools offering primary school curriculum .The Ministry of Education, in collaboration with the Ministry of Public Health and Sanitation and other partners,

developed a National School Health Policy and National School Health Guidelines in 2009. The National School Health Guidelines are aimed at operationalizing the National School Health Policy by providing specific guidelines which ensures that school age children, teachers, support staff and community members access quality and equitable services for improved health, Len Abrams, (2003).

Donor support in Schools has been remarkable with UNICEF as a key partner within the Schools sector in Kenya. The Government of Kenya/ UNICEF Program (2008-2013) funded by the Government of the Netherlands includes WASH projects in over 780 schools in 22 districts. According to the MoE Basic Report on Spatial Analysis of School Mapping Data, the national pupil to toilet ratio (2007) is indicated as 38:1 and 32:1 for boys and girls in public schools, respectively (MoE, Feb 2011). These ratios are generally thought to be inaccurate. Additionally, there is no reliable information on the condition and usability of the available facilities. School WASH in Kenya has been prioritized in several policies, plans and laws have evolved. Sessional Paper No.1 of 2005 ultimately aims at expanding access, equity and improving educational quality in the country. United Nations Convention on the Right of the Child (UNCRC, 1989) and African Charter on the Rights and Welfare of the Child (ACRWC) as enshrined in the Children Act (2001) outline four pillars of Child Rights as Survival, Development, Protection and Participation Rights. UNCRC Specifically gives young people the right to preventive healthcare and calls for specific protection for those in difficult situation or living with disabilities. Kenya's Children Act (2001) states that "Every child shall have a right to health and medical care, the provision of which is the responsibility of the parent and the government". International Conference on Population and Development recognizes health as a fundamental human right to which all people including school children are entitled. National Health Sector Strategic Plan, Kenya's blue print in healthcare provision as well as the Kenya Educational Sector Support Programs, emphasize the need to re-think health and education of school children.

Concept of Project sustainability:

Sustainability as a concept in development projects is dated to 1980s and defining development and sustainability has been difficult. Brundtland, (2002) however defined sustainable development as "one that meets the needs of the present without compromising the ability of future generations to meet their own needs". This means that a sustainable project must meet the present as well as the future human needs and aspirations. It must be one whose outputs and services are maintained continuously over time and keeps that focus with its original goals and objectives. Projects are designed and implemented to achieve certain set goals. Some projects require that their activities be sustained over time to ensure continued flow of set outputs hence achieve desired change that could be social, cultural or economic. Water projects are implemented to ease accessibility of the community members to clean water and hence improve their well-being. Implementation of these projects is always successful but their sustainability poses a challenge.

Sustainability is a problem which faces almost all development, in industrialized countries as well as in the developing ones. In recent years the debate took on new urgency through the adoption of Agenda 21 at the Earth Summit conference in Rio de Janeiro in June 1992. In the global debate sustainability was considered primarily in terms of continuing to improve human well-being, whilst not undermining the natural resource base on which future generations will have to depend Len Abrams, (2003). Mulwa (2004), points out that sustainability concerns around projects at community level encompasses different dimensions that include; social and ability of a project to restore peoples sense of worth, dignity and self-belief, economic ability of the local people to identify, procure and use available resources-whether human or material and have no or limited dependency on external, environmental , structural and organizational ,an effort of dominant institutions managing projects to become more responsive and sensitive to local needs and aspirations) as well as technological an effort to develop appropriate technology and promote the use of indigenous knowledge sustainability. A sustainable project should be able to address all these dimensions.

Influence of training in sustainability of Aphia Plus water public primary schools:

Human capacity development through specialized training of project managers, staff, community members and the whole project team has been noted to be important for project success and sustainability. Campo, (2008), in an intervention model introduced in Peru for water supply considered community training as an important component in which the project used various methods of training such as audio-visuals, visual etc., argues that training on issues like operation and maintenance empower the school's community to look after water supply systems thus aiding sustainability.

Lack of training is cited as one of the factors which could lead to breakdown and non- sustainability of water supply projects in developing countries Ademiluyi and Odugbesan, (2008). They further point out that even where full community participation or management is planned from the start, community-level committees and care takers may lose interest or trained individuals may move away. This can be a particular risk if community level organization is on a voluntary basis. Mengesha, (2003) in their study on sustainability of drinking water supply projects in Rural of North Gondar, Ethiopia recommend that building adequate skills and capacity to maintain water sources is an essential factor to sustain the water system. The National Academy of Sciences, (2011) observes that competent operating personnel are vitally important for sustained and safe operation of small water systems. Accordingly, good operator training is as essential to improving small water systems as are improved technologies, organizational fixes or regulatory oversight. Without adequately trained personnel, even a well-financed and organized system with the most advanced technology and regular compliance visits will fail to reliably deliver safe drinking water to its customers with time. This agrees with observations by Campo, (2008) who argued that training on issues like operation and maintenance empower communities to look after water supply systems thus aiding sustainability. Community members must be equipped with the necessary knowledge on how to operate, repair and maintain the water supply system as this will enhance sustainability of the project.

According to Toole (2002), capacity building sessions to develop community awareness of water supply problems will increase local participation in developing and demanding a project that will satisfy the needs of the community. Technical training in construction, operation and maintenance will teach selected individuals' practical skills and may create an understanding and the sense of responsibility for water facilities in the beneficiary community and this enhances community ownership of water projects. Campos (2008) in an intervention model carried out in Peru for water supply, considered community training as an important component in which the project used various methods of training including audio-visuals. Campos emphasizes that training on issues such as operation and maintenance empower the communities to look after their water supply systems thus enhancing sustainability. In Ghana, capacity building of key actors in rural water delivery and management usually precedes the provision of the facilities. Capacities of the district assembly staff are strengthened through training and equipment supply e.g. computers, office supplies and motor bikes. All these are geared towards enhancing the district assemblies' role in improving community ownership of water projects in rural areas Fielmua (2011). Targeting teachers for training is critical to the ownership and sustainability of water projects, especially in technical and managerial roles to ensure they actively participate in decision making process this influences community ownership of projects Harvey and Reed, (2007).

Influence of technology used extraction in sustainability of Aphia Plus water in Public Primary School:

In a study conducted in rural India it revealed that approximately a third of India's hand pumps in rural water projects are either nonfunctional or in need of repairs. The largely publicly funded hand pump programme has been a remarkable success. Through the programme access to safe water increased from less than 10 per cent to 31 per cent. This achievement was a result of Non- Governmental Organizations, NGOs using technologies and pumps that require village level operation and maintenance. The Government of India created demand so that private companies stepped in to produce the hand pumps and spare parts. They also trained engineers and mechanics to use and repair these new technologies at the community level so as to enhance ownership of community water projects Mackenzie, (2005).

In Kenya, the factors responsible for the non-functioning of boreholes range from extreme low yields, inability to raise funds to acquire spare parts, to lack of access to spare parts. To sustain access to potable water, access to spare parts needs to be improved. Obsolete hand pumps should be replaced with modern ones to ensure easy access to spare parts in case of breakdowns. Community ownership of projects is influenced by the ease of operation and availability of spare parts for the technology incorporated in the water systems Fielmua,(2011).

According to Gleitsmann (2005) in a study conducted in Nyamira County ,sustainability of various types of water supply infrastructure is dependent upon the degree to which the technology used corresponds to the needs of the local community and the community's ability to maintain and repair it over time. Considering the non-functional state of most manual hand pumps in the county, it is apparent that efforts need to be made to ameliorate the situation. Learning from previous development projects, the latest approaches are addressing the problems of limited availability of spare parts, absence of trained technicians at the local level and the limited role of women in the pump management scheme. These factors influence ownership of water projects by the beneficiary community Mwakila, (2008).

School's Capital Contribution on the sustainability on Aphia Plus Water In public primary school:

According to Boru, (2012),in rural community water supply most national policies require a capital contribution from the users, either in-kind labor and local materials or, if in cash, in the region of five percent of the capital cost. This is rarely recovered however, and so improved services are by default a gift albeit often with some community participation in construction from the government or NGO to the community. There is disagreement among practitioners about whether user cash contributions to capital costs help to cement community ownership of rural water supply systems and so contribute to sustainability.

However, there are cases in which a cash contribution to capital cost is raised but then ring- fenced for the water supply, for instance by putting it into an operation and maintenance account on behalf of the community. In this way it is of direct benefit to the users. The only approach to rural water supply in which the users pay the full capital costs of new or upgraded water points is elf-supply. Rockstorm, (2003) notes that operation and maintenance water services worldwide costs money but insufficient funds limits the purchase and spare parts. He argues that External Agencies have been reluctant to finance operation and maintenance activities while Governments often accord it less priority yet the service users community water users who are the potential source of finance on the same, do not typically see water as a commodity for sale and so many a times they are unwilling to pay for it. Community capital contributions could take the form of community levies-where individuals or households in the community agree to contribute a given fee toward running and maintenance of the water system.

Reed, (2007), the contributions could also take the forms of donations from during harvest and fines paid by community members who break community rules. The community capital contributions collection could be affected or hampered by the methods used for the same. The researchers‟ observation is that most local communities are informal in nature and this makes most of the community projects lack basic procedures and processes of fund collection as they rely on mostly on voluntary labour of elected officials who operate in homes without official facilities. Such systems get low returns and this turns out to be threat to committees that carryout this exercise as some of them are insulted or dehumanized.

These systems also do not have clear accountability records and this may make doubt such systems making them draw back in contributions. Once a project cannot generate enough revenue from beneficiaries, its sustainability will be threatened as repairs and maintenance cannot be provided for when need arise. Misappropriation of funds collected as a result low or lack of professionalism may also contribute to poor maintenance and thus lack of sustainability.

3. RESEARCH METHODOLOGY

Introduction:

This chapter describes the research methodology the researcher used in order to answer the research questions. According to (Mugenda and Mugenda 1999), research methodology outlines the techniques, methods and tools used in data analysis and how to arrive at sample size. It covered research design, target population, sample size and sampling techniques, research instrument, it's validity and reliability, data collection procedures, data analysis and presentation methods.

Research Design:

Research design ensures that the research is relevant to the problem and is an economical procedure for acquiring information (Coopers and Schindler, 2003). Descriptive research design was used in this study. Descriptive research was considered most appropriate because subjects are normally observed in their natural set up and can result in accurate and reliable information (Britt, 2006). The descriptive survey research aims at describing phenomena or narrating how various behaviors and events occur and the researcher has no control over the variables but can only report what is happening or what has already happened.

Target Population:

This study was conducted in 4 public primary schools in Manga Sub-county, Nyamira County. The target population was all teachers in primary schools, all head teachers and all deputy head teachers or Heads of Department (HODs) and Std 8 pupils. The total targeted population number was 200.

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Sample size and Sample selection:

First the schools were stratified and then a simple random sampling was taken to pick the respondents which comprised of 30% of the total. Gay & Mills (2005) advocates that a sample size of 30% of the target population for small population (N< 1000 is regarded as adequate for generalization of findings. The teachers were randomly selected to respond to the questionnaire. Out of 200 respondents only 60respondents was selected.

Table 3.1: Sample size

No	Name of school	No of teachers & pupils	30 % (sample)
1	MORAKO	50	15
2	NYAGECHENCHE	25	8
3	TOMBE	75	22
4	GEKANO	50	15
TOTAL		**200**	**60**

Data Collection Instruments:

The researcher used questionnaires as a tool for collecting data. A questionnaire is a collection of items to which the respondents are expected to react to usually in writing. Both open-ended and closed-ended questionnaires were used to collect both quantitative and qualitative data.

4. PRESENTATION OF FINDINGS, ANALYSIS, AND INTERPRETATION

Influence of training of the sustainability of Aphia Plus Water in public primary schools

Table 4.1: Influence of training of the sustainability of Aphia Plus Water

Effects	Very high 5	High 4	Moderate 3	Very low 2	Low 1	$\sum f_i$	$\sum f_i w_i$	$\sum f_i w_i \sum f)$
Mode of delivery	50	20	30	10	40	150	480	3.2
Language	30	20	20	50	30	150	420	2.8
Background of the facilitator	40	20	30	10	50	150	370	2.5
Choice of trainer/gender	20	30	50	40	10	150	460	3.1

From the data shown on table 4.1 it showed that mode of delivery had a mean of 3.2 and was given more weight, Choice of Trainer/gender at 3.1, language with mean of 2.8 and

Background of the facilitator a mean of 2.5 this shows that mode of delivery had an influence of training of the sustainability of Aphia plus Water in schools in Manga Sub county.

4.5 Influence of technology used in extraction sustainability of water in public primary chools:

Table 4.2: Technology used in extraction sustainability of water in public primary schools

Effects	Very high 5	High 4	Moderate 3	Very low 2	Low 1	$\sum f_i$	$\sum f_i w_i$	$\sum f_i w_i \sum f)$
Solar System	10	50	40	30	20	150	450	3.0
Gravity System	25	30	25	50	20	150	440	2.9
Generators	10	25	30	35	50	150	360	2.4
Hand pump	20	15	50	40	25	150	415	2.7
Rope and Bucket	5	25	60	20	40	150	345	2.3

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From the data shown on table 4.2 it showed that mode of solar system had a mean of 3.0 and was given more weight, Gravity system at 2.9 , Hand pump a mean of 2.7, Generators had a mean of 2.4 and Rope and bucket a mean of 2.3. This shows that solar system is one of the technology used in extraction sustainability of water in public primary schools.

Influence that school's capital contribution has on the sustainability of Aphia Plus Water Project:

Table 4.3: Influence that school's capital contribution has on the sustainability of Aphia Plus Water Project.

Effects	Very high 5	High 4	Moderate 3	Very low 2	Low 1	∑fi	∑fiwi	∑fiwi ∑f)
Steady income inform of formal employment	50	10	30	20	40	150	460	3.1
Parents willing to make monetary contributions	60	30	10	25	25	150	525	3.5
Parents contribute a given fee toward running and maintenance of water system	40	20	30	10	50	150	440	2.9

From the data shown on table 4.3 it showed that Parents willing to make monetary contributions had a mean of 3.5 and was given more weight, Steady income inform of formal employment at 3.1 and parents contribute a given fee toward running and maintenance of water system a mean of 2.9. This shows that Parents willing to make monetary contributions is the influence that school's capital contribution has on the sustainability in schools .

Analysis of Variance:

Table 4.4: Summary of One-Way ANOVA results of the regression analysis between sustainability of Alphia Plus Water Projects and predictor variables

Model	Sum of Squares	df	Mean square	F	Sig.
Regression	6.62	4.000	1.655	4.720	0.002
Residual	32.61	191.000	0.351		
Total	39.230	195.000			

From the ANOVA table, the regression model predicting the relationship between the dependent and independent variables is significant at F= 4.720 and P = 0.002.

Regression Coefficients:

Table 4.5: Coefficients of Regression Equation

	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig
(Constant)	1.193	0.432		2.762	0.015
Influence of training X1	0.806	0.108	0.146	7.463	0.013
Influence of technology X2	0.648	0.141	0.126	3.887	0.029
Influence that schools capital contributions has on the sustainability X3	0.413	0.125	0.145	4.904	0.022

Dependent Variable: Sustainability CWPs

The established model for the study was:

Y = 1.193 + 0.806 X1 + 0.648 X2 + 0.413 X3

The regression equation above has established that taking all factors into account (influence of training, influence of technology and influence that schools capital contributions has on the sustainability) constant at zero sustainability of Aphia plus water projects will be 1.193. The findings presented also show that taking all other independent variables at zero, a unit increase in schools participation would lead to a 0.806 increase in sustainability of Aphia Plus water and a unit increase in education and training on technology would lead to a 0.648 increase in the sustainability of Alphia Plus water projects.

5. DISCUSSION

The study attempted to answer the three objectives that mode of delivery had an influence of training of the sustainability of Aphia Plus Water in schools in Manga Sub county, an interruption of water supply in their school , showing that nobody was trained on how to repair the interrupted water supply, solar system is one of the technology used in extraction sustainability of water in public primary schools and parents willing to make monetary contributions is the influence that school's capital contribution has on the sustainability in schools .

6. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Introduction:

This chapter presents the summary of the major findings of the study, conclusions made, recommendations and suggestions on emerging issues that may require further investigations from the researcher's perspective.

Summary of Findings:

The aim of the study was the determinants of the sustainability of aphia plus water projects in public primary schools in manga sub-county Nyamira County, Kenya. The findings show that, mode of delivery had an influence of training of the sustainability of Aphia Plus Water in schools in Manga Sub county. According to Toole (2002), capacity building sessions to develop community awareness of water supply problems will increase local participation in developing and demanding a project that will satisfy the needs of the community. Technical training in construction, operation and maintenance will teach selected individuals' practical skills and may create an understanding and the sense of responsibility for water facilities in the beneficiary community and this enhances community ownership of water projects. Targeting teachers for training is critical to the ownership and sustainability of water projects, especially in technical and managerial roles to ensure they actively participate in decision making process this influences community ownership of projects Harvey and Reed, (2007).

The study established that it also showed that an interruption of water supply in their school ,solar system is one of the technology used in extraction sustainability of water in public primary schools .The factors responsible for the non-functioning of boreholes range from extreme low yields, inability to raise funds to acquire spare parts, to lack of access to spare parts. To sustain access to potable water, access to spare parts needs to be improved. Obsolete hand pumps should be replaced with modern ones to ensure easy access to spare parts in case of breakdowns. Community ownership of projects is influenced by the ease of operation and availability of spare parts for the technology incorporated in the water systems Fielmua, (2011).

The study determined that parents were willing to make monetary contributions were the influence that school's capital contribution has on the sustainability in schools. Reed, (2007), the contributions could also take the forms of donations from during harvest and fines paid by community members who break community rules. The community capital contributions collection could be affected or hampered by the methods used for the same. The researchers‟ observation is that most local communities are informal in nature and this makes most of the communityprojects lack basic procedures and processes of fund collection as they rely on mostly on voluntary labor of elected officials who operate in homes without official facilities. Such systems get low returns and this turns out to be threat to committees that carryout this exercise as some of them are insulted or dehumanized.

Conclusion:

The study established that sustainability of various types of water supply infrastructure is dependent upon the degree to which the technology used corresponds to the needs of the local community and the community's ability to maintain and repair it over time. Considering the non-functional state of most manual hand pumps in the county, it is apparent that efforts need to be made to ameliorate the situation. Learning from previous development projects, the latest approaches are addressing the problems of limited availability of spare parts, absence of trained technicians at the local level and the limited role of women in the pump management scheme. These factors influence ownership of water projects by the beneficiary community Mwakila, (2008). Project initiators must therefore involve all levels of the project cycle as this will build ownership of the project, training and education on how to operate and maintain the water facility so that its continuity is not affected by breakdown, the school must contribute towards the choice of the site for the water point and schools need to be advised on the need for them to contribute money towards operation and maintenance of Alphia plus water Projects this encourages ownership and assures continuity.

Appropriateness of design and technology in water projects is quite important and so is the knowledge of how to operate and maintain it if the project is to be sustainable. Lack of community education and training on technology used is one of the factors which could lead to breakdown and non-sustainability of water supply projects in developing countries as observed by (Ademiluyi and Odugbesan, 2008). The study established that solar system is one of the technology used in extraction sustainability of water in public primary schools. The study determined that the factors responsible for the non-functioning of boreholes range from extreme low yields, inability to raise funds to acquire spare parts, to lack of access to spare parts. To sustain access to potable water, access to spare parts needs to be improved. Obsolete hand pumps should be replaced with modern ones to ensure easy access to spare parts in case of breakdowns. Community ownership of projects is influenced by the ease of operation and availability of spare parts for the technology incorporated in the water systems Fielmua, (2011).

The study established that in rural community water supply, most national policies require a capital contribution from the users, either in-kind labor and local materials or, if in cash, in the region of five percent of the capital cost. This is rarely recovered however, and so improved services are by default a gift albeit often with some community participation in construction from the government or NGO to the community. There is disagreement among practitioners about whether user cash contributions to capital costs help to cement community ownership of rural water supply systems and so contribute to sustainability, Boru, (2012). However, there are cases in which a cash contribution to capital cost is raised but then ring- fenced for the water supply, for instance by putting it into an operation and maintenance account on behalf of the community. In this way it is of direct benefit to the users. The only approach to rural water supply in which the users pay the full capital costs of new or upgraded water points is "self-supply". Rockstorm, (2003) notes that operation and maintenance water services worldwide costs money but insufficient funds limits the purchase and spare parts. He argues that External Agencies have been reluctant to finance operation and maintenance activities while Governments often accord it less priority yet the service users community water users who are the potential source of finance on the same, do not typically see water as a commodity for sale and so many a times they are unwilling to pay for it. Community capital contributions could take the form of community levies-where individuals or households in the community agree to contribute a given fee toward running and maintenance of the water system.

Recommendations:

The study determined that capacity building in project sustainability is very crucial. Community members need to be trained on water technology used in Alphia Plus water and more so on how to operate and maintain the system. Water technology that schools cannot operate or maintain, on breakdown renders the water project dysfunctional and not able to meet its objectives hence not sustainable. Community training and education on technology used must be done for any alphia if it is to be sustainable. These trainings need to be frequent and an analysis on the education level of the schools should first be made in order to establish the most suitable language mode of training to use so as to assure effective transfer of knowledge from the trainer to the trainee.

The study established that Project sustainability is of paramount importance for any project and especially for Alphia Plus water and for that matter, schools should be made aware of the need of water projects to serve not only their pupils , but also future generations, hence take the necessary measures to ensure this. Most of the hand pumps in the division are either no longer operating (45%) or have been stolen as a result of not operating due to lack of capacity to maintain after breakdown (50%). Implementation of springs, lockable boreholes or piped water systems would work well

for the division. Community participation has for long been identified as a tool of helping schools to focus their energy and mobilize resources in order to solve their own problems. When community members identify, plan and share tasks involved in projects with professionals, and are involved in decision making on the activities that affect their lives, projects initiated are more likely to achieve their objectives. Community Participation make projects gain a great support and ownership from schools and this assures sustainability of projects and should be encouraged in all community water projects.

The study established that project location is equally important and schools should be involved in identification of the site for the project in order to encourage ownership in terms of protection and cleanliness of the site. Operation and maintenance of any water project need money and the community water users should be encouraged to contribute towards the same in order to avoid rendering the project dysfunctional or unsustainable on breakdown as they wait on well-wishers who may not be available. Community capital contributions could take the form of community levies-where individuals or households in the community agree to contribute a given fee toward running and maintenance of the water system.

Suggestions for Further Studies:

Project sustainability is of paramount importance for any project and especially for Aphia Plus water Projects and for that matter, the school should be made aware of the need of water projects to serve not only their generation, but also future generations, hence take the necessary measures to ensure this. Most of the hand pumps in the division are either no longer operating (45%) or have been stolen as a result of not operating due to lack of capacity to maintain after breakdown (50%). Implementation of springs, lockable boreholes or piped water systems would work well for the division. Community participation has for long been identified as a tool of helping rural as well as urban dwellers to focus their energy and mobilize resources in order to solve their own problems. When community members identify, plan and share tasks involved in projects with professionals, and are involved in decision making on the activities that affect their lives, projects initiated are more likely to achieve their objectives. Schools Participation make projects gain a great support and ownership from theassures sustainability of projects and should be encouraged in all community water projects.

Capacity building in project sustainability is very crucial.Community members need to be trained on water technology used in Aphia plus water projects and more so on how to operate and maintain the system. Water technology that schools cannot operate or maintain, on breakdown renders the water project dysfunctional and not able to meet its objectives hence not sustainable. Community training and education on technology used must be done for any water projects if it is to be sustainable. These trainings need to be frequent and an analysis on the education level of the water projects should first be made in order to establish the most suitable language mode of training to use so as to assure effective transfer of knowledge from the trainer to the trainee.

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