



DETERMINANTS OF SUCCESSFUL IMPLEMENTATION OF DOMESTIC BIOGAS PROJECTS IN KENYA: A CASE OF GITHUNGURI SUB-COUNTY

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ABSTRACT

In spite of the huge efforts and investments in the installation of domestic biogas projects to alleviate many pressing problems in developing countries, such as rural energy shortages, low agricultural productivity, and poor public health, the implementation of such projects has not been successful as intended. The purpose of this study was to explore the underlying determinants hindering successful implementation of these projects in Kenya. Further, the study sought to determine the effects of ‘project management skills, technological factors, Financial resources and government policy’ on the implementation of domestic biogas projects in Githunguri sub-county of Kiambu. This study used descriptive research design and both qualitative and quantitative methods in the analysis and data presentation. The target population for this study was 600 biogas users and 60 biogas contractors. This study used a stratified random sampling to select 10% of the target population. The sample size of this study was therefore 66 respondents. Structured questionnaires were used in this study to collect data. Qualitative data was analysed by use of content analysis presented in a prose form. On the other hand, Quantitative data was analysed by use of Statistical Package for Social Sciences (SPSS) version 21. Further, a multiple regression analysis was used to establish the relationship between the dependent and the independent variables. The study also used T-test analysis of variance and F-test to test the relationship of the variables. The study found out that all the independent variables influenced the dependent variable positively and financial resources was the most significant factor followed by technological factors, project management skills and government policy at influence successful implementation of domestic biogas projects in Githunguri sub-county. The study recommends that improvement in use of financial resources can enhance implementation of domestic biogas projects in Kenya

Keywords: biogas projects, project management skills, government policy

INTRODUCTION

Kenya’s long-term development blueprint, Vision 2030, aims at creating a “globally competitive and prosperous country with a high quality of life by 2030. Vision 2030 therefore aims at guiding the country towards meeting the Millennium Development Goals (MDGs) by 2015 and beyond, transforming Kenya into “a newly industrialized, middle-income country.” One of the most important organizational developments in recent years has been the significant growth in project work across different sectors and industries (Maylor et. al 2006).

The international Energy Agency (2012), estimates that if there is no major policy action and increased investment in the electricity sector, about 650 million Africans will be living without electricity by 2030, compared with 500 million today. Biogas can help to meet the energy needs of sub-Saharan Africa, which is 70% rural according to UN- World water assessment program. This is only region of the world which the total number of people without access to electricity is rising (UNEP, 2012).

Biogas technology (BGT) can alleviate many pressing problems in developing countries, such as rural energy shortages, low agricultural productivity, and poor public health (GTZ, 2010). Despite this

potential and heightened interest of many developing countries and funding agencies in the technology, BGT has not been implemented widely or rapidly, except possibly in China (Stuckey, 2006). Biogas is an energy technology that has the potential to counteract many adverse social, economic, health and environmental impacts (Wachera, 2014). The use of biogas projects as an energy source has proven itself to be an important strategy in solving the problems of energy usage in rural areas of developing countries (SNV, 2007). An estimated 2.5 billion people, in developing countries rely heavily on biomass, such as fuel wood, charcoal, agricultural wastes and animal dung, to meet their energy needs for cooking. Small scale biogas digesters have a great potential to contribute to sustainable development by providing variety of socio-economic benefits (Mshandte & Parawira, 2009), including diversification of energy supply, enhance regional and rural opportunities, and creation of a domestic industry and employment opportunities (Rio & Burguillo, 2008).

The problems affecting domestic biogas projects include the prohibitive initial investment cost (Karekezi, 2002) and availability of materials for construction of bio-digesters that will not leak gases or materials. The use of fuel produced and digested products must be socially acceptable to the rural community if the digesters have to be adopted (Fox, 1993). Political measures may be needed to encourage adoption, including training and capacity building programs, flexible financing mechanisms and dissemination strategies (Karekezi, 2002; Greben and Oelofse, 2009).

According to International Energy Agency (2008), the current global trends in energy supply and consumption are patently unsustainable. To alleviate these challenges reducing dependence on oil and biomass has become one of the priority issues for most countries around the world. So far, bio fuels are the most rapidly expanding and widely used types of renewable household fuel, although they still accounted for only 1.5% of the total household fuel demand in 2006 (IEA, 2008).

Unlike other renewable fuels such as biodiesel and bioethanol, a biogas production is relatively simple and operates under any condition and is not monopolistic (Gijzen, 2002). Dung is a potential substrate for biogas production, seen only as a floor polish and fertilizer in the garden for hundreds of years. Biogas for rural energy is sustainable, affordable and has no negative effect on people's health or environment, if handled properly (Green et al., 2002; Hall, D.O & Moss 2003). There are currently more than 30 million household digesters in China, followed by India with over 4 million, 1.2 million in Nepal and 60,000 in Bangladesh (Jiang, 2011; Thian Thu, 2012 & Austin, 2012). China has increased its investments in biogas infrastructure very rapidly and by 2020, 80 million households in China are expected to have biogas digesters serving more than 300 million people (NDRC, 2007).

According to (EPA, 2011), in America, 162 farm scale plants were in operation by 2010, providing energy for 41,000 homes; in addition 17 plants were operating in Canada. At the end of 2011, the number of small scale digesters was more than 4,000 in Germany, 350 in Australia, 72 in Switzerland, 65 in UK followed by Denmark with 20 community type and 35 farm scale plants and Sweden had 12 plants (Wilkinson, 2011).

Over the last fifty years, biogas technology in Kenya has been promoted by national and international organizations and they, together with trained Kenyan technicians have built hundreds of biogas digesters in the country (AKUT, 2011). However, earlier evaluations have showed that, unfortunately, a high proportion of digesters (53%) appear to operate below capacity, or are dormant or in disuse after construction because of management, technical, social-cultural and economic problems (GTZ, 2009).

The country is facing a number of challenges related to successful implementation of biogas projects. In the Kenyan rural areas; about 4% of the rural populations have access to electricity. The scattered nature of human settlements further escalates distribution costs and reduces accessibility (KEREAA, 2012). Majority of Kenyans live in rural areas where biomass remains the leading source of energy that is 55% (GOK, 2009). However, the potential of biomass has not been effectively utilized in the provision of modern energy for transforming wastes from agricultural production and processing into locally produced modern energy (GTZ/MoE, 2010).

Uptake of biogas technology in Kenya has remained very low due to high capital costs for not only the plant, but also for the modified burners and lighting accessories (IIED, 2017). Inadequate maintenance and management support services required have further impeded uptake because plants are prone to

cracking and leaking yet their operations require that they be air and water-tight. Lack of adequate water supplies has also been an impediment. Despite these constraints, the potential is enormous (Gok, 2013).

Statement of the Problem

The biogas technology in Kenya is witnessing a slow uptake despite of its significance and potential contribution in the economic activity in all sectors of the economy. The sector plays a very major role in the country's economic development through its contribution to energy, agriculture, environmental protection, gross domestic product (GDP) and creation of employment (GTZ, 2010). However the implementation of Biogas technology sector is not to expectations (UNDP, 2010). In 2010, it was reported that the SNV, spent Kes. 200 million to set up 8,000 plants in Kenya. The initiative targeted small scale farmers practising Zero grazing. Similar projects are being implemented in Ethiopia, Senegal, Burkina Faso and Tanzania. There are other similar initiatives such as Biogas for Better Life, which is at various stages of Biogas development in Africa countries. While there are few documented successful small-scale biogas plants in the rural areas of Africa, BGT has not yet been successfully adopted as either an energy or economic strategy in Africa (Biogas For Better Life, 2009). In Africa compared to Asia, BGT dissemination has been relatively unsuccessful. Njoroge(2002) attributes the non-progressiveness of most biogas programmes in Africa to; failure by African Governments to support biogas technology through a focused energy policy, poor design and construction of digesters, wrong operations & lack of maintenance by users, poor dissemination strategies and lack of monitoring & follow ups by promoters. According to Mwirigi et al., (2012), the domestic biogas projects is bound to fail due implementation challenges. This according to GTZ, (2010), can result to losses of over 10.56%. There is, therefore, a need to address the unpredictability of the successful implementation of biogas projects in terms of delivery time, cost and to the standard of quality expected. While several studies (Mwirigi, 2013; Lockwood, 2012; Wanjiru, 2013, Nyandika, 2014) have been done focusing on different aspects of project completions and further appreciating the crisis in every project in terms of completion and implementation, all empirical evidences are in short of the actual determinants that influences the implementation itself. Hence this study seeks to fill this gap by examining the determinants of successful implementation of biogas projects in Kenya.

Objectives of the study

The general objective of the study was to find out the determinants of successful implementation of domestic biogas projects in Kenya.

The specific objectives of the study were to;

- i. Determine the effect of financial resources on successful implementation of domestic biogas projects in Kenya
- ii. Identify the effect of project management skills on successful implementation of domestic biogas projects in Kenya.
- iii. Establish the effect of technological factors on successful implementation of domestic biogas projects in Kenya.
- iv. Examine the effect of government policy on successful implementation of domestic biogas projects in Kenya.

Research Questions

The research was guided by the following research questions;

- i. Do financial resources affect successful implementation of domestic biogas projects in Kenya?
- ii. How do project management skills affect successful implementation of domestic biogas projects in Kenya?
- iii. To what extent do technological factors affect successful implementation of domestic biogas projects in Kenya?
- iv. Does government policy affect successful implementation of domestic biogas projects in Kenya?

Theoretical Review

Stewardship theory

In stewardship theory, the top management of the organizations are regarded as the stewards of the projects assets and liabilities and are expected to act in the best interest of the stakeholders (Mallin, 2007).

He further observes that the stewards must take fiduciary position. Stewardship theory relates to the board's task of providing support and advice to management (Davis, 1993). The theory has its roots in psychology and sociology. Abdulla and Valentine (2009), note that stewards are organizations managers and leaders working for the interest of shareholders. The stewards protect and make profits for shareholders and are satisfied and motivated when organizational success is attained. The theory emphasizes that effective control held by professional managers empowers them to maximize firm performance and corporate profits. In this study, the theory is applicable and supports the variables of technical factors and project management skills in the management of domestic biogas projects in Kenya. The project managers, contractors and technicians assist their clients (users) as good stewards to install these projects but they don't turn up to help them when these projects get technical challenges which lead to non-functional biogas plants (Mwirigi, 2010).

Sustainability Theory

Sustainability theory means a capacity to maintain some entity, outcome or process overtime (Jenkins, 2004). In general, sustainability refers to the property of being sustainable. This theory is applicable to the operations of domestic biogas projects in Kenya as their sustainability may improve their survival rate. According to Rosenbaum, (1993), sustainability means using methods, systems and materials that won't deplete resources or harm natural cycles. The long term health of a nation depends on the sustainability of development projects that operate in the country (Amrule, 2013). Within the development community, the notion of sustainability came to be applied to financial resources, including project funds, indicating that projects and donor support are not limitless and must be used efficiently in ways that local actors support so that benefit flows are sustained (USAID, 2005). In this study, since domestic biogas projects implemented need to be sustainable in the long run, to sustain human desire for energy for cooking and lighting at the household level, the effects of climatic change and physical environment will be controlled as it will curb deforestation thus protection and conservation of the environment by providing adequate government policies on biogas technology in Kenya (MoE/GTZ, 2010). The sustainability theory instigated the second research objective: To establish the effect of technological factors on successful implementation of domestic biogas projects in Kenya.

Program Evaluation theory

Rossi (2004) describes program theory as consisting of the organizational plan which deals with how to garner, configure, and deploy resources, and how to organize program activities so that the intended service system is developed and maintained. The theory is further defined by (Donaldson, 2001) as process through which program components are presumed to affect outcomes and the conditions under which these processes are believed to operate. Program theory guides an evaluation by identifying key program elements and articulating how these elements are expected to relate to each other (Yin, 2004). This will help save program designers and evaluator's time and resources, Donaldson (2001). Theory based evaluations therefore enable the evaluator to tell why and how the programme is working, Weiss, (2004).

In implementation of the domestic biogas projects, it requires the project managers to acquire the project management and financial skills such as monitoring and evaluation skills of such projects. Monitoring tracks and documents resources used throughout the implementation of the project, Passia, (2004) while Evaluation assesses the effectiveness in achieving its goals and in determining the relevance and successful implementation of the ongoing project, McCoy, (2005). The above theory instigated the third research objective: To determine the effect of financial resources on successful implementation of domestic biogas projects in Kenya.

Decentralization Theory

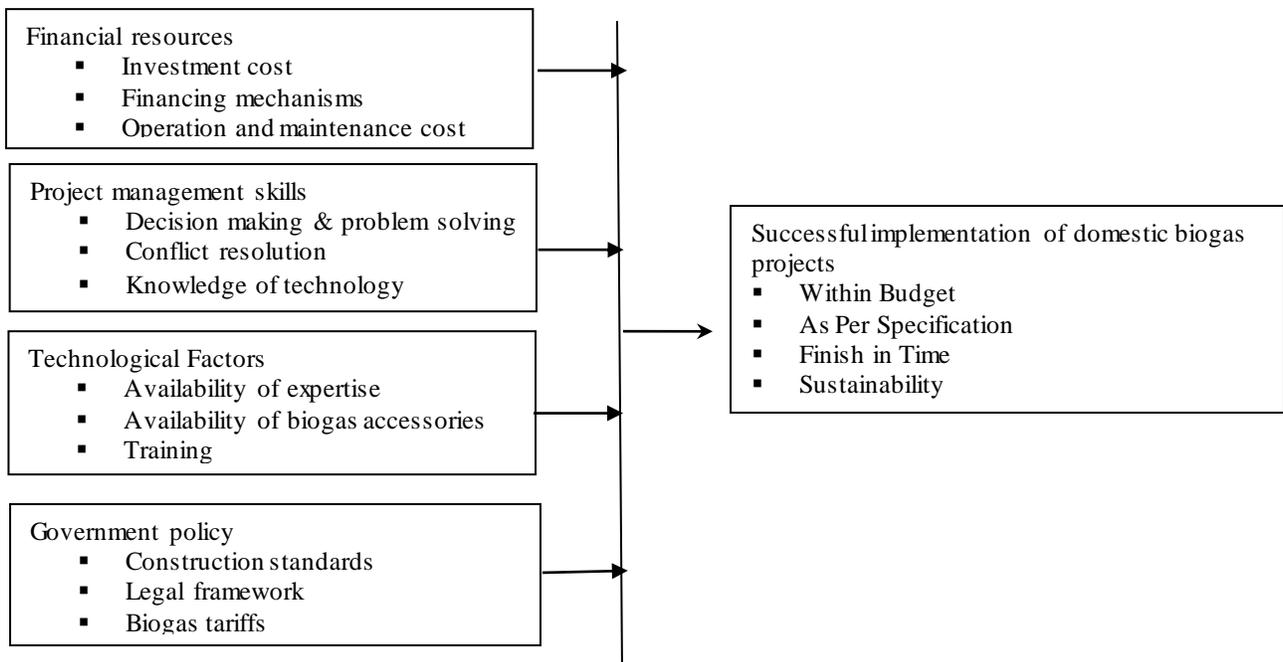
Decentralization is a process of sharing power between the central government on one hand, and the regional and local governments on the other such that the central government transfers power, functions, policies, competencies, and means to the regional and local governments at the grassroots. In establishing the interconnection between participatory governance and decentralization, Kokor (2001) notes that local governance: [S]ought to establish participatory democracy in which the citizens of a locality act directly in the process of both local governance by coming up with sound policies and development. The central

theme and driving force of decentralization are: to create opportunity for the majority of rural communities, in the villages and towns to take part in collective decision making and gain access to political and administrative authority; Promote local sustainable development by establishing community projects with the involvement of the locals to improve living conditions in the country (Bonye et al, 2013).

In this study, since transfer of responsibilities and functions after the exit of the implementers and donors of the projects to the communities helps in decision making and administration of the projects at the grassroots, successfully implemented projects can only be achieved if the functions and authorities are being devolved to communities as they are the main beneficiaries. Thus, the study seeks to establish the technical resources, project management skills and rural renewable energy policies spelt out and accommodate domestic biogas users to enhance the performance and sustainability of such projects. Further, it will seek to unearth factors that hinder these domestic biogas projects from being sustainable. The above theory instigated the fourth research objective: To examine the effect of government policy on successful implementation of domestic biogas projects in Kenya.

Conceptual framework

Mugenda and Mugenda (2003) defines conceptual framework as a hypothesized model identifying the concepts under the study and their relationships. It’s a diagrammatical representation that shows the relationship between independent variables (project management skills, technological factors, financial resources and government policy) and dependent variable (successful implementation of domestic biogas projects) in the study. The figure 1 below shows the conceptual framework for the study;



Independent variables

Dependent variable

Figure 1: Conceptual framework for the study

RESEARCH METHODOLOGY

The study adopted a descriptive research design. The researcher adopted it for the study to assess the determinants of successful implementation of domestic biogas projects in Kenya, with a view to offer solutions. The target population constituted the 600 domestic biogas projects (GTZ/MoE, 2014) represented by biogas users and 60 contractors drawn from MoE & MOALF in Kiambu County involved in the implementation of the projects in the study area according to the records available drawn from MoE & MOALF(2014).

A proportionate sample size of approximate 60 respondents of biogas users which is 10% of the target population was selected using stratified random sampling technique and 6 government officers being 10% of the population was selected using purpose sampling

Table 1. Target population and Sample size

Respondents	Target population	Sample Size %	Designated Sample size
Biogas contractors	60	10	6
Biogas users	600	10	60
Total	660	10	66

The study relied mainly on primary data. Structured questionnaires were used in this study to collect data.. The questionnaires comprised of both open ended and closed ended questions. The closed ended questions were used to limit the respondents to given variables in which the researcher was interested, while open ended questions were used in order to give the respondents room to express their views in a more pragmatic manner (Kothari, 2004). Out of 60 questionnaires administered to biogas users, 37 of them, that is 61.67% were dully filled and returned while 5 out of 6 of biogas contractors questionnaires representing 83.33%. Overall, out of 66 questionnaires distributed, 42 that is 63.64% response rate was achieved.

The researcher selected a pilot of 6 from relevant experts to test the reliability and validity of the questionnaire. The rule of thumb is that 1% of the sample should constitute the pilot test (Creswell, 2003). The researcher used the most common internal consistency measure known as Cronbach’s alpha(α) Cronbach Alpha was established for every objective which formed a scale. The results show that project management skills had the highest reliability ($\alpha= 0.983$), followed by financial resources ($\alpha=0.876$), government policy ($\alpha=0.839$), and technological resources ($\alpha=0.777$). This illustrates that all the four variables were reliable as their reliability values exceeded the prescribed threshold of 0.7. This infers that the instrument was reliable as emphasized by Amin (2005).

Content validity was used in this study. The content validity formula by Amin (2005) was used. The formula is; Content Validity Index = (No. of judges declaring item valid) / (Total no. of items). All the four variables were valid as their CVI values exceeded the prescribed threshold of 0.78. This infers that the instrument was reliable as emphasized by Amin (2005) as validity of test yielded an average index score of 78%. This implied the instrument was valid as emphasized by (Amin, 2005).

Data was collected and analyzed by using both quantitative and qualitative methods with the help of statistical package of social sciences (SPSS) version 21 and excel. The findings were presented using frequency distribution tables and graphs. For further analysis on, the researcher adopted a multiple regression model for the study to establish the strength and direction of the relationship between the independent variables (Project management skills, financial resources, technological factors and government policy) and the dependent variable (successful implementation of domestic biogas projects in Kenya). This was done at 5% level of significance and 95% level of confidence. The multiple regression model is as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$$

Where: Y= successful implementation of domestic biogas projects in Kenya,

β_0 = constant (coefficient of intercept); X1= Financial resources; X2= Project management skills;

X3= Technological factors; X4= Government policy; ϵ = error term;

β_1, \dots, β_4 = regression coefficient of four variables.

RESULTS AND DISCUSSION

Background Information

Respondents’ experience in Biogas sector

The research went further to find out on the length of service of the contractor in the sector. This information is shown in figure 2.

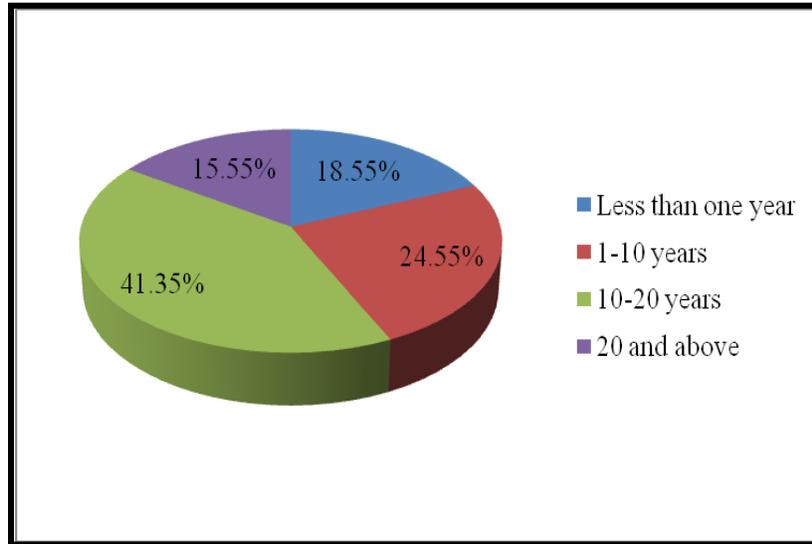


Figure 2, Length of service in biogas sector

From the findings in figure 2 most of the respondents (41.35%) had worked for 10 - 20 years, 24.55% for 1 – 10 years, 18.55% for less than a year and 15.55% for 20 years and above. This implies that the respondents had worked for a relatively long period to give credible information about biogas sector in the study area. These findings correspond to those by Reagans, Argote and Brooks (2005) that individual experience, organizational experience and experience working together on a team each provide a distinct contribution to implementation and performance of projects. According to Enshassi, Mohamed & Abushaban (2008) availability of experienced personnel leads to successful implementation of projects in terms of quality, time and cost. This shows that work experience is an important factor in the successful implementation of domestic biogas projects in Kenya.

Respondents’ Level of Formal Education

The study sought to establish the respondents’ level of education. The findings were as shown in figure 3.

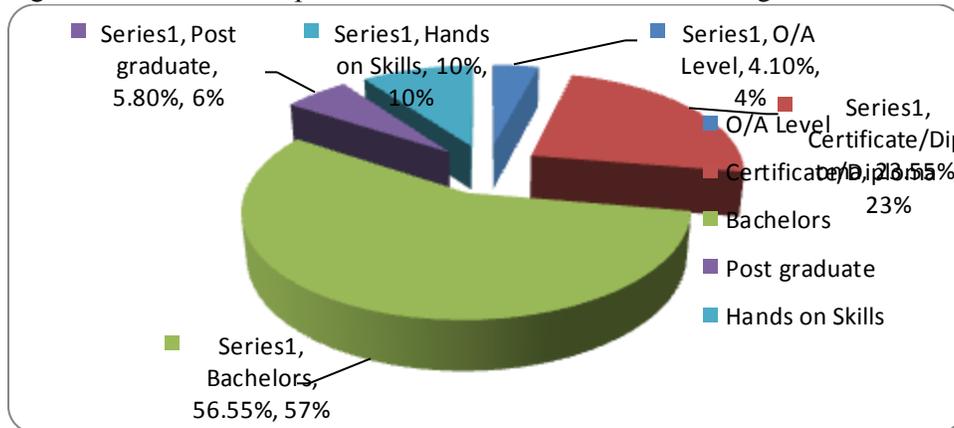


Figure 3. Respondents’ Level of Formal Education

From the results in figure 3, most of the respondents (56.55%) had acquired certificate/diploma level of education, 23.55% of the respondents stated to have acquired bachelors, 10% had acquired through hands skills on, 5.80% postgraduate level of education and 4.10% had O/A level of education. This is a clear indication that most of the respondents were literate and thus they were in a position to answer all the questions in this study. The findings agree with literature by Chaddad (2004) that high level of literacy is important which easily help in understanding and implementing projects. Abushaban (2008) found out that availability of personnel with high qualification lead to better implementation of projects in terms of quality, time, cost, productivity and safety. This implies that the level of education is an important factor in understanding and implementation of domestic biogas projects in Kenya.

Type of biogas technology

The study sought to establish the respondents’ type of biogas technology installed. The findings were as shown in figure 3.

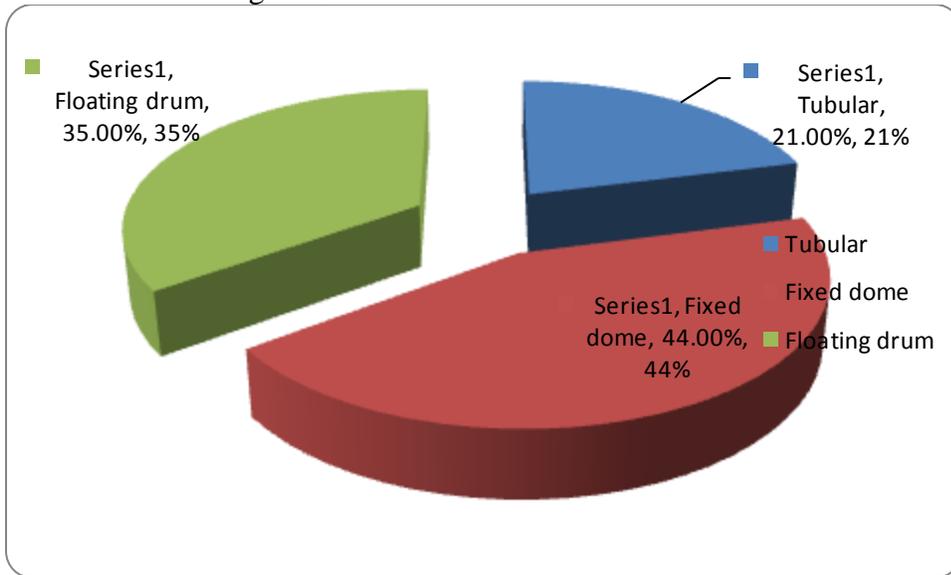


Figure 4. Type of biogas technology

From the results in figure 4, most of the respondents (44.00%) had installed fixed dome biogas plants, 35% of the respondents stated to have installed floating drum type and 21% of the respondents cited to have installed tubular type of biogas systems. This is a clear indication that most of the respondents had installed different types which require different approaches during the implementation. The type of biogas technology influence implementation process. The findings are in line with GTZ (2010) that type of biogas technology adopted and implemented determines the implementation of its own procedures and processes which influence its implementation and performance in the long run in terms of finish in time, within budget, cost and sustainability(Wanjiru, 2013). This implies that the type of technology is an important factor in understanding and implementation of domestic biogas projects in Kenya.

Study Variables

Financial Resources

The first objective of the study was to establish the effect of financial resources on successful implementation of domestic biogas projects in Kenya.

Financial resources and Implementation of domestic biogas projects

The study sought to establish the extent to which the respondents agreed or disagreed with the aspects of financial resources influence implementation of domestic biogas projects in the study area. The responses were rated on a five point Likert scale where: 1 – Strongly agree 2 – Agree 3 –Neutral 4-Strongly Disagree and 5- Strongly agree. The mean was generated from SPSS version 21 and is as illustrated in Table 2.

Table 2. Financial resources and Implementation of domestic biogas projects

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	SD
Investment cost	18	15	5	2	2	1.8	0.29
Financing mechanisms	19	12	9	1	1	1.1	0.28
Operation & maintenance	13	15	10	2	2	1.3	0.24

From the results in table 4.6 above, respondents agreed that investment cost influence implementation of biogas by a mean of 1.8 while they strongly agreed that financing mechanisms influence implementation of domestic biogas projects by a mean of 1.1; that operation and maintenance cost influence implementation of domestic biogas projects by a mean of 1.3. The findings show that respondents strongly agreed that investment cost, financing mechanisms and operation and maintenance cost influence implementation of biogas projects in Githunguri sub-county. The findings corroborates with literature review by Habeeb, (2013) who cited that the ability to accurately forecast cost performance allows organizations or project teams to confidently allocate capital, reducing financial risk, possibly reducing the cost of capital Brignall and Modell (2000). According to Kamwana (2014), financial resources is one of the most important project management activities needed to ensure your project is delivered within the cost expectations laid down by the project's definition (Cleland, 2009). Financial management like any form of control process is not about collecting and measuring how much cost you have expended on the project, and then simply looking at the budget and deciding what is left will 'obviously' finish the project (Bourne and Walker, 2003).Cost control success factors are based on good project control practices, which result in good cost and schedule outcomes thus success of the project Strogatz,(2003). Meeting requirements of financial evaluation of investment cost, financing mechanisms of the projects and operation and maintenance cost of a project are the key success factors for successful implementation of domestic biogas funded projects(GTZ,2010) This infers that these factors of financial resources influence implementation of domestic biogas in Githunguri sub-county.

Project Management Skills

The second objective of the study was to establish the effect of project management skills on successful implementation of domestic biogas projects in Kenya.

Project Management skills on Implementation of domestic biogas projects

The study sought to establish the extent to which the respondents agreed or disagreed with the following aspects of project management skills influence on implementation of domestic biogas projects in the study area. The responses were rated on a five point Likert scale where: 1 – Strongly agree 2 – Agree 3 – Neutral 4-Strongly Disagree and 5- Strongly agree. The mean was generated from SPSS version 21 and is as illustrated in Table 3.

Table 3: Project Management skills on Implementation of domestic biogas projects

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. deviation
Decision making & problem solving skills	21	19	10	11	2	1.6	0.19
Conflict resolution ability	17	14	9	1	1	1.2	0.27
Knowledge of technology	13	15	8	5	1	1.4	0.34

From the results in table 3, respondents agreed that decision making and problem solving skills influence implementation of domestic biogas projects by a mean of 1.6 while they strongly agreed that conflict resolution ability influence implementation of domestic biogas projects by a mean of 1.2; that knowledge

of technology influence implementation of domestic biogas projects by a mean of 1.4. The findings show that respondents agreed that decision making and problem solving skills influence implementation of domestic biogas projects in Githunguri sub-county. The findings are in line with literature review by Schouten & Moriarty (2003), Wanjiru(2011), Mwirigi(2009) and Shell(2007), who observed that decision making & problem solving skills, conflict resolution ability and knowledge of technology influence implementation of domestic biogas projects positively. This infers that these factors of project management skills influence implementation of domestic biogas in Githunguri sub-county.

Technological factors

The third objective of the study was to establish the effect of project management skills on successful implementation of domestic biogas projects in Kenya.

Technological factors on Implementation of domestic biogas projects

The study sought to establish the extent to which the respondents agreed or disagreed with the following aspects of technological factors influence on implementation of domestic biogas projects in the study area. The responses were rated on a five point Likert scale where: 1 – Strongly agree 2 – Agree 3 – Neutral 4-Strongly Disagree and 5- Strongly agree. The mean was generated from SPSS version 21 and is as illustrated in Table 4.

Table 4. Technological factors on Implementation of domestic biogas projects

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. deviation
Availability of expertise	16	11	9	4	2	1.5	0.16
Availability of accessories	16	15	7	3	1	1.1	0.27
Operation & maintenance	15	13	8	5	1	1.2	0.14

From the results in table 4, respondents agreed that availability of expertise influence implementation of domestic biogas projects by a mean of 1.5, availability of accessories influence implementation of domestic biogas projects by a mean of 1.1; that operation and maintenance influence implementation of domestic biogas projects by a mean of 1.2. The findings are in line with literature review by Wanjiru(2013), Shell (2007),GTZ(2008), RoK(2009) who observed that use of modern technologies such entails availability of expertise and accessories and enough technicians for operation and maintenance of the systems during and after implementation as technological factors have a positive influence for implementation of small scale biogas systems. This infers that these technological factors influence implementation of domestic biogas in Githunguri sub-county

Government policy

The fourth objective of the study was to establish the effect of government policy on successful implementation of domestic biogas projects in Kenya.

Government policy on Implementation of domestic biogas projects

The study sought to establish the extent to which the respondents agreed or disagreed with the following aspects of government policy influence on implementation of domestic biogas projects in the study area.

Table 5. Government policy on Implementation of domestic biogas projects

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. deviation
Construction standards	15	10	11	4	2	1.3	0.13
Legal framework	15	15	8	3	1	1.1	0.17
Biogas tariffs	17	11	8	5	1	1.2	0.21

The responses were rated on a five point Likert scale where: 1 – Strongly agree 2 – Agree 3 –Neutral 4- Strongly Disagree and 5- Strongly agree. The mean was generated from SPSS version 21 and is as illustrated in Table 5.

From the results in table 4.15 above, respondents agreed that construction standards influence implementation of domestic biogas projects by a mean of 1.3, legal framework influence implementation of domestic biogas projects by a mean of 1.1; that biogas tariffs influence implementation of domestic biogas projects by a mean of 1.2. The findings are in tandem with GTZ (2008) that there is need to fast track policies according to the Energy Act 2006 which has provision for promotion of renewable energy which includes biogas. However, the necessary legal and regulatory framework for biogas still needs to be put in place. Some of the biogas companies have come together to form a biogas installers network, which intends to collaborate with MOE & KEBS to develop standards and ensure that members operations conform to the standards (Gichohi, 2010).. This infers that these government factors influence implementation of domestic biogas in Githunguri sub-county.

Implementation of domestic biogas projects

The study, additionally, sought to establish the implementation of domestic biogas projects in Githunguri sub-county. Specifically, the study focused on the finish in time, within budget, finish as per specifications and sustainability

Finish Time

The study sought to determine the extent to which finishing in time measure successful implementation of domestic biogas projects in Githunguri sub-county. Figure 5 shows that 36.75% of the respondents indicated that finishing in time measure successful implementation of domestic biogas projects in Githunguri sub-county to a very great extent 27.45% of the respondents indicated that finishing in time measure successful implementation of domestic biogas projects in Githunguri sub-county to a great extent, 22.65% of the respondents indicated that finishing in time measure successful implementation of domestic biogas projects in Githunguri sub-county to moderate extent 9.65% of the respondents indicated that finishing in time measure successful implementation of domestic biogas projects in Githunguri sub-county to low extent while 6.50% of the respondents indicated that finishing in time measure successful implementation of domestic biogas projects in Githunguri sub-county to no extent at all.

The findings concur with the findings of Ghazala and Vijayendra (2011) who conducted a study on the implementation construction projects in Hong Kong and found that finishing in time was an important measure of successful implementation of projects. From these findings we can infer that finishing in time is an important measure of successful implementation of domestic biogas projects in Githunguri sub-county.

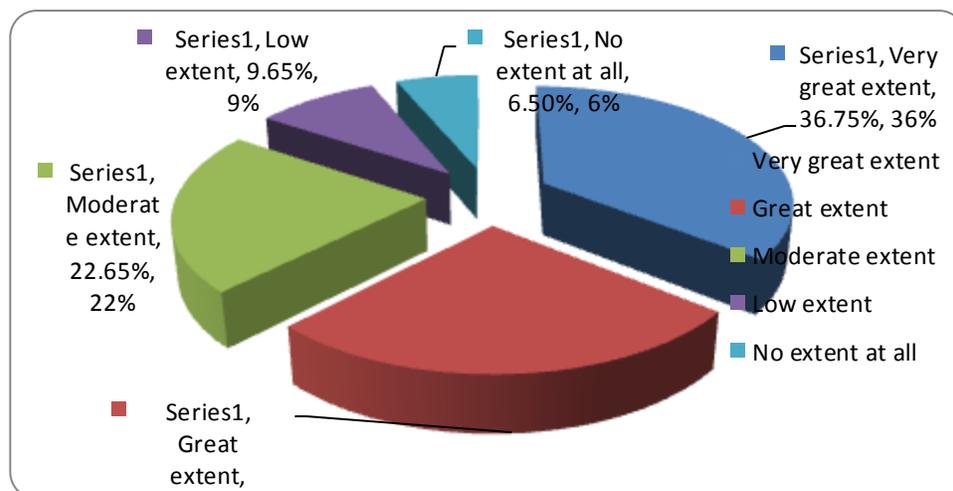


Figure 5. Finish in Time as a measure of successful implementation of domestic biogas projects

Finish within Budget

The study sought to determine the extent to which finishing within budget measure of successful implementation of domestic biogas projects. Figure 6 shows that 29.35% of the respondents indicated that finishing within budget measure of successful implementation of domestic biogas projects to a very great extent; 28.45% of the respondents indicated that finishing within measure of successful implementation of domestic biogas projects to a great extent, 26.45% of the respondents indicated that finishing within budget measure of successful implementation of domestic biogas projects to moderate extent 12.35% of the respondents indicated that finishing within budget measure of successful implementation of domestic biogas projects to low extent while 3.40% of the respondents indicated that finishing within budget measure of successful implementation of domestic biogas projects to no extent at all. These findings concur with Miller and Lessard (2005) who established that poor construction project implementation can be caused by increase in the cost of the project. These findings imply that finishing within budget is an important measure of successful performance of domestic biogas projects in Kenya.

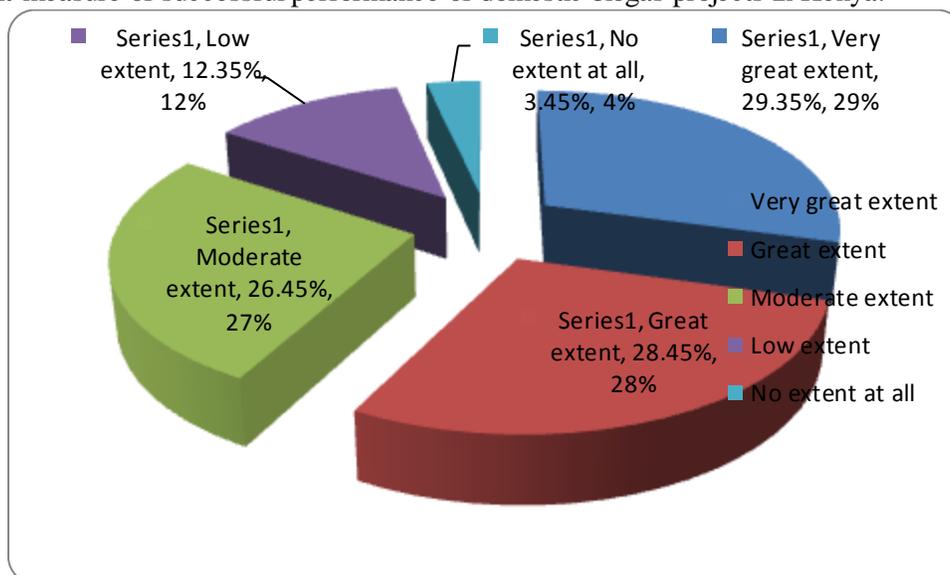


Figure 6. Extent to which finishing within budget measure successful implementation of domestic biogas projects

Finish as per Specifications

The study sought to determine the extent to which finishing as per specifications measure successful implementation of domestic biogas projects at Githunguri sub-county. Figure 7 shows that 31.75% of the respondents indicated that finishing as per specifications measure successful implementation of domestic biogas projects at Githunguri sub-county to a very great extent 30.45% of the respondents indicated that finishing as per specifications measure successful implementation of domestic biogas projects at Githunguri sub-county to a great extent, 27.35% of the respondents indicated that finishing as per specifications measure measure successful implementation of domestic biogas projects at Githunguri sub-county to moderate extent 5.25% of the respondents indicated that finishing as per specifications measure successful implementation of domestic biogas projects at Githunguri sub-county to low extent while 5.25% of the respondents indicated that finishing as per specifications measure successful implementation of domestic biogas projects at Githunguri sub-county to no extent at all. These findings agree with Al-Kharashi and Skitmore (2008) who indicate that the main cause of poor implementation due to delays in Saudi Arabia construction sector for projects is the lack of proper specifications. This implies that finishing as per specifications is an important measure successful implementation of domestic biogas projects at Githunguri sub-county.

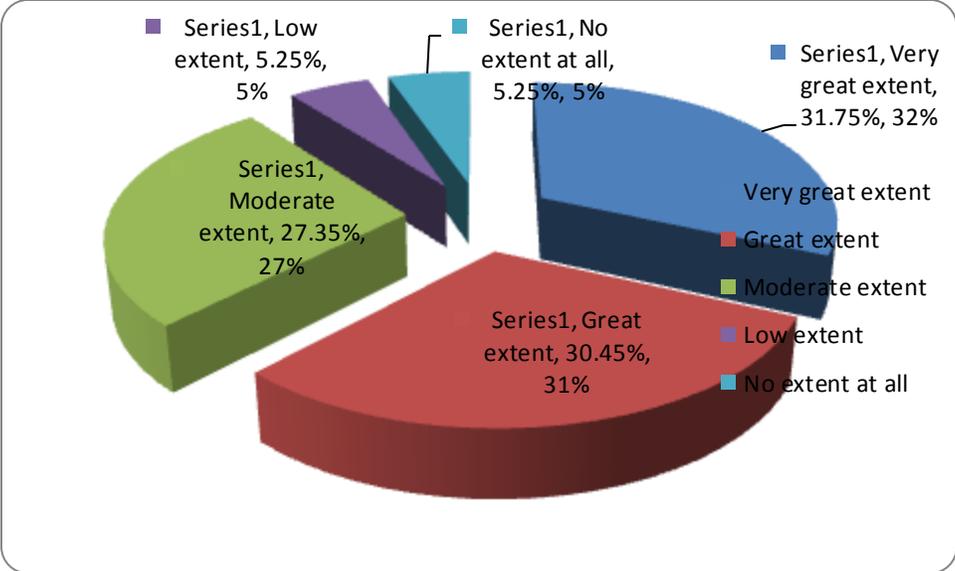


Figure 7. Extent to which finishing as per specifications measure affect successful implementation of domestic biogas projects

Sustainability

The study sought to evaluate the extent to which sustainability measure successful measure successful implementation of domestic biogas projects. Figure 8 shows that 34.50% of the respondents indicated that sustainability measure successful implementation of domestic biogas projects to a very great extent 26.45% of the respondents indicated that sustainability measure successful implementation of domestic biogas projects to a great extent, 14.35% of the respondents indicated that sustainability measure successful implementation of domestic biogas projects to moderate extent 10.45% of the respondents indicated that sustainability measure successful implementation of domestic biogas projects to low extent while 14.25% of the respondents indicated that sustainability measure successful implementation of domestic biogas projects to no extent at all. These findings agree with the findings of Adan (2012) who established that sustainability of projects is a good measure of performance of constituencies’ development fund projects. This clearly shows that sustainability of projects is an important measure of successful implementation of domestic projects in Githunguri sub-county.

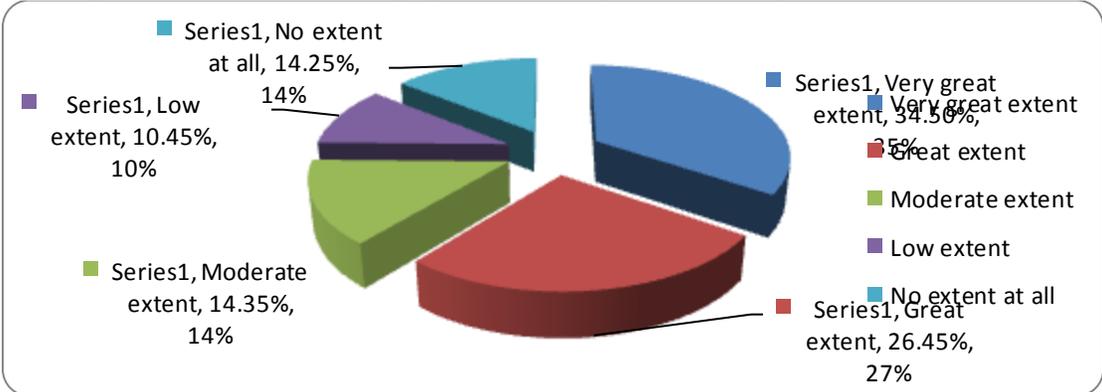


Figure 8. Extent to which sustainability measure successful implementation of domestic biogas projects

Multiple Regression Analysis

The researcher conducted a multiple regression analysis so as to establish the determinants of successful implementation of domestic biogas projects in Kenya. The researcher applied SPSS version 21 to code,

enter and compute the measurements of the multiple regressions for the study. According to Green & Salkind (2003) regression analysis is a statistics process of estimating the relationship between variables. Regression analysis helps in generating equation that describes the statistics relationship between one or more predictor variables and the response variable. The results are shown in table 6.

Table 6. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.867 ^a	.751	.322	.2302

a. Predictors: (Constant), Financial Resources, Technological factors, Project management Skills, Government policy

The coefficient of determination (R^2) explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (successful implementation of domestic biogas projects) that is explained by all four independent variables (Financial Resources, Technological factors, Project management Skills, Government policy). According to the four independent variables studied, they explain only 75.10% of the influence on the successful implementation of domestic biogas projects in Kenya as represented by R^2 . This therefore means that factors not studied in this research contribute 24.90% of the influence. Therefore, a further research should be conducted to investigate the other factors (24.90%) that influence the successful implementation of domestic biogas projects in Kenya. These findings agree with Al-Kharashi & Skitmore (2008); Nyandika (2014) and Adan (2012) argument that factors influencing successful implementation of domestic biogas projects include; financial resources, user involvement, technology, top management support, project management, type of enterprises, ICT systems, government policy, availability of equipment and raw materials, political good will, project management skills and foreign exchange rate.

Analysis of Variance (ANOVA)

Table 7. Analysis of Variance^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	95.654	4	23.9135	72.5091	.0000 ^p
	Residual	12.202	37	.3298		
	Total	107.856	41			

a. Dependent Variable: Successful implementation of domestic biogas projects

b. Predictors: (Constant), Financial Resources, Technological factors, Project management Skills, Government policy

The reports summary ANOVA and F statistic (72.5091) is significant at 0.05 confidence level. The significance value is .0000 and the value of F is large enough to F critical we conclude that the set of independent variables; Financial Resources, Technological factors, Project management Skills, Government policy influence Successful implementation of domestic biogas projects in Kenya.

Coefficients^a

Table 8. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.678	3.765		2.439	.002
	Financial Resources	.774	.388	.002	2.535	.000
	Project management skills	.653	.266	.135	3.366	.002
	Technological factors	.755	.288	.017	2.311	.001
	Government policy	.651	.446	.109	2.469	.003

a. Dependent Variable: Successful implementation of domestic biogas projects in Kenya

The table shows that the independent variables statistically significantly predict the dependent variable, $F(4, 37) = 72.5091, p < .005$, this shows that the overall model was significant.

The researcher conducted a multiple regression analysis so as to determine the relationship between the dependent variable and independent variables. The general form of the equation was to predict Successful implementation of domestic biogas projects in Kenya from Financial Resources, Technological factors, Project management Skills, Government policy is:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon \quad \text{Where}$$

Y= Successful implementation of domestic biogas projects in Kenya; β_0 = Constant Term; $\beta_1, \beta_2,$ and β_3 = Beta coefficients; X_1 = Financial Resources; X_2 =Project Management Skills; X_3 = Technological factors; X_4 = Government policy and ε = Error term. The model equation would be; $Y=12.678 + 0.774X_1 + 0.653X_2 + 0.755X_3 + 0.651X_4$. The predicted Successful implementation of domestic biogas projects in Kenya = $12.678 + (0.774 \times \text{Financial Resources}) + (0.653 \times \text{project management Skills}) + (0.755 \times \text{Technological factors}) + (0.651 \times \text{Government policy})$. From above regression equation; the study found out that when all independent variables (Financial Resources, Technological factors, Project management Skills, and Government policy) are kept constant at zero the Successful implementation of domestic biogas projects in Kenya will be at 12.678. At one unit change in financial Resources will lead to 0.774 increases in the Successful implementation of domestic biogas projects in Kenya. Also a one unit change in technological factors will lead to 0.653 increases in the Successful implementation of domestic biogas projects in Kenya. Further, a one unit change in project management skills will lead to 0.755 increases in the Successful implementation of domestic biogas projects in Kenya and one unit change in Government policy will lead to 0.651 increases in Successful implementation of domestic biogas projects in Kenya. This concludes that financial resources contributes more to Successful implementation of domestic biogas projects in Kenya followed by technological factors, project management skills and government policy respectively. To test for the statistical significance of each of the independent variables, it was necessary to test at 5% level of significance and 95% level of confidence of the p-values and from the table 4.18 above the financial resources had a 0.000; technological factors showed a 0.001 level of significance, project management skills showed a 0.002 level of significance and government policy had a 0.003 level of significance; a t-values were is greater than 2.

This can be used to conclude that there is a positive significant relationship between Financial Resources, Technological factors, Project management Skills, and Government policy and Successful implementation of domestic biogas projects in Githunguri sub-county hence the most significant factor is financial resources followed by technological factors, project management skills and government policy respectively. The findings corroborates with Brignall & Modell (2000); Cleland(2009); Wanjiru (2013) and Bouner & Walker(2003) who argues that factors influencing successful implementation of domestic biogas projects include; financial resources , user involvement , technology and top management support.

CONCLUSIONS

The study concludes that financial resources, project management skills, technological factors and government policy influence the successful implementation of domestic biogas projects in Githunguri sub-county in Kenya. The study found out that all the independent variables influenced the dependent variable positively and financial resources was the most significant factor followed by technological factors, project management skills and government policy at influence successful implementation of domestic biogas projects in Githunguri sub-county 5% significance level and 95% confidence level. The study also established that 75.90% of the successful implementation of domestic biogas projects in Githunguri sub-county was explained by financial resources, project management skills, technological factors and government policy and this means that the other factors not studied in this research contributed 24.90% of successful implementation of domestic biogas projects in Githunguri sub-county in Kenya.

RECOMMENDATIONS

The study recommends that improvement in use of financial resources can enhance implementation of domestic biogas projects in Kenya. The financial resources need to be used efficiently and effectively as this can enhance timely completion of projects, realistic estimates, within budget and enhance sustainability which is key factor of successful implementation of domestic biogas projects in Kenya.

Additionally, the study recommends for better management of technological factors as they positively enhance successful implementation of domestic biogas projects. This can be done by offering trainings to contractors, artisans and project managers on the technical aspects of domestic biogas project. Since the technology is new in Kenya for many technicians, it is necessary to offer the trainings that promote capacity building for sustainability of these projects.

Further, the study recommends the implementers to have project management skills to improve the implementation of domestic biogas projects. The decision making and problem solving skills, conflict resolution in case of implementation issues that may emerge and likely to derail implementation and knowledge on the technology to implementers as this will strengthen their ability to improve implementation of domestic biogas projects.

Finally, the study recommends for effective energy policies that assist to create an enabling environment for promotion of biogas technology in Kenya as this will enhance successful implementation of biogas projects to realize the benefits of the technology to biogas users; offer employment opportunities to technicians. This will enhance identification of corrective actions to address issues, continuing support of end-users and have a better organizational culture which will lead to improved implementation of domestic biogas projects.

REFERENCES

- Agle, B. R., R. K. Mitchell & J.- A. Sonnenfeld: 2008, 'Who Matters to CEOs? An Investigation of Stakeholder Attributes and Salience, Corporate performance, and CEO Values', *Academy of Management Journal* 42, 507-525.
- Ahsan, K., Gunawan, I., 2010. *Analysis of cost and schedule performance of international development projects*. *International Journal of Project Management* 28 (1), 68–78. ares552e.htm. Last visited December, 2006.
- Atrill, P. (2006). *Financial Management for Decision Makers*, (4th ed.). London: Prentice Hall.
- Beach, S. (2009). *Who or what decides how stakeholders are optimally engaged by governance networks delivering public outcomes?* Australian Centre for Business Research; QUT Business School; School of Management.
- Belassi W. and Tukul O. (2002). *A new framework for determining critical Success/failure factor in Projects*. *International Journal for Project Management*.
- Bordens, K. S., and Abbott, B.B. (2008). *Research design methods: A process approaches* (7th ed.). New York, NY: McGraw-Hill.
- Burke, R. (2004). *Project Management Planning and Control Techniques*. 4th edition, New Delhi India: Pearson Education.
- Callahan, M. T., D. G. Quackenbush, and J. E. Rowings, (2006). "Construction Project scheduling". USA: McGraw-Hill.
- Chandran C. (2004). *Research Methods: A qualitative Approach with Illustrations from Christian Ministries*. Nairobi: Daystar University.
- Chikati ,J. (2009). *Project Cycle Management: an Integrated Approach and Logical*. Pearson. New Delhi.
- Cooper D R, Schindler PS (2005). *Business Research Methods*. (8th ed.). Mc Graw-Hill, New Delhi, India.
- Creswell, J. W. (2003). *Research design: Quantitative, qualitative, and mixed methods approaches* (2nd Ed.). Thousand Oaks, CA: Sage.
- Creswell, J. W., (2002). *Educational research: Planning, conducting, and evaluating quantitative and qualitative approaches to research*. New Jersey: Merrill/Pearson Education.
- Deloof, M. (2003). "Does Working Capital Management Affect Profitability of Belgian Firms?" *Journal of Business Finance and Accounting*, Vol. 30, No. 3 & 4, 573-587.
- Dennis Lock (2007). *Project Management*. Gower Publishing Limited, New Delhi.
- Donaldson, S. I. (2001). *Overcoming our negative reputation: Evaluation becomes known as a helping profession*. *American Journal of Evaluation*, 22, 355-361.
- Donaldson, T. and Preston, L. (1995). *The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications*. *Academy of Management Review*, v 20, n 1, pp65-91.

- Freeman, R.E. (2004). *Strategic Management: A stakeholder approach*. Boston: Pitman.
- Freeman, R.E., and Phillips, R. A. (2002). Business Ethics Quarterly, 12(3), 331-349.
- Goldratt E. and Cox J., (2002). *The Goal: A process of ongoing improvement*. (Revised Ed.). Croton-on-Hudson. North River Press.
- Goldratt, E. M. (2006). *Critical chain*. The North River Press, Great Barrington, U.S.
- Government of Kenya (2009). *Ministry of Planning and National Development: The National census*. Nairobi: Government Printer.
- Government of Kenya (2012). Feed-in-Tariffs policy for wind, biomass, small hydros, geothermal, biogas and solar, *sessional paper , 2nd revision*, December, 2012
- Government Press (2005). *Ministry of Planning: Millennium Development Goal 7*.
- Harold, K. (2009). *Project Management: A systems Approach to Planning, Scheduling and Controlling* (8th ed.). Wiley Publishing: NY.
- Harvey, Maylor (2010). *Project Management* (4th ed.). Englewood Cliffs: Prentice Hall.
- Heldman, K. 2011. *Project management jumpstart*. 3rd ed. Hoboken, NJ: Wiley
- Herman, S .John, M. and Nicholas (2011). *Project Management for Business, Engineering and Technology*, Principles and Practice, 3rd Edition
- Hitesh, B. (2009). *Marketing strategy management*. (2nd ed.). New Delhi India: Response Books.
- Hoard, C.A. 2003. *Hierarchy of skills: laying a foundation for PM Maturity*. [online]. Available from: <http://www.ganththead.com/content/articles/176281.cfm>>. [Accessed 12 April 2011].
- Hunkeler D and Rebitzer G (2005). The Future of Life Cycle Assessment. *The International Journal of Life Cycle Assessment* 10 (5) 305-308.
- IFAD (2006); *Sustainability of rural development projects Best practices and lessons learned by IFAD in Asia India Case Study North Eastern Region Community Resource Management Project for Upland Areas*
- Jack R. Meredith and Samuel J.Mantel (2010). *Project Management : A Managerial Approach*. (8th ed.). New Delhi.
- James P. Lewis (2005). *Project Planning Scheduling and Control*. USA. Mc Graw Hill.
- Jankowicz, A.D., (2005). *Business Research Projects*, (4th ed.). Luton.
- Jennifer R. McConville (2006): *Applying Life Cycle Thinking To International Water and Sanitation Development Projects: An Assessment Tool for Project Managers in Sustainable Development work*
- Johnson, G. & Scholes, K., (2003). *Exploring Corporate Strategy*. (7th Edition). New Delhi: Prentice Hall
- Joseph, K. M. (2013). *Effect of fund management practices on the financial performance of cdf funded water projects in Kenya a case of Molo constituency ,Nakuru County, Kenya*. Available at <http://ir.kabarak.ac.ke/bitstream/handle/123456789/179>
- Karl, M. (2000). *Monitoring and evaluation stakeholder participation in Agriculture and rural development projects. A literature review. Sustainable Development(SD) Food and Agriculture Foundation of the United Nations (FAO)*. Available at <http://www.fao.org/sd/PPdirect/PPre0074.htm>
- Kerzner, H. (2003). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*, New York: Wiley, p.45.
- Kliem, R.L. 2008. *Effective communications for project management*. Boca Raton: Auerbach/Taylor & Francis.
- Klöpffer W (2003). Life-Cycle Based Methods for Sustainable Product Development. *The International Journal of Life Cycle Assessment* 8 (3) 157-159. Labuschagne
- Knipe, A., Van der Waldt, G., Van Niekerk, D., Burger, D. & Nell, K. 2002. *Project management for success*. Sandown: Heinemann.
- Komalawati (2008). *Participation and Project Susutainability: Participatory Intergrated Development in Rain-fed (PIDRA) Projects in East Java -Indonesia*
- Kombo P.O. (2006). *Proposal and Writing: An Introduction*. Pauline's Publications Africa.
- Kothari, C.R. (2004). *Research methodology: methods and techniques*. New Delhi: New Age International.
- Krejcie and Morgan (2006). In their article "Determining Sample Size for Research Activities" (Educational and Psychological Measurement, pp. 607-610).
- Kwak, Y.H., 2002. *Critical success factors in international development project management*. CIB 10th International Symposium Construction Innovation & Global Competitiveness. Cincinnati, Ohio. 9–13 septembre
- Lamberson, M. (2005). *Changes in Working Capital of Small Firms in Relation to Changes in Economic Activity*, Retrieved from <http://www.AJOnline.com> on 17th August 2014.
- Laufer, A., H. Woodward., and G. A. Howell. (1999). *Managing the decision making process during project planning*. Journal of Management in Engineering, 15(2):79-84.

- Lavagnon A. Ika a., Amadou Diallo b, Denis Thuillier (2011) *Critical success factors for World Bank projects: An empirical investigation* International Journal of Project Management pg105- 106 Ste Catherine Est, C.P. 6192, Montréal, Québec, Canada H3C 4R2
- Lawther P., Light B and Gibson N. (2000). "A Critical Success factors model for projects rise resources planning implementation" Proceedings (8th Ed.). European Conference on Information Systems.
- Lewis R. Ireland (2006). *Project Management*. McGraw-Hill Professional: UK.
- Loker, W.M. (2000). *Sowing discord, planting doubts: Rhetoric and reality in art environment and development project in Honduras*. Human Organization, 59(3): 300-310.
- Love, H., Mackinnon, D., Cumbers, A, Chapman, K.(2005),*Learning, Innovation and regional development ; a critical appraisal of recent debates, Progress in Human Geography*, Vol 26.No. 3, pp.293-311.
- Makgoshi and Maliwichi (2010). *Sustainability of Poverty Eradication Projects in rural Communities*. Acts Publishing: Kenya.
- Malladi, S. (2007). *Enhancing project performance and productivity*. Addressing it in project management and beyond Pm tips and techniques .PM tips and techniques.pm world today,9(7)
- Matsumura,K. (2008). *Causes of Poor Performance in World Bank Water and Sanitation Projects*.
- Maylor, C. and Vessey, I. (1999). "TRP Implementation approaches towards a consistency framework". New York
- Maylor, H., Brady, T., Cooke Davis, T. and Hodgson, D. (2006). "From projectification to programmification, International Journal of Project Management, Vol. 24 No 8.
- Mbachu and Nkondo (2007). ISK *Sue Arrow smith and Arwel Davies*, eds. London: Kluwer Law International.
- Meredith J, R (2006) *Project Management. A Managerial Approach*, John Wiley & Sons, Inc Newyork.
- Morardet ,S. Merrey, J. Seshoka& H. Sally (2005). *Improving Irrigation Project, Planning and Implementation in Sub-sahara Africa: Diagnosis and Recommendations*.
- Mugambi, D.K, (2005). *Challenges of Project Implementation of Community based Goat breeding Projects*. A case study of Meru. Unpublished MBA thesis, Kenyatta University.
- Mugenda O,&Mugenda A. (2003). *Research methods: Quantitative and qualitative approaches*. Nairobi; Laba Graphics Services.
- Mugenda, A., and Mugenda, O. (2003). *Research methods; quantitative and qualitative approaches*. Africa Center for Technology (ACTS), Nairobi Kenya.
- Mugure ,F.M. (2012). *Influence of community participation on the performance of Kiserian dam water project Kajiado county, Kenya*.
- Mwangi, K. (2005). *Efficiency and efficacy of Kenya's Constituency Development Fund: Theory and evidence*. Working Paper Number 2005 – 42, Department of Economics, University of Connecticut, U.S.A
- Nosike, A.F (2005). *Women Leadership and the Future*. New Nigeria, July 22.
- Nyaguthii E. and Oyugi L. A. (2013). *Influence of community participation on successful implementation of constituency development fund projects in Kenya: a case study of Mwea Constituency*; Available at: <http://www.ijem.com/journal/August-2013/49.pdf>
- Ochelle (2009); *Factors influencing sustainability of community water projects in Kenya; A case of community water Mulala division, Makueni County, University of Nairobi*
- Ochieng et al, (2012) *Effectiveness of Monitoring and Evaluation of CDF Projects in Kenya*. A Case of Ainamoi Constituency. International Journal of Arts and Commerce Vol. 1 No. 6 November 2012
- Padachi, K. (2006). "Trends in Working Capital Management and its Effect on Firms' Performance: An Analysis of Mauritian Small Manufacturing Firms". International Review of Business Research Papers, Vol. 2, No. 2, pp. 45-58
- Patton, M.Q. (2002). *Qualitative Research and Evaluation Methods*. Thousand Oaks, California: Sage.
- Paul K.Ngugi (2008). *Planning Of Geothermal Projects: A Case Study on Kenya*, Papers and Presentation s at "Short Course III on Surface Exploration for Geothermal Resources" Organized by UNU-GTP and KenGen in Naivasha Kenya
- Pearson Education Limited, 2009. *Code of Practice for Project Management for Construction and Development*, Eight Edition, Edingurgh Gate, Harlow, England, 217pp
- Phinney M. (2007). *Project Management. A system approach to planning, scheduling and controlling* (8th ed.). Harold Kerzner, John Wiley & sons. New York.
- Project Management Institute (PMI) (2008). *A guide to the project management body of knowledge (PMBOK® Guide)* (4th Ed.). Newtown Square, PA, USA: Project Management Institute(PMI).
- Project Management Institute (PMI). (2012). *A guide to the project management body of knowledge (PMBOK® Guide)* (5th Ed.). Newtown Square, PA, USA: Project Management Institute (PMI).

- Ravallion, M. (2005). *Evaluating anti-poverty programmes*. In T. P. Schultz & J. Strauss (Eds.), Development Research Group, *World Bank and Handbook of Development Economics*, 4, Amsterdam, North-Holland.
- Repared (2009). *The Project Management Handbook (Regional Partnership for Resource Development)* Nairobi.
- Rogers, P. (2009). *Matching Impact Evaluation Design to the Nature of the Intervention and the purpose of the Evaluation in Designing impact evaluations: different perspectives*. 3ie Working paper4.London: 3iE (www.3ieimpact.org/admin/pdfs_papers/50.pdf).64.
- Rono, K.P and Aboud, A. A. (2003). *The role of popular participation and community work ethic in rural development: the case of Nandi District, Kenya*; *Journal of Social Development in Africa* Vol 18 No 2 July 2003
- Rossi, P. H., Lipsey, M. W., and Freeman, H. E. (2004). *Evaluation: A systematic approach* (7th Ed.). Thousand Oaks, CA: Sage.
- Samuel and Tom (2010), *Project Management from Design to Implementation*, Richmond designers and Printers, Nairobi.
- Scriven, M. (1998). *Minimalist theory*. UK.
- Shapiro J. (2004). *Monitoring and Evaluation*. Johannesburg: CIVICUS66.
- Sirota P. (2006). *Political participation of the NGOS in project implementation in Nepal*. *International journal of organisations*.2 April 2003:140-150.
- Thairu, R,W. (2014). *Analysis of implementation of NGO projects in Nairobi County*.
- Tim, H. (2008). *Management Concepts and Practices*, Fifth Edition. Englewood Cliffs: Prentice Hall
- Trevor L. Young, (2008) *Successful Project Management, the Sunday Times*, 2nd Edition
- UNDP (2002). *Handbook on Monitoring and Evaluation for Results*. New York: UNDP.
- UNIDO(2013); *Independent UNIDO Country Evaluation Republic of Kenya 2013*
- United Nations (2000). *Millennium Development Goals* <http://www.un.org/millenniumgoals/>, accessed June 24, 2006
- United Nations, 2003.*United Nations Millennium Declaration (A/55/L.2)*[Online] Available at: <http://www.un.org/millennium/declaration/>
- Wayne and Wittig(2002) *Building value through project implementation: A focus on Africa Three*.
- Weiss H. (2004). *On Theory – Based Evaluation: Winning Friends and Influencing People* *Evaluation Exchange*, 9(4): 2 -773.
- Wil D. Verwey (1977). *Riot Control Agents and Herbicides in War*. BRILL,p. 99.ISBN 9028603360.
- World Bank (2007) *Project Performance: project performance issues*. Report v.washington.USA.
- Wysocki, R.K. 2007. *Effective project management: traditional, adaptive, extreme*. Indianapolis, IN.: Wiley.
- Zulu and Chileshe (2008). *Poor performance ofZambian Contractors*. *Institution of Structural Engineers magazine*, UK, July Publication.