

# **FACTORS INFLUENCING SUSTAINABILITY OF INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE TECHNOLOGY SUPPORTED LIVESTOCK PROJECTS IN KISUMU COUNTY**

**Anne Wairimu Miki**

Master of Science in Project Management, College of Human Resource Development,  
Jomo Kenyatta University of Agriculture and Technology, Kenya

**Dr. Assumpta Kagiri**

Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya

**Dr. Kinyanjui Nganga**

Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya

©2017

**International Academic Journal of Information Sciences and Project Management  
(IAJISPM) | ISSN 2519-7711**

**Received:** 13<sup>th</sup> May 2017

**Accepted:** 25<sup>th</sup> May 2017

Full Length Research

**Available Online at:**

[http://www.iajournals.org/articles/iajispm\\_v2\\_i1\\_66\\_85.pdf](http://www.iajournals.org/articles/iajispm_v2_i1_66_85.pdf)

**Citation:** Miki, A. W., Kagiri, A. & Nganga, K. (2017). Factors influencing sustainability of international livestock research institute technology supported livestock projects in Kisumu County. *International Academic Journal of Information Sciences and Project Management*, 2(1), 66-85

## **ABSTRACT**

This study focused and examined the factors influencing sustainability of International Livestock Research Institute technology supported livestock projects at the Kisumu County. A project can be considered as sustainable if its outcomes continue after the end of its funding. However, since the sustainability of project outcomes may be difficult to anticipate and to describe as most are not tangible and are difficult to see, this study focused on the sustainability of technologically supported livestock projects with respect to project stakeholders, project funding, project technology and project information. The main objective of this research was to establish the factors that influence sustainability of technology driven livestock projects in Kenya. This study examined the influence of project stakeholders, project funding, project technology and project information which have been selected as the objectives in the study of factors influencing sustainability of technology driven livestock projects in Kenya. Research questions were based on the four objectives of the study. Three theories relating to project sustainability which include Resource-Dependence Theory, Stakeholder Participation Theory, and Technology Acceptance Model would be explored. The study would however be grounded on the Technology Acceptance Model as it provides more insight on the factors influencing sustainability of technology driven projects. A conceptual framework was examined to establish the relationship between the dependent and independent variables. This study targeted 150 respondents and from this, stratified

sampling technique was employed to select a sample size of 45 respondents whom the researcher sought information from. A pilot study was carried out to test the reliability and validity of the research instrument. Descriptive research design was used and a questionnaire used to gather primary data. The statistical tools of analysis that were used in this study are arithmetic mean and standard deviation. Data was analyzed by use of SPSS v 22.0 and presented in form of tables. From the data analysis, it was established that Project Stakeholders, Project Funding, Project Technology and Project Information influence the sustainability of technology driven projects but to varying extent. Although the four factors were found to influence the sustainability of technology driven projects, Project Technology was found to be the most influential with a mean score of 3.55. The study also found out that Project Information, Project Funding and Project Stakeholders influenced sustainability of technology driven projects to a greater extent with means of 3.527, 3.5093 and 3.4857 respectively. Given that the study focused only on the International Livestock Research Projects in Kisumu County, the results may not be applicable to all of Kenya projects. It is recommended that a study be done in various parts of the Country that would allow for broader generalization of findings. This study therefore suggests that another similar study could be carried out to investigate the factors influencing sustainability of technology driven projects in Kenya where various organizations can be involved across the 47 counties in Kenya

**Key Words:** *project stakeholders, project information, project sustainability, funding, project technology, project technology driven livestock projects*

## **INTRODUCTION**

Sustainability is without doubt one of the most important challenges of our time and the immediate future. Over the past few decades, animal science research has offered a number of technological options that could raise the productivity of different livestock species if adopted area-wide (BIRTHAL, 2001). The sustainability of our livestock industry is vitally important to all of us (Defra, 2012). In the last 10 to 15 years, the concept of sustainability has grown in recognition and importance, (Silvius & Schipper, 2014). Technology-induced growth in the livestock subsector would thus improve food and nutritional security, alleviate poverty, and reduce interregional and interpersonal economic inequities, (BIRTHAL et al., 2001). In the academic world, the sustainability aspects of Information and Communication Technology (ICT) or by ICT are an emerging field of study, (Ghose et al., 2009). Developing a sustainable Information Technology (IT) is a process whereby the involved actors succeed by translating their interests into the development and use of IT (Avgerou, 2003).

While studying on sustainability of two separate rural development projects in the Philippines, Tango (2009) examined that from the onset of the projects, there were significant efforts to include community, local government, Non-Governmental Organizations (NGO's) and service providers in both design and start-up activities, focusing on fostering a team approach and commitment to sustainable outcomes. The project was able to make use of strong local NGOs by involving them as partners throughout all phases of the project cycle. In a lesson from Nepal Water system project, Nani Babu Silwal, Chairperson, Lele Water Users' Committee, Nepal commented that when the system was completed they were happy and thought that the system would remain in the same condition for their whole lives. Moreover, they never thought the system would fail. The implementing agency just told them 'now it is yours', you must look after the system yourself (Schouten & Moriarty, 2003).

According to World Bank (2003) on the Rural Water Supply and Sanitation (RWSS) project in Morocco, lack of investment in "Social Capital" was an impediment to systematically following the demand driven, participatory approach of the project. Social mobilization teams concentrated on getting construction underway and provided very little support to Water User Associations once the schemes were operational while they would need more continuous support from social mobilization teams and this would enhance considerable sustainability of the RWSS system. A further study in World Bank (2003) of the first World Bank-financed Lusaka Upgrading and Sites and Services Project in Zambia, in one of the squatter areas, local work groups were set up to work on the drainage system. The creation of effective local organizations able to initiate new projects on their own initiative is a major contribution towards the long-term development of the community even though these particular activities were not included in the objectives of the original project being evaluated.

Two case studies reviewing factors which contributed to unsustainable Health Information Systems (HIS) for Tanzania and Mozambique concluded that top-down development approach and a dysfunctional relationship between the Ministry of Health (MoH) and the development agency contributed to the creation of an unsustainable system. In Tanzania, the donor directly gave funds to the vendor bypassing the MoH. In Mozambique, the responsibility of the vendor expired after the system was developed and he left the country, (Kimaro & Nhampossa, 2007).

Despite the amounts of money spent on implementation of projects in Kenya, poor sustainability is depriving them from the returns expected of these investments. Several factors are responsible for poor project sustainability. Successful case of sustainable agriculture tend to be more prevalent in the areas where the community is organized in groups. The community approach helps communities to mobilize their own resources and develop sanctions for other members who are unwilling to support the activities. It is also easy for external agents like donors or government to provide services or finances through such organizations, (Nyoro & Muiruri, 2001). According to the Kenya Water for Health Organization (KWAHO), a water organization project in Kenya, the sustainability of the water projects at the grassroots has been due to the strategies integrated before the projects are completed, which include sensitivity to socio-cultural factors in the communities where the project are being implemented.

Further analysis indicates that the project should be respectful and considerate of the community's beliefs, norms, and religion. Any project activity that undermines a community's socio-cultural orientation will be met with a lot of resistance and the chance of its sustainability is small. For instance, the case of anti-Female Genital Mutilation (FGM) projects in communities of Rift Valley province in Kenya is a living testimony (Cheserem, 2011).

The International Livestock Research Institute (ILRI), Nairobi, Kenya works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock, (ILRI Strategic Plan, 2013-2022). With more rapid technical change, it has become clear that the ability of organizations to develop innovative new products and services is a crucial influence on sustainability (Hill & Rothaermel, 2003). What is important is that the projects are using equipment that can be found internationally (Batchelor, 2003). The information obtained should be based on a mixture of factual data provided by case study projects, and information and opinion gleaned from a range of stakeholders in order to ensure that complete and balanced views of projects are obtained.

Having noted the complexity of the sustainability question, a framework is required within which to collect and analyze the data (Batchelor, 2003). The digital revolution has made it easier to store, share, and reuse data. As noted by Reed et al., (2005), data should be accurate and bias free, reliable and consistent over space and time, provide timely information and be verifiable and replicable. The availability of reliable and relevant data and information remain obstacles to achieving the objectives of sustainability partnerships (Anitra 2008).

ILRI works with partners to enhance development of new knowledge and technological and policy information to help farmers improve their livelihoods by exploiting the potential of their animals, (ILRI Strategic Plan, 2013-2022). ILRI carries out its research in East, Southern, and West Africa, in South and Southeast Asia, and in China. Further, key among the research conducted has been on increasing smallholder livestock productivity through genetics as the game changer. This has led to increased dairy production from the indigenous cattle for many poor families as cross-breeds are developed. Disease resistant breeds of cattle, sheep and goats have also been generated through genetic research, (ILRI Web page). Several technologies via the mobile phone are currently in use. These include ODK and Ngombe Planner thus improve data collection and management and data use. The results recorded on the phone are sent to ILRI servers for analysis.

## **STATEMENT OF THE PROBLEM**

Research has shown that projects implementation in sub-Saharan Africa often demonstrate low levels of sustainability (Gebrehiwot, 2006). It is estimated that impacts of many sustainability projects are not evident for 15–20 years, (Walker, 2000; Adato & Meinzen-Dick, 2007). The key causes for this include inappropriate policy or legislation; insufficient institutional support; unsustainable financing mechanisms; ineffective management systems; and lack of technical backstopping, (Niyi et al., 2007). Sustainability of technology supported livestock projects continues to be poor due to variation in objectives of different stakeholders such as researchers, funders, community members, and public and private sector organizations, (Swanepoel et al., 2010). Stakeholders like local communities, public sector, private sector, nongovernmental and civil society organizations (NGOs and CSOs), development practitioners and researchers need to work together, (Pell, et al., 2010).

Over 80% of Africa's farmers are smallholder farmers, living in poverty and farming less than two hectares with low levels of production. Yet there are experiences and tools at hand, both in research stations and in farmers' hands, that can help withstand the adverse trends and capitalize on the many opportunities. Foremost among these are digital technologies, both hardware (mobile telephones, satellites, supercomputers) and software (applications to facilitate decision-making, digital soil maps, and faster breeding cycles for traditional African crops). Currently, farming itself is the primary source of employment and income for roughly 60% to 65% of the region's workforce, (Annan et al., 2015). Projects have failed most frequently in their initial objectives because inappropriate technologies or institutions were used or because they were implemented in an unfavorable policy environment. The Asian Development Bank noted that the principal cause of poor performance and even failure in publicly and donor-funded livestock programmes and projects was the use of inappropriate technology, (ADB, 2000).

Relative to its importance as a direct and indirect source of food and as a major component of sustainable development, the livestock sector is under-funded and under-resourced throughout the developing world. The CGIAR core budget allocation to livestock research is not congruent

with the value of livestock products when the values of non-food products and services are included. In the World Bank, only 4% of the loans given to the agriculture and rural development sector were for livestock projects although livestock are components in some integrated agricultural projects, (World Bank, 2006). Bank funding for livestock has declined especially for standalone livestock projects. This happened in spite of the fact that the success rate for livestock projects has increased from 43% during to 64% while that for agricultural projects has decreased from 75% to 55% in the same period (Blackburn & de Haun, 2000).

The International Livestock Research Institute's mission is to improve food and nutritional security and to reduce poverty in developing countries through research for efficient, safe and sustainable use of livestock—ensuring better lives through livestock. ILRI and its partners develop, test, adapt and promote science-based practices that—being sustainable and scalable—achieve better lives through livestock, (ILRI strategy 2013–2022). Based on the assumption that technology can be leveraged to increase food security and improve livelihoods, the proposed study is an attempt to understand how mobile handsets and ICT tools can be utilized to enable provision of services and information and subsequently test sustainability of these technological advancements with regards to project stakeholders, project funding, project technology and project information.

## **GENERAL OBJECTIVE**

The general objective of this study is to establish the factors influencing sustainability of technology driven livestock projects in ILRI.

## **SPECIFIC OBJECTIVES**

1. To examine how project stakeholders influence sustainability of ILRI technology supported livestock projects.
2. To determine how project funding influence sustainability of ILRI technology supported livestock projects.
3. To examine how project technology influences sustainability of ILRI technology supported livestock projects.
4. To determine how project information influences sustainability of ILRI technology supported livestock projects.

## **THEORETICAL REVIEW**

This study is built upon certain theories that have much links with sustainability in organizations. The study was guided by the Resource-Dependence Theory, Stakeholder Participation Theory, and Technology Acceptance Model.

## **Resource-Dependence Theory (RDT)**

Resource Dependence Theory (RDT) is based upon how the external resource of organizations affects the behavior of the organization. Pfeffer and Salancik (1978) utilized the previous environmental literature to develop Resource Dependence Theory. The theory is based on the notion that environments are the source of scarce resources and organizations are dependent on these finite resources for survival. A lack of control over these resources thus acts to create uncertainty for firms operating in that environment. Organizations must develop ways to exploit these resources, which are also being sought by other firms, in order to ensure their own survival.

Resource Dependence Theory is often applied to explain how organizations reduce environmental interdependence and uncertainty, (Hillman et al.,2009). Under RDT, organizations seek to manage their environments and reduce their dependencies; uncertainties and other's power over them by engaging in inter organizational relations. Further, organizations inevitably never manage all external interdependencies, and any actions produce new patterns of dependence and interdependence, which in turn produce inter-organizational as well as intra-organizational power, where such power has some effect on organizational behavior", (Hillman et al., 2009). Davis & Cobb (2010) identify three core ideas of the RDT framework: first, social context matters; second, organizations have strategies to enhance their autonomy and pursue interests; and third, power (not just rationality or efficiency) is important for understanding internal and external actions of organizations. Moreover, RDT has influenced studies in fields of management, sociology, education, health care, public policy, and other cognate disciplines, (Davis, 2009).

However, on completion of 30 years of existence it faced a peculiar problem that its main postulate has been recognized and accepted at an axiom level yet faces poor empirical and conceptual development opportunities. It has remained as an appealing metaphor but stagnated in its development and empirical testing appeal (Casciaro & Piskorski, 2005). In as much as organizations are inter-dependent, the theory of Resource Dependence needs a closer examination. Its very weakness lies in its very assertions of dependence. With changing trends of financial uncertainties, there is need to lean towards other theories of uncertainties.

Based on Resource Dependence Theory, this study intends to advance the theoretical understanding of what influences and hinders sustainability management within technology driven livestock research organizations. According to this theory, organization depends on resources for their survival; therefore, for any organization to achieve sustainability, resources are indispensable. For livestock research projects to achieve sustainability, resources are important. These resources will come in the form of human resource – therefore the need to involve all the stakeholders in the project for sustainability, other resources of land and finances, (ILRI strategy 2013–2022).

## **Stakeholder Theory**

The stakeholder theory is a theory of organizational management and business ethics that addresses morals and values in managing an organization, (Freeman, 1984). The stakeholder approach identifies and models the groups which are stakeholders of a corporation, and both describes and recommends methods by which management can give due regard to the interests of those groups. In short, the theory attempts to address the "principle of who or what really counts". Traditionally in the view of a company, the shareholder view, only the owners or shareholders of the company are important, and the company has a binding fiduciary duty to put their needs first, to increase value for them. Stakeholder Theory instead argues that there are other parties involved, including employees, customers, suppliers, financiers, communities, governmental bodies, political groups, trade associations, and trade unions. Even competitors are sometimes counted as stakeholders – their status being derived from their capacity to affect the firm and its stakeholders. The nature of what is a stakeholder is highly contested, with hundreds of definitions existing in the academic literature, (Miles, 2012).

More recent scholarly works on the topic of Stakeholder Theory that exemplify research and theorizing in this area include Friedman and Miles (2002), and Phillips (2003). Donaldson and Preston, (1995), argue that the theory has multiple distinct aspects that are mutually supportive: descriptive, instrumental, and normative. The descriptive approach is used in research to describe and explain the characteristics and behaviors of firms, including how companies are managed, how the board of directors considers corporate constituencies, the way that managers think about managing, and the nature of the firm itself. The instrumental approach uses empirical data to identify the connections that exist between the management of stakeholder groups and the achievement of corporate goals (most commonly profitability and efficiency goals). The normative approach, identified as the core of the theory by Donaldson and Preston, examines the function of the corporation and identifies the "moral or philosophical guidelines for the operation and management of the corporation.

The political philosopher Charles Blattberg has critiqued Stakeholder Theory for assuming that the interests of the various stakeholders can be, at best, compromised or balanced against each other, (Blattberg, 2004). Blattberg argues that this is a product of its emphasis on negotiation as the chief mode of dialogue for dealing with conflicts between stakeholder interests. He recommends conversation instead and this leads him to defend what he calls a 'patriotic' conception of the corporation as an alternative to that associated with stakeholder theory. According to Mansell (2013), by applying the political concept of a 'social contract' to the corporation, stakeholder theory undermines the principles on which a market economy is based.

Based on Stakeholder Theory, this study intends to advance the theoretical understanding of what influences and hinders sustainability management within technology driven livestock research organizations. In terms of engaging the stakeholders, the project stakeholder engagement process for sustainability process is important involving six steps which include;



identifying all stakeholders-relating the stakeholders with the sustainability target-prioritizing the stakeholders-managing stakeholders-measuring stakeholder's performance and finally putting targets into actions.

### **Technology Acceptance Model (TAM)**

Fred Davis, (1989), introduced the Technology Acceptance Model which deals more specifically with the prediction of the acceptability of an information system. The technology acceptance model (TAM) is an information systems theory that models how users come to accept and use a technology. The purpose of this model is to predict the acceptability of a tool and to identify the modifications which must be brought to the system in order to make it acceptable to users. This model suggests that the acceptability of an information system is determined by two main factors: perceived usefulness and perceived ease of use. Emerging information technology cannot deliver improved organizational effectiveness if it is not accepted and used by potential users. Technology Acceptance Model (TAM) is one of the most successful measurements for computer usage effectively among practitioners and academics.

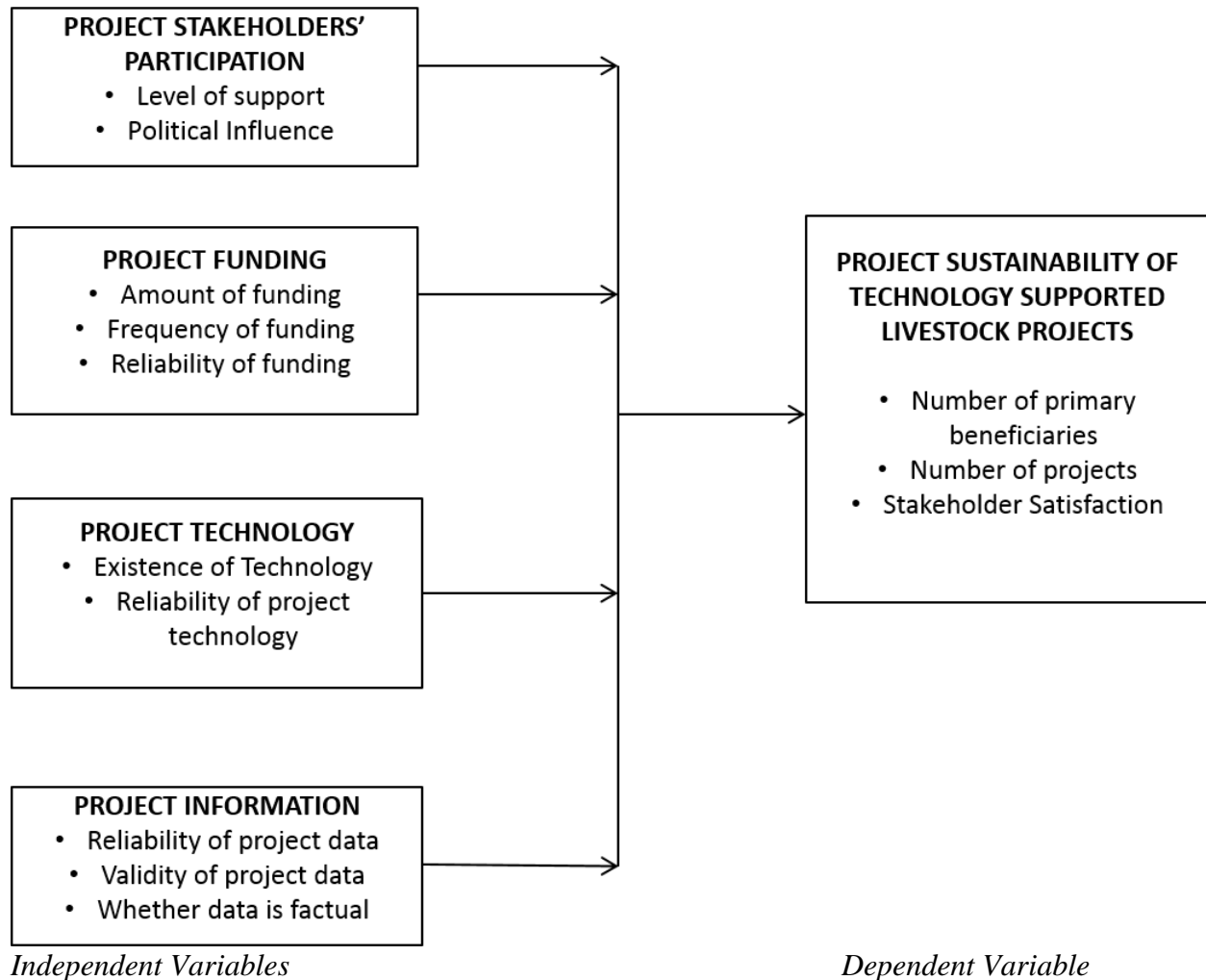
TAM as a model has been studied to explain how people adopt and use e-learning and Selim (2003), stated that there was a need to investigate TAM with web-based learning. He put CWAM and tested the relationships among perceived usefulness, perceived ease of use and intention to use with university students using the structural equation modeling techniques of the LISREL program. He concluded that the model fit the collected data and that the usefulness and ease of use turned out to be good determinants of the acceptance and use of a course website as an effective and efficient learning technology.

However, TAM has been widely criticized, despite its frequent use, leading the original proposers to attempt to redefine it several times. Criticisms of TAM as a "theory" include its questionable heuristic value, limited explanatory and predictive power, triviality, and lack of any practical value (Chuttur, 2009). Benbasat&Barki (2007) suggest that TAM "has diverted researchers' attention away from other important research issues and has created an illusion of progress in knowledge accumulation. Furthermore, the independent attempts by several researchers to expand TAM in order to adapt it to the constantly changing IT environments has led to a state of theoretical chaos and confusion". In general, TAM focuses on the individual 'user' of a computer, with the concept of 'perceived usefulness', with extension to bring in more and more factors to explain how a user 'perceives' 'usefulness', and ignores the essentially social processes of IS development and implementation, without question where more technology is actually better, and the social consequences of IS use.

Based on TAM theory, this study intends to advance the theoretical understanding of what influences and hinders sustainability management within technology driven livestock research organizations. Technology acceptance and sustainability assessment is vital for technology developers and investors in the decision making process because of the limited availability of

development and deployment resources. Recognizing that technological growth can lead to changes in economic structure, environmental balance and social structures, technology adoption and sustainability assessment is necessary not only to investors and developers but also to government and nongovernmental organizations, as well as groups of users to make decisions that may affect the further development of technology (Barkane&Ginters, 2011).

## CONCEPTUAL FRAMEWORK



**Figure 1: Conceptual Framework**

## RESEARCH METHODOLOGY

Descriptive research design was utilized in this study. This approach was appropriate for this study as it would help to describe the state of affairs as they exist without manipulation of variables which is the aim of the study. The target population constituted 150 farmers. 50 farmers from Dairy Genetics Project Phase 1 and 100 farmers from Dairy Genetics Project Phase 2, the two ILRI technology driven livestock projects based in Kisumu County. The researcher selected 30% of the target population to form the sample size. The sampling size was 45 farmers,

15 farmers from Dairy Genetics Project Phase 1 and 30 farmers from Dairy Genetics Project Phase 2. A stratified sampling technique was employed to select the sample.

The primary data was gathered using questionnaires with both open and close ended questions from the respondents. The questionnaire comprised a list of predominantly close-ended questions. Data was collected through a self-administered questionnaire through drop and pick later system with a letter of transmittal from the university. Statistical Package for Social Science (SPSS V 22.0) program was used to perform descriptive research design statistics analysis. Descriptive statistics involved the use of both measures of central tendency and measures of dispersion. For open ended questions, the study made use of content analysis to analyze. Data was presented in form of tables, figures and graphs.

## **RESEARCH RESULTS**

From the study, 42 out of the 45 respondents from the farmers from Dairy Genetics Project Phase 1 and Dairy Genetics Project Phase 2 filled in and returned the questionnaire. The response rate achieved for the questionnaire was 93.3%. The study found that project sustainability is determined by the number of primary beneficiaries, project sustainability is determined by stakeholder satisfaction project sustainability is determined by the number of projects completed. Sustainable projects involve development of local and self-reliant economy that does not damage the social well-being of communities.

The study found that project stakeholder's influences project sustainability to a greater extent with a composite mean of 3.4857 and standard deviation of 0.8282. The study found that the project stakeholders' level of support influences the number of projects completed to a large extent. The project stakeholder's level of support influences the number of primary beneficiaries and also the stakeholder's participation. On the other hand, political influence on project stakeholders influences the stakeholder's participation and the number of projects completed and to a small extent does political influence on project stakeholders influence the number of primary beneficiaries.

The study found that project funding influences project sustainability to a great extent with a composite mean of 3.5093 and standard deviation of 0.748. With regard to project funding, the study established that frequency of funding influences the number of projects completed. In addition, the amount of funding influences the number of primary beneficiaries. This is followed closely by the result that reliability of funding influence the number of projects completed. Frequency of funding influences the number of primary beneficiaries and the amount of funding influences the number of projects completed. Further, reliability of funding influence the stakeholder's participation. Frequency of funding in addition influences the stakeholder's participation and that the amount of funding influences the stakeholder's participation.

The study also found that project technology influences project sustainability to a greater extent with a composite mean of 3.552 and standard deviation of 0.6439. The study found that project

technology influences the sustainability of ILRI technology supported livestock projects. Accordingly, this study found that existence of technology was a key factor in influencing the stakeholder's participation followed by reliability of project technology which influences the number of primary beneficiaries. In addition, reliability of project technology influences the number of projects completed and existence of technology influences the number of primary beneficiaries. Further, reliability of project technology influences the stakeholder's participation and that existence of technology influences the number of projects completed.

The study further found that project technology influences project sustainability to a greater extent with a composite mean of 3.527 and standard deviation of 0.658. The study found that reliability of project data is the key factor that influences the number of projects completed followed by the number of primary beneficiaries. The validity of project data influence the number of projects completed and the number of primary beneficiaries Moreover, whether data is factual or not influences the number of primary beneficiaries, reliability of project data influences the stakeholders participation, whether data is factual or influence the number of projects completed, validity of project data influence the stakeholder's participation and whether data is factual or influence the stakeholder's participation.

The study finally found that project sustainability is determined by the number of primary beneficiaries was agreed upon with a mean of 3.79 while Project sustainability is determined by stakeholder satisfaction followed closely with a mean of 3.53 and finally Project sustainability is determined by the number of projects neutrally agreed upon with a mean of 3.29. Overall these aspects of project sustainability had a composite mean of 3.5388 and standard deviation of 0.6521. This is in agreement with the statement that Developmental organizations have increasingly focused on primary beneficiaries' participation and collaboration with stakeholders as critical factors to sustainability of project activities.

## **CONCLUSIONS**

The main objective of this study was to establish the factors influencing sustainability of technology driven livestock projects in ILRI. Project stakeholders, project funding, project technology and project information were identified as the main variables of the study. The study concludes that project sustainability is determined by the number of primary beneficiaries and stakeholder satisfaction. However, sustainability of technology supported livestock projects continues to be poor due to variation in objectives of different stakeholders such as researchers, funders, community members, and public and private sector organizations. The study also concludes that stakeholders' participation is critical in the sustainability of projects as measured in terms of number of primary beneficiaries and number of projects completed and it is influenced by political influence and level of support.

The study deduced that project funding has a great influence on the sustainability of ILRI technology supported livestock projects. Adequacy of funding; timing of funds disbursement;

adequacy of human resource capacity; lack of accountability; procurement procedures and bureaucracy; disagreements among beneficiaries and social-cultural obstacles were main factors affecting effectiveness of IT supported projects. The study further concludes that technology is an important factor influencing the improvement of performance and therefore ensuring project sustainability. As such, appropriate technology choice cultivates effective community demand by providing information about the potential solutions that consider local technical capacity and are suitable for local environmental, cultural, and economic conditions. The study finally concludes that sustainability research requires further data collection to examine whether the activities and benefits of the implementation phase continue. Such information includes project design reports and data gathered through participatory approaches as well as participatory monitoring and evaluation.

## **RECOMMENDATIONS**

The study recommends that the programme and project designers should make provision for community participation right from the start of the project. This includes social mobilization, organization and training of the communities. The organization must put in place the enabling environment including policy and legal frameworks for accountability necessary for achieving sustainability. Sustainability is an issue that requires the collective efforts of all stakeholders to achieve. The Institute must put in place the enabling environment including policy and legal frameworks necessary for achieving sustainability.

The study recommends that for the ILRI technology supported livestock projects in Kisumu to be sustainable there must be systems and procedures for raising funds for maintenance that provide clear and timely accounts of the financial position of the organization; reduce costs of providing services by recovering costs, charging user fees, financial community contribution to the initial capital, encourage community contribution in kind and free/cheap labor provision; raise resources through institutional earnings and use assets to attract and leverage resources from the community and diverse donors. The beneficiaries should actively participate in management of community projects, as this helps them to be more accountable and transparent in their operations.

The study established that project technology influences the sustainability of ILRI technology supported livestock projects. As such the study recommends that there is need for selecting appropriate technologies since. Project designers must take into account all parameters mitigating selection of technology including characteristics, demand and adequacy of source and cost of operation and maintenance before making choices. Such factors as affordability, access to spare parts and quality of water are also important factors that influence long term sustainability of facilities. Planners must involve target communities in comprehensive analysis of the above parameters so that beneficiaries can appreciate their responsibilities clearly from the beginning.

From the study, project information project information has a significant influence on the sustainability of ILRI technology supported livestock projects. The study thus recommends that the institute should conduct baseline data for evaluation purposes and decision making, the project implementers should update information system for timely decision making, there should be regular collection and management of information data for purposes of project implementation monitoring and adherence to accepted standards of service delivery by engaging experts for specialized consultancy to enhance sustainability of technology driven livestock projects.

From the study, the number of primary beneficiaries has a significant influence on the sustainability of ILRI technology supported livestock projects. The study thus recommends that the institute ensure that identification of the primary beneficiaries is key to sustainable projects. Stakeholder's should be engaged from the onset of the project and are well updated to ensure that they are continually satisfied with the projects.

## **REFERENCES**

- Achman, R. (2011). Stakeholder's Perspectives on Sustainable Project Management. Delft: Unpublished master's thesis, Delft University of Technology.
- Adato M., and Meinzen-Dick, R. (2007). Agricultural research, livelihoods and poverty. IFPRI, Washington, D.C., USA
- Afande, O. F. (2013). Factors affecting use of donor aid by International NGO'S in Kenya. A case of USAID. Dedan Kimathi University of Technology.
- Anitra Nelson (2008). Steering Sustainability in an Urbanising World Policy, Practice and Performance. Ashgate Publishing Limited.
- Avgerou, C. (2003). "The link between ICT and economic growth in the discourse of development," in: Organizational Information Systems in the Context of Globalization, Proceedings of the International Federation of Information Processing, IFIP 9.4 and 8.2 Joint Conference on Organizational Information Systems in the Context of Globalization (pp. 373–386). Dordrecht. The Netherlands: Kluwer.
- Bal, M. Bryde D. Fearon D. Ochieng, E. (2013). Stakeholder Engagement: Achieving Sustainability in the Construction Sector. *Sustainability* 2013, 5, 695-710.

- Barkane, Z. and Ginters, E. Introduction to technology acceptance and sustainability modeling. In: Annual Proceedings of Vidzeme University of Applied Sciences “ICTE in Regional Development”; 2009/2010. p. 62-90.
- Batchelor S.J., Norrish P., Scott N., Webb M., (2003). Sustainable ICT case histories.(DFID, KAR8067).
- Bazeley, P. (2013). *Qualitative Data Analysis. Practical Strategies*, Sage Publishing.
- Benbasat, I.,Barki, H., (2007), "Quo vadis, TAM?" (PDF), *Journal of the Association of Information Systems* 8(4): 211–218
- Blattberg, Charles (2004). "Welfare: Towards the Patriotic Corporation". From Pluralist to Patriotic Politics: Putting Practice First. New York: Oxford University Press. pp. 172–184.
- Bridget S., Cathy L., (2005). *Research Methods in the Social Sciences*. SAGE Publications, 2005.
- Bryson, J., (2004). What to do when stakeholders matter. *Public Management Review*, 6 (1), p.21-23.
- Casciaro T., Piskorski, M. J. (2005). Power imbalance, mutual dependence, and constraint, absorption: A close look at resource dependence theory,*Administrative Science* (Quarterly 50 (2): 167-199.
- Castaldo J., Dulaney, C., Klingler, T., Rossmann, D., &Wrubel, L. (2011). Experiences from the Field: Choosing a Discovery Tool for YOUR Unique Library. In *Charleston Conference Proceedings 2011* (pp. 563–569). West Lafayette, IN: Purdue University
- Cheserem E. (2011). "Female genital mutilation in Kenya: a literature review." Bachelor's Thesis,Turku University Of Applied Science, 2011.
- Chuttur, M.Y. (2009), Overview of the Technology Acceptance Model: Origins, Developments and Future Directions, *Indiana University, USA, Sprouts: Working Papers on Information Systems*.
- Cooper, D.R., & Schindler, P.S. (2003). *Business Research Methods*. (8th ed.). Boston: 15 McGraw-Hill Irwin.
- Cox, B. G. (2010). “Research Methods. “*Encyclopedia of Survey Research Methods*”. ISBN: 978141.

- Davis, F. D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly* 13 (3): 319–340.
- Davis, G. F. (2009), *Managed by the Markets: How Finance Reshaped America*, Oxford University Press, Oxford UK.
- Davis, G. F. and J. A. Cobb (2010) "Resource dependence theory: Past and future." *Stanford's organization theory renaissance, 1970-2000*: 21-42. Bingley, NY: Emerald Group
- Ditshwanelo, T. (2005). Critical success factors for implementation of Enterprise Resource Planning (ERP). Empirical validation. Paper presented at the 2nd International Conference on Information Technology.
- Donaldson, T., & Preston, L. (1995). The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications. *The Academy of Management Review*, 20(1), 65-91.
- Downs, C. W., and Adrian, D. (2004). *Assessing organizational communication*. London: Guilford
- Ekanayake S V and Halwatura R U. Success factors in donor funded projects: Case study on internal estate roads, Proceedings of the International Conference on Sustainable Built Environment (ICSBE-2012), 14th 16th December 2012, Sri Lanka.
- Freeman, R. Edward (1984). *Strategic Management: A stakeholder approach*. Boston: Pitman. ISBN 0-273-01913-9.
- Friedman, Andrew L., Miles, Samantha (2002). "Developing Stakeholder Theory". *Journal of Management Studies* 39 (1): 1–21.
- Furman, J., (2015). *The Project Management Answer Book*. Management Concepts.
- Gareis, R., Huemann, M., & Martinuzzi, R.-A. (2009). Relating sustainable development and project management. In Proceedings of IRNOP IX. Berlin: IRNOP.
- Gebrehiwot M. (2006) An Assessment of Challenges of Sustainable Rural Water Supply: The Case of Ofla Woreda in Tigray Region. Msc Thesis, Regional and Local Development Study (RLDS). A.A.U. Ethiopia.
- Ghose, A., Hasan, H., & Spedding, T. (2009). Editorial for the special issue on IT and climate change. *Australasian Journal of Information Systems*, 16(2), 19-21.
- Grace, D., Randolph T., Affognon H., Dramane D., Diall O. and. Clausen P.H (2009): Characterisation and validation of farmers' knowledge and practice of cattle



trypanosomosis management in the cotton zone of West Africa. In: *ActaTropica* 111 (2): 137-143.

Graham, B., (2007). *Developing a Questionnaire 2<sup>nd</sup> Edition*. Continuum International Publishing Group.

Hall, D. C., Ehui, S. K. and Shapiro, B. I. (2004). Economic analysis of the impact of adopting herd health control programs on smallholder dairy farms in Central Thailand. *Agricultural Economics*, 31: 335–342.

Handbook on Sustainability, 2006. Sustainability of international cooperation projects in the field of higher education and vocational training, *European Communities*, 2006

Hill, C.W.L., Rothaermel, F.T., 2003. The performance of incumbent firms in the face of radical technological innovation. *Academy of Management Review*, 28 (2): 257-274.

Hillman, A. J., Withers, M. C. and B. J. Collins (2009). "Resource dependence theory: A review." *Journal of Management* 35: 1404-1427.

ILRI Strategic Plan, 2013-2022. Livestock research for food security and poverty reduction: better lives through livestock ILRI. 2013, Nairobi Kenya.

Jäger, T. & Zakharova, A. (2014). Stakeholder participation to improve societal acceptance for mega projects: A case study of the forum for the coal-power plant “Datteln 4” project. (Student paper). Umeåuniversitet.

Joppe, M. (2000). The Research Process. *Academia*, Retrieved February 25, 1998.

Kimaro, H., & Nhampossa, J. (2007). The challenges of sustainability of health information systems in developing countries: Comparative case studies of Mozambique and Tanzania.

Kioko, Irene W (2012). Factors affecting effective use of donor aid by International Non-Governmental organizations in Kenya: a case of USAID. University of Nairobi Repository

Kofi A., Gordon C., Sam D. (2016). African farmers in the digital Age; Overcoming Isolation, Speeding up change, and Taking success to Scale. *Issue of Foreign Affair*

Kvale, S. (Ed.). (2007). *Doing Interviews*. London, England: SAGE Publications, Ltd.

Liebenehm, S., Affognon H. & Waibel H. (2011). Collective livestock research for sustainable disease management in Mali and Burkina Faso. In: *International Journal of Agricultural Sustainability* 9 (1): 212-221.

- Loch C. H. and Kavadias S. (2002) "Dynamic Portfolio Selection of NPD Programs using Marginal Returns," *Management Science*, Vol. 48 (10), pp.1227-1241, lead article.
- Mansell, S. (2013). *Capitalism, Corporations and the Social Contract: A Critique of Stakeholder Theory*. Cambridge: *Cambridge University Press*.
- Martens, M. L., and Carvalho, M. M., 2013. An exploratory study of sustainability evaluation in project management. *Product: Management & Development*, 11(2), 111-117.
- McGraw-Hill Dictionary of Scientific & Technical Terms, 6E, Copyright © 2003 by The McGraw-Hill Companies, Inc.
- Miles, Samantha (2011). "Stakeholder Definitions: Profusion and Confusion". *EIASM 1st interdisciplinary conference on stakeholder, resources and value creation, IESE Business School, University of Navarra, Barcelona*.
- Miles, Samantha (2012). "Stakeholders: essentially contested or just confused?". *Journal of Business Ethics* 108 (3): 285–298.
- Nesamvuni A.E., Mulaudzi J,Ramanyimi N.D., Taylor G.J., (2000). Estimation of body weight in Nguni-type cattle under communal management.*South African Journal of Animal Science*. 2000;30:97–98.
- Nhi, Q.L., 2002-2005. An Analysis of the Sustainability of the Project "Industrial and Urban Development in Viet Tri City". Roskilde University Center, Denmark
- NiyiGbadegesin& Felix Olorunfemi (2007). Assessment of Rural Water Supply Management in Selected Rural Areas of Oyo State, Nigeria. ATPS Working Paper Series No. 49 (African Technology Policy Studies).
- Nyoro J.K., Muiruri H.K., (2001). Policies for agricultural sustainability in Kenya. A case study report for Policies that work for sustainable agriculture and regenerating rural economies. Tegemeo Research Institute, Nairobi, Kenya.
- Oino et al., (2015). The dilemma in sustainability of community based projects in Kenya. *Global Journal of Advanced Research* Vol-2, Issue-4 PP. 757-768.
- Orodho J.A., (2003). Regional Inequalities in Education, Population and Poverty Patterns in Kenya: Emerging Issues and Policy Directions, *Population of Kenya Journal*.
- Oswald, K., &Ruedin, L. (2012). Empowerment sustainability and phasing out support to empowerment processes(pp. 16): OECD.

- Ouma, D. S., (2012). Factors affecting the effective implementation of Donor funded projects in Kenya: a case of World Bank Funded projects in Kenya. University of Nairobi Digital Repository.
- Pfeiffer, J. and G. R. Salancik (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York, NY, Harper and Row.
- Phillips, Robert (2003). *Stakeholder Theory and Organizational Ethics*. Berrett-Koehler Publishers. ISBN 1-57675-268-2.
- Precious H., Gerry N. Muuka, Gerald Wheelock & James Bukenya(2008). NGO Project Managers' Perception of the Sustainability of Development Projects: Empirical Evidence from Sub-Saharan Africa, *Journal of African Business*, 9:1, 191-217.
- Project Management Institute. (2013a). *The sponsor as the face of organizational change*. Newtown Square, PA: Project Management Institute, (2013a).
- Reed, J, Cook, G, Childs, S, McCormack, B (2005). A literature review to explore integrated care for older people. *International Journal of Integrated Care*.
- Scheirer, M. A. (2005). Is sustainability possible? A review and commentary on empirical studies of program sustainability. *American Journal of Evaluation*, 26(3), 320-347.
- Schipper, R.P.J. and Silvius, A.J.G. (2014). Sustainability in Project Management Competencies: Analyzing the Competence Gap of Project Managers. *Journal of Human Resource and Sustainability Studies*.
- Schmitt, D.P., (2005) Sociosexuality from Argentina to Zimbabwe: A 48 nation study of sex, culture and strategies of human mating. *Behavioral and brain sciences*228:247-311.
- Schouten, T., & Moriarty, P. B. (2003). *Community water, community management: from system to service in rural areas*. London, ITDG.
- Selim, G. M. (2003), *International Journal of Auditing*, Volume 7: Editorial Issue 3 pp 187–188.
- Silvius et al., (2012). *Sustainability in Project Management*. Gower Publishing Advances in Project Management ISBN: 978-1-4094-3169-5.
- Swanepoel F., Aldo S., Siboniso M., (2010). *The Role of Livestock in Developing Communities: Enhancing Multifunctionality*. *African Sun Media*, 2010

- Tango International (2009). "Sustainability of Rural Development Projects: Best Practices and Lessons Learned by IFAD in Asia." International Fund for Agricultural Development (IFAD)
- Travis K. Ostrom (2010). Considering sustainability factors in the development project life-cycle: a framework for increasing successful adoption of improved stoves. Michigan Technological University, Houghton, Michigan, United States of America
- VermaShalini (2014). Development of Life Skills and Professional Practice. *Vikas Publishing House PVT Ltd.* 2014.
- Walker, T.S. (2000). Reasonable expectations on the prospects for determining the impacts of agriculture research on poverty in ex- post case studies. *Food Policy* 25: 515-530
- Walter Odhiambo Ojwang and Henry M. Bwisa, (2014), Role of Participatory Management in the Sustainability of Constituency Development Fund Projects: A Case Study of Maragua Constituency, *International Journal of Academic Research in Business and Social Sciences*, 4, (10), 108-127
- Winrock International (2008). Peru Healthy Kitchen/Healthy Stove Pilot Project. Washington, D.C. United States Agency for International Development.
- World Bank (2003). Sustainable Development in a Dynamic World, Washington D.C. World Development Report, 2003
- Zinbarg R., Yovel I., Revelle W., McDonald R., (2006). Estimating generalizability to a universe of indicators that all have one attribute in common: A comparison of estimators for omega *Applied Psychological Measurement* 30: 121–144.