

EFFECTS OF PROJECT COMPLEXITY ON PROJECT IMPLEMENTATION: A CASE OF ORANGE MONEY PROJECT AT TELKOM KENYA LIMITED

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ABSTRACT

The aim of this study was to determine the effect of project complexity on project implementation a case of orange money project at Telkom Kenya Ltd. The specific objectives of the study were: to analyze the effect of project technical team on implementation of orange money project in Telkom Kenya Ltd; to establish the effect of project planning on implementation of orange money project in Telkom Kenya Ltd, to assess the influence of management support on implementation of orange money project in Telkom Kenya Ltd and to find out the effect of IT infrastructure on implementation of orange money project in Telkom Kenya Ltd. The study used a descriptive research design to obtain an in-depth analysis of the phenomenon under study. The researcher used stratified random sampling technique to select an appropriate sample size of employees from the population of 272 employees of Telkom Kenya Ltd who are currently working at Telkom Kenya Ltd headquarters. Primary data was collected by use of structured questionnaires containing both open ended and close ended questions. SPSS software

was used to perform empirical analysis of data. Descriptive statistics was analyzed and reported. The findings of the study indicated that the relationship between IT infrastructure and project implementation is positive and insignificant while management support, project planning and technical team are positively and significantly related to project implementation. Based on the study conclusions, the study recommended that in order to realize an improvement in implementation of Orange Money project in Telkom Kenya Ltd the company should put more emphasis on management support, technical team and project planning. Strategies geared towards improving management support should be put in place to boost the implementation of project. Furthermore, the company should put in place measures that aim to improve the skills of the technical team. The study lastly recommended that the company should engage in project planning as it leads to an improvement in project implementation.

Key Words: *Project Complexity, Project Implementation, Technical Team, Project Planning, Management Support, Information Technology Infrastructure*

INTRODUCTION

Complexity is an important criterion in the selection of an appropriate project organizational form. Project complexity influences the selection of project inputs, e.g. the expertise and experience requirements of management personnel. It is frequently used as a criterion in the selection of a suitable project procurement arrangement and it affects the project objectives of time, cost and quality. Richardson (2009) believes that understanding complexity should help managers constrain achievement by planning and control methods. Understanding the source of the complexity and the degree of resultant difficulties might help to determine the skills and

capabilities needed to deal with the problem. Project complexity can be defined as 'consisting of many varied interrelated parts' and can be operationalized in terms of differentiation and interdependency (Whitty & Maylor, 2009).

Organizational Complexity is based on the functions of a project organizational structure which include: definition of relationships in terms of communication and reporting, allocation of responsibility and authority for decision making and allocation of tasks (Whitty & Maylor, 2009). The more complex organizations are further differentiated down into vertical and horizontal differentiation. The level of project complexity affects project management activities such as planning, co-ordination, control, goals determination, organizational form, and project resources evaluation and management are all affected by the level of complexity in a project. Lebcir and Choudrie (2011) provide four factors driving project complexity: Project uncertainty; infrastructure newness; infrastructure interconnectivity and infrastructure size. Lebcir and Choudrie (2011) aver that project uncertainty is the most influential factor when it comes to cycle time for construction projects. Project complexity has not been described obviously (Bertelsen & Koskela, 2002) but one subject that has been recognized by all project managers is, project complexity is one of the most important project characteristics that have effect on success of projects. Recognizing sources of the project complexity and levels of project complexity has become an important subject to help modern project management (Vidal, Ludovic-Alexandre, Marle Franck, Bocquet & Jean-Claude, 2011).

Despite detecting the importance of project complexity to project management, few methods have been presented to evaluate the complexity of projects. Latva-Koivisto (2001) assessed the complexity of business processes through the conversion of process charts to graphs. Vidal and Marle (2008) analyzed project complexity and presented a project complexity model called ALOE to manage projects under conditions of complexity and to help project complexity understanding and management. Vidal et al. (2008) identified multiple aspects of project complexity by the international Delphi study and presented the Analytical Hierarchy Process (AHP) method to evaluate project complexity. Xia and Khan (2012) used the Delphi method to identify complexity measures for building projects. Qureshi and Kang (2015) suggested structural equation modelling to evaluate project complexity.

Complexity expresses a condition of numerous elements in a system and numerous forms of relationships amongst the elements (Girmscheid & Brockman, 2008; Moldoveanu, 2004; Williams, 2002). From systems perspective, system complexity has also been defined "objectively", by Moldoveanu (2004), as structural intricacy which takes into account the number of parts and the interconnectedness, while allowing the system to be classified as simple, complicated, complex or chaotic. Lebcir and Choudrie (2011) argues that there is no comprehensive framework which includes and integrates all the aspects of project complexity in

the context of construction projects. A high level of infrastructure newness indicates that most of the elements of the infrastructure are new to the project (Lebcir & Choudrie, 2011).

This has implications for the management of the project as the volume of work increases and requirement for integration between the new and old elements in the infrastructure become more important. Remington et al. (2009) looked at dimensions of project complexity as providing information on where the complexity comes from. They identified five dimensions: goals, means to achieve goals, number of interdependency of elements, timescale of project and environment – market, political and regulatory. Orange Money Project is a project of Telkom Kenya Limited. As of 2004, most internet service is provided via dial-up service. Jambonet, an important Kenyan ISP, is a subsidiary of Telkom Kenya Ltd. France Telecom now holds 51% of Telkom Kenya Ltd's shares.

STATEMENT OF THE PROBLEM

Business environments these days are characterized by complexity, and acceleration of everything from communication to production methods. Project management has been one of the major drivers of this complexity and acceleration. However, research continually shows that companies have difficulty in the implementation of projects. From observation and previous studies, it is noted that factors such as top management support, project teamwork and composition, project management, effective communication, business case, change management program and culture, business plan and vision, weak external consultancy, post implementation support, inappropriate skills, unclear goals and objectives, scope management during the project, unrealistic time or resource estimates, all influence the implementation of projects (Cushing, 2002). Most of the stakeholders, consultants and project managers have made up their own personal opinion and conclusion about the ultimate causes of failure of Projects. However, success or failure of a project cannot be determined at one single point in time, but over the full-life of the solution delivered by the project.

According to Ruddock, (2006), most projects fail due to lack of structural issues such as poor project planning, weak business cases and a lack of top management support. Dehlin and Olofsson, (2008) concluded that major causes of project failure during the project life cycle are a breakdown in communication (57%), lack of planning (39%) and poor quality control (35%). Researchers have discussed expected benefits for adoption at organization and project levels. Some of the discussed benefits are: improved operational efficiency of an organization, improved quality and reduction in project time (Dehlin & Olofsson, 2008; Ruddock, 2006; Gunasekaran et al., 2001), increased profit levels and sustainable competitive advantage (Gunasekaran et al., 2001). This research therefore seeks to determine the effects of project complexity on project implementation: A case of Orange Money project at Telkom Kenya Ltd as

no such kind of study have been done before at Telkom Kenya Ltd despite all the mentioned benefits related to Orange Money project. Thus this study sought to fill this research gap.

OBJECTIVE OF THE STUDY

The general objective of the study was to determine the effects of project complexity on project implementation of Orange Money project at Telkom Kenya.

SPECIFIC OBJECTIVES

1. To assess the extent the technical team influenced implementation of Orange Money project in Telkom Kenya Ltd.
2. To determine the effect of project planning on implementation of Orange Money project in Telkom Kenya Ltd.
3. To study the influence of management support on implementation of Orange Money project in Telkom Kenya Ltd.
4. To find out the effect of information technology infrastructure on implementation of Orange Money project in Telkom Kenya Ltd.

THEORETICAL REVIEW

Goals and Methods Matrix

Turner and Cochrane (1993) classify projects using two parameters: how well defined the goals are, and how well defined are the methods of achieving those goals. Turner and Cochrane (1993) suggest that if methods are uncertain, the fundamental building blocks of Project Management will not be known. For instance, the WBS, tasks required to complete the job, the OBS, etc.

Agreement & Certainty Matrix

Stacey (1996) analyzes the complexity on two dimensions: the degree of certainty and the level of agreement. There are different zones which have different implication. Close to Agreement, Close to Certainty: This zone forms the part of “Simple” projects where there is rational decision making. People involved in the project agree on what needs to be done. The traditional management approach works best and most of the management literature and theory address this region. The goal is to identify the right process where efficiency and effectiveness is maximized (Stacey, 1996).

Far from Agreement, Close to Certainty: While there may be agreement on how outcomes are created, there could be disagreement as to which outcomes are desirable. This leads to political game play in an organization. Typically, coalition building, negotiation and compromise are used

to solve the situation. This complexity could be defined as ‘directionally complex’ which is dealt in the Remington and Pollack (2007) model. The progress towards superficially agreed goals is hampered by political motivations and hidden agendas (Remington & Pollack, 2007). Close to Agreement, Far from Certainty: The ultimate goal is agreed upon, but it is unsure as to how to get there. Traditional management approaches may not work and you cannot have a predetermined plan. There has to be strong leadership with a sense of shared mission.

Williams (2002) points out that uncertainty in goals often causes changes and this leads to increase in structural complexity. Anarchy: Far from Agreement, Far from certainty: On the other extreme, we have total anarchy where no one agrees on the plans and there is a high level of uncertainty. The traditional methods of project management will not work and perhaps the only solution is avoidance. Organizations should stay away from such situations as much as possible. Stacey’s matrix is primarily focused on change. This model is useful for choosing between leadership approaches for a specific issue. However, it is just one aspect of tackling a complex project. It may facilitate as an aid to approach projects based on where you are placed on the matrix but does not go beyond to demonstrate the interdependencies.

Complexity Model suggested by Terry Williams

Williams (2002) shares the view of Baccarini (1996) on complexity but extends it by one additional dimension. In addition to the two components of complexity, viz. number of elements and the interdependency of these elements, he introduces the third element which is Uncertainty. Since uncertainty adds to the complexity of a project, therefore it can be viewed as a constituent dimension of project complexity (Williams, 2002). Terry Williams suggests that overall project complexity can be characterized by two dimensions, each having two sub-dimensions. These two sub-dimensions lead to a complex system in which the whole is more than the sum of the parts (Williams, 2002).

Adam Kahane’s Approach to Complexity

Kahane (2004) puts a lot of emphasis on talking and listening to each other when solving tough problems. His approach to complexity is deeply rooted in a social environment. He distinguishes complexity in three ways:

Dynamic Complexity: This means that the cause and effect are far apart and it is hard to grasp from firsthand experience. They usually unfold in unpredictable and unfamiliar ways. In addition, people involved in the problem see things very differently.

Generative Complexity: This type of complexity is characterized by a situation where you cannot calculate the solution in advance based on what has worked in the past. The future is unfamiliar and undetermined.

Social Complexity: When dealing with social complexity, the people involved must participate in creating and implementing the solution. The people involved have diverse perspectives and interests. Kahane (2004) introduced the U-process as a methodology for addressing complex challenges. In using the U-process, an individual or team undertakes three activities: Sensing the current reality of the system of which they are part presenting and reflecting to allow their “inner knowledge” to emerge, about what is going on and what they have to do. Realizing, and acting swiftly to bring forth a new reality (Kahane, 2004).

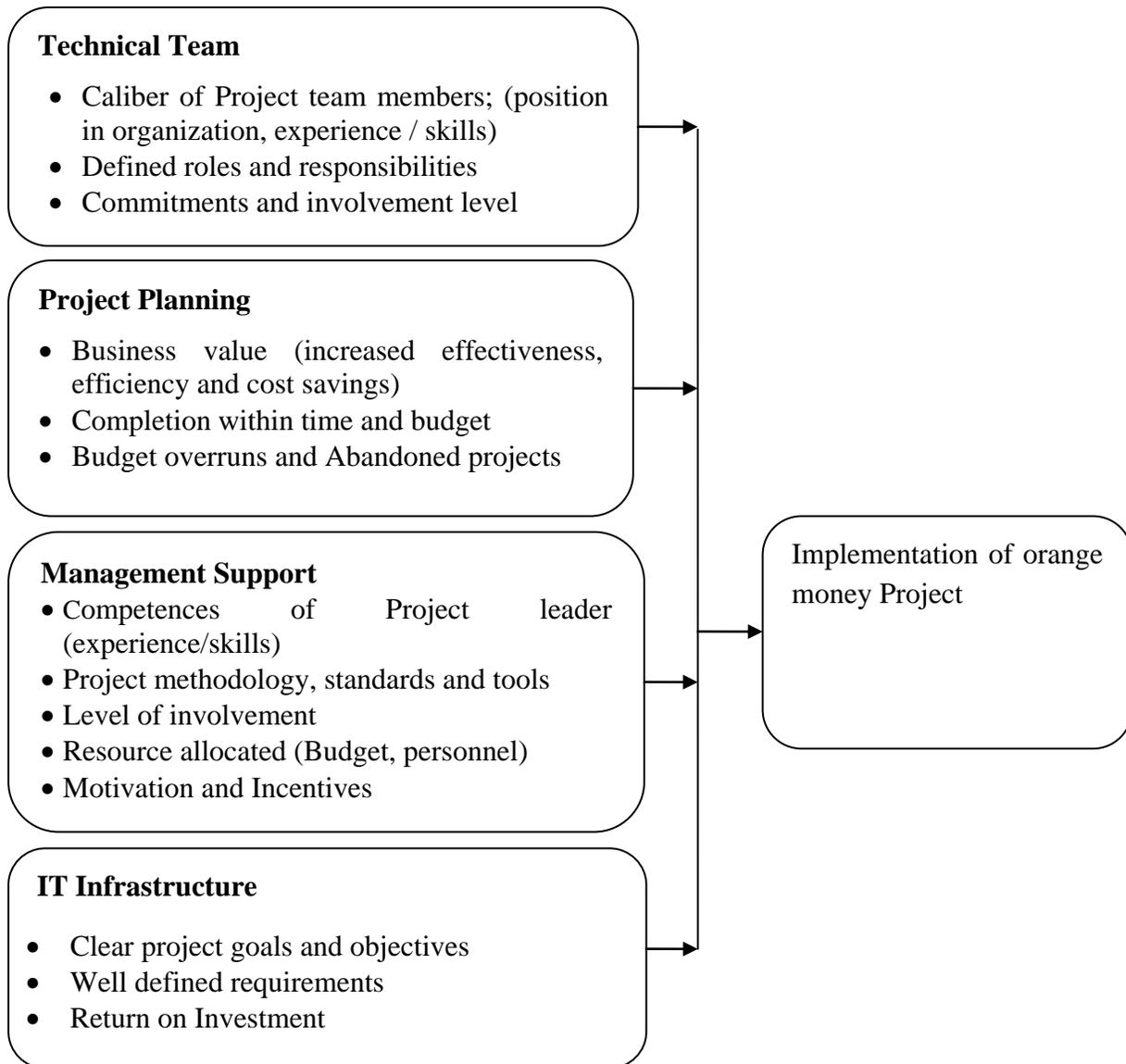
Cynefin Decision Making Framework

Another interesting framework was developed by Snowden and Boone (2007) called the Cynefin framework which allows executives to see new things from new viewpoints, assimilate complex concepts, and address real world problems and opportunities. The framework sorts it into five contexts based on cause and effect. The first four are simple, complicated, complex and chaotic. The last one is disorder which is applied when it is unclear which of the four is dominant. The following table clearly depicts the characteristics of each context and ways to tackle them.

CONCEPTUAL FRAMEWORK

There is an increasing acceptance that an understanding of complexity is important because of the difficulties which it spawns. According to Geraldi and Adlbrecht [2007], this understanding should help project practitioners to reflect upon circumstance, holistically and pragmatically, in order to be able to navigate complex situations. Bosch -Rekvelde et al. [2011] argue that aiming to understand complexity does not necessarily contribute to the controllable nature of project complexity; it is merely a way to help project practitioners in preparation and readiness for dealing with complex or complicated situations. Richardson [2009] believes that understanding complexity should help managers constrain achievement by planning and control methods. Others, such as Remington *et al.*, (2009), claim that understanding the source of the complexity and the degree of resultant difficulties might help to determine the skills and capabilities needed to deal with the problem.

Projects have certain critical characteristics that determine the appropriate actions to manage them successfully. It is submitted that project complexity - organizational, technological, informational, etc. - is one such project dimension. Liberatore et al. (2001) have identified the improved capabilities of project management (PM) software as enablers of effective project management adoption and an area for future research. Thus, information technology (IT) tools or Project Management software adopted for Project Management processes have an effect on project complexity for Business Project Management. Tatikonda and Rosenthal [2000] suggested that complexity contributes to uncertainty, a statement that was supported later by Remington et al. [2009] who argues that uncertainty causes technical complexity, while goal complexity causes uncertainty.



Independent Variables

Dependent Variable

Figure 1: Conceptual Framework

Therefore, existence of uncertainty is not a good reason to consider a project as “complex” because small projects can be classified as complex category by this definition [Whitty and Maylor, 2009]. Geraldi and Adlbrecht [2007] identified three types of complexities; complexity of fact (caused by size and dependency between tasks), complexity of faith (originated because of newness of the project), and complexity of interaction (interfaces between people and organizations, includes aspects like politics and ambiguity. Maylor et al. [2008] introduced dimensions of managerial complexities -Mission, Organization, Delivery, Stakeholders and

Team -with sub categories. Remington et al. [2009] identified several factors that increases experienced level of complexity (severity factors).

Bosch-Rekvelde et al. [2011] classified a large number of contributors to complexity (40 elements in total) into three main groups: Technological, Organizational and Environmental (TEO) framework. According to Cushing, (2002), lack of clear project goals and objectives changing during the project are considered the key factors in project failure. Tilmann and Weinberger, (2004) identified project management process and organizational culture as the key factors in determining the success of projects. On the contrary, Jenster and Hussy, (2005) concluded that lack of the management support and user involvements are the two critical factors in project implementation.

Lebcir and Choudrie (2011) studied the effects of project complexity on time to complete construction projects. Lebcir and Choudrie (2011) argue that there is no comprehensive framework which includes and integrates all the aspects of project complexity in the context of construction projects. They proceeded to develop a new project complexity framework which indicates that project complexity in construction projects is driven by the following factors: project uncertainty; infrastructure newness; infrastructure interconnectivity and infrastructure size. Lebcir and Choudrie (2011) also found that project uncertainty, which reflects the depth of the innovation in the project, is clearly a strong determinant of the time required to complete the project. Projects involving medium or high innovation are associated with far longer completion times than project involving low innovation. When making decisions determining the level of innovation in the project, project managers must make a trade-off between its effects on the project cycle time, and the other objectives of the project linked to the competitive environment, the project financial rewards, and so on.

Remington et al. (2009) looked at dimensions of project complexity as providing information on where the complexity comes from. They identified five dimensions: goals, means to achieve goals, number of interdependency of elements, timescale of project and environment – market, political and regulatory. Danilovic and Browning (2007); Alderman and Ivory (2007); Cooke-Davies et al., (2007); Aritua et al. (2008) have all highlighted similar attributes namely inter-relationships, self-organisation, emergence, feedback and non-linearity and have discussed these effects in multi-project situations. Uniqueness, indirect communication among elements (Luhmann & Boje, 2001; Kumar, et al., 2005), dynamism and lack of clarity on the goals of the project are also cited. Vidal and Marle (2008) however, argue that project complexity can be characterized into four types: project size, project variety, interdependencies and interrelations and context-dependence.

Remington and Pollack (2007) categorized complex projects into four dimensions based on the source of complexity: structural, technical, directional and temporal. They emphasize that a clear

understanding of the source of complexity helps in selecting appropriate tools and approaches to manage the project. Remington et al. (2009) argue that the level of severity perceived, in relation to each of the four dimensions of complexity in Remington & Pollack's (2007) model, depends upon the breadth and depth of experience and capability of key personnel in relation to the type and degree of complexity; the project organisational structure, and its interfaces with key participating organisations, with respect to communication and governance; existing cultural norms and work practices within and between participating organisations, including project culture; appropriateness of organisational processes, such as procurement practices, to the type(s) of complexity experienced.

RESEARCH METHODOLOGY

Research Design

This study adopted a descriptive survey design. Descriptive research design was used as it had merits such as a researcher having no control over the variables and only reported what was happening. Descriptive design was found appropriate because it involved collecting data in order to answer pertinent questions concerning the current status of subjects under study. The research design provides facts and suggestions on major connections between the variables. The primary purpose of this study was to determine effects of project complexity on project implementation a case of orange money project at Telkom Kenya Ltd.

Population of the Study

The population of the study comprised of 272 staff from the Telkom Kenya Ltd headquarters. This target population was drawn from a group of individuals who are actively involved in the implementation of orange money project; namely, IT and Network, Customer Care, business Market, Marketing and Finance departments.

Sample Size and Sampling Techniques

The sampling frame was the listing of management staff in the various departments of Telkom Kenya Limited. This list stood at 272 members as at December 2015. This study computed 40% of the target population and use stratified sampling technique to arrive at that sample which is estimated at 80 respondents.

Data Collection

Primary data was obtained from the respondents through a structured questionnaire comprising of both closed and open-ended questions. Prior to launching the full-scale study, the questionnaire was pre-tested to 10 randomly selected members of staff of Telkom Orange Kenya to ensure its workability in terms of structure, content, flow, and duration. Experts and colleagues who are experienced in research were also requested to examine the questionnaire to

check whether there are any items that need to be changed or rephrased, as well as the appropriateness of the time set for. This process helped refine the questionnaire, enhance its legibility and minimize the chances of misinterpretation it.

Data Analysis and Presentation

The collected data was analyzed using quantitative data analysis methods. Descriptive analysis such as frequencies and percentages was used to present quantitative data in form of tables and graphs. Data from questionnaire was coded and entered into the computer using Statistical Package for Social Science (SPSS V 18.0) for analysis. It gave means, standard deviations, correlations and frequency distribution of each independent and dependent variable. Implementation of Orange money project was regressed against the four independent variables using the regression model. The mean, median, percentage, mode and standard deviation are the most commonly used descriptive statistics. Measures of central tendency were used in this study to give a description of the data. Graphs bar and pie charts were used for further representation.

Implementation of Orange money project was regressed against the four independent variables using the regression model below.

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where: Y = implementation of Orange Money project; a = Constant; β_1 to β_4 = coefficients; X_1 = technical team; X_2 = Project planning; X_3 = Management support; X_4 = IT infrastructure; e = Error term

FINDINGS AND DISCUSSIONS

Descriptive Findings and Analysis

The analysis was based on 72 out of the 80 questionnaires which were properly filled and returned. The study established that 32% of the respondents indicated that ISP was being implemented and 39% agreed that SCADA was being implemented. Only 29% indicated that there was infrastructure upgrade. 28.5% of the respondents were users representatives in the project, 29% were management representative while only 21% were project leaders. The respondents were asked to rate statements on a 5 point likert scale ranging from 1 to 5 with 1 being 'to no extent at all', 2 being 'to a small extent' 3 being 'to some extent', 4 being 'to a high extent' and 5 being 'to a very high extent'.

From the study majority of the respondents, 62.5%, agreed that necessary conducting trainings/workshops for the team to foster team work affected project implementation to a high extent, 52.80% on the other hand also agreed that having project team members that were

experienced, knowledgeable and skilled affected project implementation to a high extent while 52.2% agreed that when project team showed commitment and achieved their targets and goal in time, it affected project implementation to a high extent. Those respondents who indicated that having a project team that is all inclusive and representative of all key stakeholders affects project implementation to a high extent were 52.8%. The final average indicated that technical team affected project implementation to a high extent. The standard deviation of 1.20 indicated that there was a small variation in the responses.

The results also indicate that majority of the respondents (54.2%) indicated that majority respondents agreed that the goals/objectives for orange money project were communicated to all stakeholders and that affected project implementation to a high extent. Standard deviation of 1.30 indicates that that there was a small variation in the responses.

The study findings revealed that 47.2% of the respondents agreed that top management ensured availability of resources (financial and human), as well as necessary facilities to ensure that the project team meets their targets and that affected performance to some extent. The mean of 3.05 indicated that majority of the respondents agreed that management support affected project implementation to some extent and the standard deviation of 1.33 implies that the responses were less varied.

The study results above indicate that majority respondents indicated that 43.0% agreed that projects functional and technical requirements are well defined and understood by all stakeholders. The variations in the responses were also minimum. The results also indicate that majority respondents, 52.8%, agreed that there is there is proper flow of communication among the participants.

Regression Analysis

The study findings in table 1 indicate that all the independent variables are estimating the implementation of Orange Money project at Telkom Kenya. This is as indicated by an R coefficient of 0.679. Further results indicate that the independent variables jointly explain 46.1% of the changes in implementation of Orange Money project at Telkom Kenya.

Table 1: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.679a	0.461	0.429	0.479799

The results in table 2 indicated that the F statistic of 14.314 of the model was significant at 5% level of significance as indicated by a P value of 0.000. This means that the model of the relationship between project complexities on implementation of Orange Money project at Telkom Kenya fit well.

Table 2: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	13.181	4	3.295	14.314	0.000
Residual	15.424	67	0.23		
Total	28.604	71			

The study findings in table 3 indicate that technical team is positively and significantly associated with project implementation. This implies that a unit increase in technical team will improve project implementation by 41%. However, Technical team influences project planning, management support and IT infrastructure but they are insignificant.

Table 3: Correlation Analysis

		Technical team	Project planning	Management support	IT Infrastructure	Implementation
Technical team	Pearson Correlation	1	0.2	-0.083	0.205	.406**
	Sig. (2-tailed)		0.092	0.491	0.084	0.000
Project planning	Pearson Correlation	0.2	1	.283*	0.119	.418**
	Sig. (2-tailed)	0.092		0.016	0.319	0.000
Management support	Pearson Correlation	-0.083	.283*	1	0.143	.454**
	Sig. (2-tailed)	0.491	0.016		0.23	0.000
IT Infrastructure	Pearson Correlation	0.205	0.119	0.143	1	.285*
	Sig. (2-tailed)	0.084	0.319	0.23		0.015
Implementation	Pearson Correlation	.406**	.418**	.454**	.285*	1
	Sig. (2-tailed)	0	0	0	0.015	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The results in table 4 indicate that all other factors being zero, the level of implementation of Orange Money project at Telkom Kenya is -0.311. The results also indicate that the relationship between IT infrastructure and project implementation is positive and insignificant as indicated by a beta coefficient of 0.127 and P value of 0.181. The findings also indicate that, management support, project planning and technical team are positively and significantly related to project implementation. This is indicated by beta coefficients of 0.439, 0.176 and 0.364 with P values of: 0.000, 0.030 and 0.000 respectively.

Table 4: Regression Coefficients

	B	Std. Error	t	Sig.
(Constant)	-0.311	0.478	-0.651	0.517
IT Infrastructure	0.127	0.094	1.351	0.181
Management support	0.439	0.103	4.251	0.000
Project planning	0.176	0.079	2.223	0.030
Technical team	0.364	0.093	3.922	0.000

CONCLUSIONS

Based on the study findings, the study concluded that technical team, management support and project planning are positively and significantly associated with project implementation. The relationship between these variables is positive and significant. Management support, technical team, and project planning are the critical factors in explanation of changes in project implementation respectively.

Based on the study findings, the study concluded that management support is the most critical factor in explanation of changes in project implementation and the relationship between information technology and project implementation is positive and insignificant.

RECOMMENDATIONS

The study recommends that in order to realize an improvement in implementation of Orange Money project in Telkom Kenya Ltd, the company should put more emphasis on the technical team by offering the project team necessary support and tools required to achieve their targets and goals, offering incentives and compensation, motivation, encouragement as well as ensuring availability of resources as well as necessary facilities.

The company should put in place measures that aim to improve the skills of the technical team, for instance; conducting trainings /workshops for the team to foster team work, having project team members that are-experienced, knowledgeable and skilled and having a project team that is all inclusive and representative of all.

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