

# INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & MANAGEMENT COMMUNICATION AND FEEDBACK FLOW: A STRATEGIC FUNCTION OF STAKEHOLDER MANAGEMENT FOR EFFECTIVE SOFTWARE ENGINEERING PROJECTS IN NIGERIA

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## ABSTRACT

This research examined whether communication and feedback flow among stakeholders contribute significantly to project success. Communication and feedback flow is one of the most needed areas of project management of which attention of many researchers had been drawn to it. To ensure the project success, information such as requirements, expectations, resources, budgets, expenditures, and progress reports need to be communicated to all stakeholders on regular basis. Most software engineering projects in Nigeria have failed due to irregular communication among stakeholders in the project. To achieve the objective, questionnaire method was used to gather data from the respondents and analyzed using Pearson product moment correlation coefficient. It was concluded that communication and feedback among stakeholders contribute to effective software engineering projects in Nigeria. It is important that the project managers encourage useful contributions from the stakeholders without losing control of the project.

**Keywords:** *Stakeholder management, software engineering project, communication and feedback, project success, project stakeholders.*

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## I. INTRODUCTION

The main objective in communication is dissemination of information to the audience of which Project Managers must be cognizant of the preferences of the project's stakeholders (Nguyen, Skitmore & Wong 2009). In most project management literatures, communication has been addressed as a vital skill for project managers in order to be able to write, listen well, speak, lead meetings effectively, and resolve conflicts constructively. Keeping stakeholders informed is the beginning and end of stakeholder management. Čulo and Skendrović (2010) went further to say that communication in stakeholder management involves asking stakeholders for input, but mechanisms are put in place to record both inputs and the responses of the project team.

Abd-Karim, ahman, Berawi and Jaapar (2007) agreed that communicating effectively with stakeholders enable them to know much about the project, background of the project organization, products or services details and even the project outcomes. It also helps them develop skills that will help them in problem solving and decision making. Finally, it makes the stakeholders to feel valued which can make the put in their best in a project (Savage, Nix, Whithead, & Blair1991). According to Turkulainen, Aaltonen, and Lohikoski (2015), before the commencement of a project, project organizations ought to launch an aggressive communication to get the stakeholders acquainted with the project objectives. Project organizations need to involve different group leaders include executives, project teams, functional departments, and customers to talk through project objectives and gather feedbacks to move the project forward. Effective Communication serves as the very bedrock of successful project and can be in person, through email or social media, and can be with sponsors or stakeholders (El-Gohary, Osman, & Ei-Diraby, 2006). It can influence the opinion of the society, provide teams with sense of purpose, convince management to increase budget, and increase project success rates. Most software engineering projects failed due to ineffective communication among stakeholders. According to PMI (2013) organizations with effective and efficient communication methods are more likely to stay within scope, meet quality standards, and deliver intended project objectives.

In Nigeria most software engineering project has gulped several billions of naira but has remained largely in limbo for decades, for example National Identity Database of National Identity Management Commission (NIMC). It took the executives of NIMC three years to sign the concession agreement, a document that will tell the project team what is expected from the project (Premium Times, October 26, 2016). The report revealed that meetings were convened irregularly and this resulted in non-participation of other partners, late submission of design, and extinction of progress report. National Identity card project is not the only project that has failed due to irregular communication among stakeholders. Others are Independent National Electoral Commission (INEC) Electronic Voters Card Reader (PVC), National University Commission (NUC) National Universities Commission Data Base (NUCDB), National Population Commission (NPC) Bio-metric data project, Federal Ministry of Health and Social Services e-Health (NHIS). These projects failed due to irregular communication and feedback flow from stakeholders despite gulping billions of oil revenue. Project stakeholders were left out of the planning, execution, and deployment; consequently they either reject the finished product or fail to utilize it properly.

Most research (Eskerod & Vaagaasar, 2014; Yang, Shen, & Ho, 2009) on stakeholder management concentrate on building tools and frameworks more than establishing communication plan between project organizations and their stakeholders. In order to bridge the gap in literature, this work studied the mode of communication as a strategy of stakeholder management in software engineering projects and investigated the extent to which communication flow and feedback among project stakeholders contributes to effective Software Engineering Projects in Nigeria. Communication and feedback flow, though an integral part of stakeholder management, insignificant research work exists on stakeholder communication in projects thus, this study research question is formulated as:

To what extent does communication and feedback among stakeholders contribute to effective Software Engineering Projects in Nigeria?

In order to answer this research question, an empirical study was carried out on software engineering projects undertaken in public sectors in Nigeria. These projects are cost-intensive and involved many stakeholders such as customers, functional departments, media, suppliers, end-users, society, government, and sponsors. The data collected through questionnaire method was analyzed using Pearson moment correlation coefficient and regression analysis. The study proved that communication and feedback among stakeholders contributes to effective software engineering projects in Nigeria.

## **II. RELATED LITERATURES**

Communication is not just exchanging information, rather understanding the emotion and intentions associated with the information is also important. For communication to be effective a two-way dialogue should exist. It does not matter the way the message is conveyed rather how the receiver receives and interprets the information. According to Nguyen, et al. (2009), the project manager should communicate the intended message to the understanding of the stakeholders. Effective communication comprises some other skills including nonverbal communication, active listening, managing stress in the moment, the ability to communicate assertively, and the capacity to recognize and understand emotions. These skills help project stakeholders to strengthen connections to others and improve teamwork, decision making, problem solving, and even communicate negative or difficult messages without initiating conflict or destroying trust (Čulo & Skendrović, 2010)

According to Cadle and Yeates (2008), the level of communication among stakeholders is absolutely critical to effective SEP. In most SEP, development cycle is a black hole where requirements are elicited without inputs from stakeholders (Smolander & Päiväranta, 2002). Some stakeholders might be unaware of the business case, project vision, and project objectives. Most stakeholders have no idea where the project is at the development cycle and cannot make meaningful input even after the requirements phase if the stakeholder is left out of the development loop (Rozanski & Woods, 2005). People can easily describe what they think they want than to describe what they exactly want (Clarkson, 1991). Fricker, Gorschek and Myllyperkio (2007) said that frequent communication helps in clarification of misunderstandings, confusion and misinterpretations. The project organizations need to work in more collaborative and evolutionary manner with their stakeholders to develop software that meets stakeholders' requirements. There are needs to communicate articulated requirements and project benefits to the stakeholders to gain their support. According to Smolander and Paivaranta (2002), regular communication provides stakeholder

groups with key messages about the project, its objectives and benefits. Project organizations need to monitor stakeholders and take corrective measures when needed to ensure stakeholders stay involved with the project. Communication method can be in form of meetings, sending emails, telephone calls or wikis to find out why participation has dropped. Decker, Ras, Rech, Jaubert, and Rieth (2006) saw wikis as a more powerful method than email or any other office tools but less expensive and easier to use than full-fledged collaboration or requirements management tools. Cadle and Yeates (2008) opined that having regular roundtable discussion with different stakeholders at different time should be encouraged.

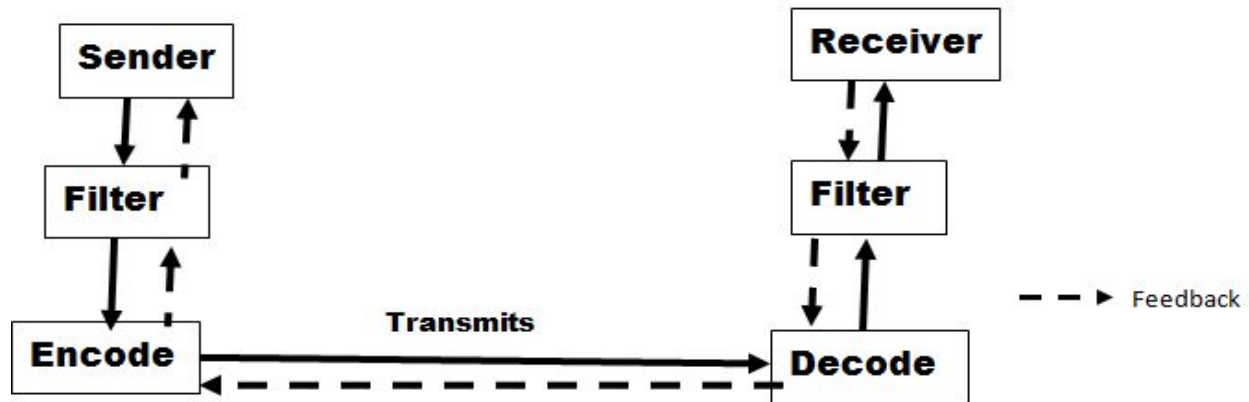


Figure 1: Communication and Feedback Model (modified from Cadle & Yeates, 2008)

Figure 1 shows that feedback is best thing to do in order to test idea against reality. Appropriate and relevant feedback helps drive real-time course-corrections (Milis & Vanhoof 2007). Feedbacks from different stakeholders help project manager to take better decision and create continuous improvement about the project. Sometimes, what should be communicated gets distorted in transmission in spite of the purposes of communication. When the receiver misunderstands what the sender said, misunderstandings, frustration, and conflicts may ensue. Caroll and Buchholtz (2008) identified candor, fidelity, and confidentiality as three key principles associated with communication. With candor, project stakeholders are required to be forthright, sincere, and honest, fair, and free from prejudice and malice in the communication. Fidelity requires the project stakeholders to be faithful to detail, accurate, and avoid deception or exaggeration. Confidentiality means that project stakeholders must exercise care in deciding what information to disclose to others. A project stakeholder might lose trust if confidentiality in communication is breached. Stakeholder’s participations can be influenced and addressed by using effective communication (Lim, Ahn,& Lee, 2005). Various stakeholders require different styles of communication at various circumstances. Finding out the stakeholder’s preferred style of communication is important as such project teams need to select communication style according to the role and position of the stakeholder. The project manager might inquire from stakeholders their preferred style of communication because Chen and Chen (2007) said that stakeholders preferred style is personal. Some prefer emails, while others prefer telephone conversation. Finally the project manager should summarize the discussion to ensure that every stakeholder agrees with the conclusions. Adopting a proactive communication with both internal and external stakeholders in a project establishes clear understanding and awareness of the role each key stakeholder plays in the project. Effective communication also helps in developing a clear and consistent SEP and ensures honest and accurate information is delivered in an effective and timely manner. Irrespective of the type of project, researchers (Achterkamp & Vos, 2008; Chen & Chen, 2007) have agreed that project failure is not only caused by ineffective project management practices, but of inappropriate communication among the project stakeholders.

### III. METHODOLOGY

The primary data was the main source in this research and the questions on the questionnaire were the evaluation of information gathered from software project organization. Secondary data was collected from unpublished and undocumented records of software project organizations. The result of the analysis of the secondary data revealed the problems existing in Software Engineering Projects in Nigeria and this was used to formulate objectives,

research questions, and questions in the questionnaire. Questionnaire method was the technique used for the primary data collection due to its obscurity, and detailed information was released without reservation (Easterby-Smith et al., 2012). The questionnaire used 10-point scale instead of 5-point or 7-point because we are evaluating what the project organizations had done in the past. If we were seeking the opinion of the respondents, then 5-point or 7-point scale would have been appropriate.

**IV. RESULTS AND DISCUSSIONS**

**Demographic Analysis**

This section is mainly designed to provide general information about the respondents in terms of the type of institutions, position and experience of the respondent.

*Table 1: Nature of the Organization versus Position*

		Position			Total No. Returned	Total No. Sent	% Returned
		ICT Manager	Project Manager	Software Engineer			
Nature of the Organization	Tertiary Institution	9	7	9	25	60	41.70%
	Government Agency	19	15	16	50	60	83.30%
	Government Ministry	17	20	18	55	60	91.70%
Total		45	42	43	130	180	

Table 1 shows the cross tabulation of the nature of the organization and the respondents position in the organization. It indicated that government agencies have more ICT managers while ministries have more project managers and this is in line with NITDA Report (2012) which discovered that many government organizations are incorporating ICT in their daily activities. The number of software engineers and ICT managers that participated in the survey from the ministries is 17 and 18 respectively while project managers that responded are 20. From government agencies, more ICT managers returned the questionnaires than any other group while more project managers were the least recorded from tertiary institutions. The compound bar chart in Figure 2 depicted this result of table 1 graphically.

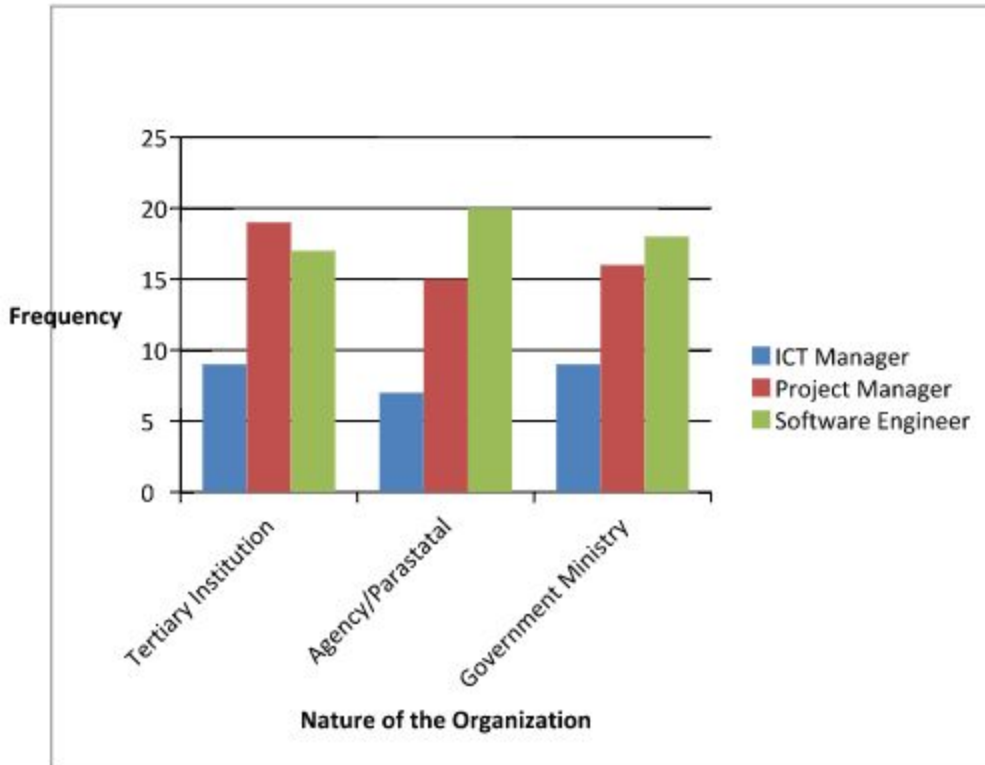


Figure 2: Nature of the Organization versus Position

In table 1, also show the percentage number of questionnaire returned from each group which is depicted in Figure 3. Government ministries recorded the highest response rate of 91.7 % while tertiary institutions had the least with 41.7%. Government parastatals recorded 83.3%. The pie chart in Figure 3 depicted the results graphically.

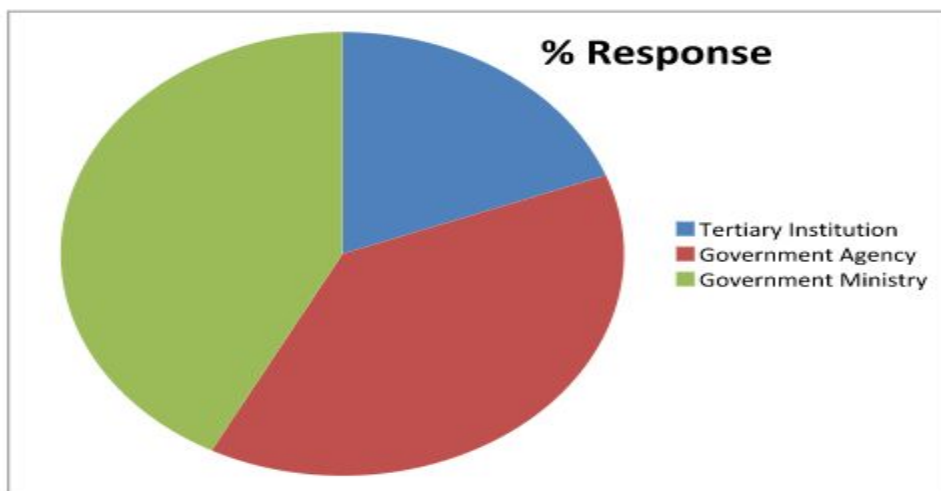


Figure 3: Percentage number of Returned Questionnaire

**Analysis Of Research Questions**

The research questions addressed different ways in which communication and feedback affect effective Software Engineering Projects in Nigeria. The correlation procedure was employed to analyze the research questions, using

Pearson’s correlation coefficient. Generally, the Pearson’s correlation coefficient (R) measures the extent of linear relationship between two variables. The value of R ranges from –1.00 to +1.00. A value of –1.00 indicates a perfect negative linear relationship between the two variables while a value of +1.00 indicates a perfect positive linear relationship. There is no linear relationship between the two variables when the value of R is zero. For the purpose of analyzing the research question, we shall apply the following interpretation of various ranges of values of the correlation coefficient, R.

0.00 < R < 0.25	very weak positive linear relationship
0.25 ≤ R < 0.50	weak positive linear relationship
0.50 ≤ R < 0.75	strong positive linear relationship
0.75 ≤ R < 1.00	very strong positive linear relationship

Similar interpretation holds for the associated negative linear relationships.

**Research Question:** To what extent does communication and feedback among stakeholders contribute to effective Software Engineering Projects in Nigeria?

Table 2: The Correlation Procedure for Communication and Feedback among Stakeholders and Effectiveness of Software Engineering Projects in Nigeria

**The CORR Procedure**

2 Variables: Effectiveness and Communication & Feedback

**Simple Statistics**

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
Effectiveness	130	63.30769	14.64243	8230	27.00000	97.00000	Effectiveness
Communication	130	30.86923	11.52375	4013	8.00000	115.00000	Communication

Pearson Correlation Coefficients, N = 130

Prob > |r| under H<sub>0</sub>: Rho=0

	Effectiveness	Communication
Effectiveness	1.00000	0.53298
Effectiveness		<.0001
Communication	0.53298	1.00000
Communication	<.0001	

Table 2 indicates that the Pearson’s correlation coefficient (R) between Communication and Feedback among Stakeholders and Software Engineering Projects effectiveness is obtained as 0.53. This indicates a strong positive linear relationship between communication and feedback among stakeholders and effective Software Engineering Projects in the organizations under study. It shows that over the years, organizations with high communication and feedback among stakeholders also experienced high Software Engineering Projects effectiveness. We therefore conclude that communication and feedback among stakeholders contributes to effective Software Engineering Projects in Nigeria to a relatively high extent.

**V. TEST OF HYPOTHESIS**

**Null hypothesis:** Communication and feedback among stakeholders does not significantly contribute to effective Software Engineering Projects in Nigeria

**Alternative hypothesis:** Communication and feedback among stakeholders significantly contributes to effective Software Engineering Projects in Nigeria

Table 3: The Regression Procedure for Communication and Feedback among Stakeholders and Effectiveness of Software Engineering Projects in Nigeria

**The REG Procedure**

Model: MODEL 1  
Dependent Variable: EFFECTIVENESS  
Number of Observations Read 130  
Number of Observations Used 130

**Analysis of Variance**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	7856.53540	7856.53540	50.79	<.0001
Error	128	19801	154.69654		
Corrected Total	129	27658			

Root MSE	12.43771	R-Square	0.2841
Dependent Mean	63.30769	Adj R-Sq	0.2785
Coeff Var	19.64644		

**Parameter Estimate**

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	Intercept	1	42.40257	3.12971	13.55	<.0001
Communication	Communication	1	0.67722	0.09503	7.13	<.0001

Table 3 shows that the regression model for the effect of Communication and Feedback among Stakeholders on Software Engineering Projects effectiveness is obtained as:

$$\text{Model 1: } Y = 42.40257 + 0.67722 X_2 \quad (\text{Equation 1})$$

Where

Y = Effectiveness of Software Engineering Projects in Nigeria

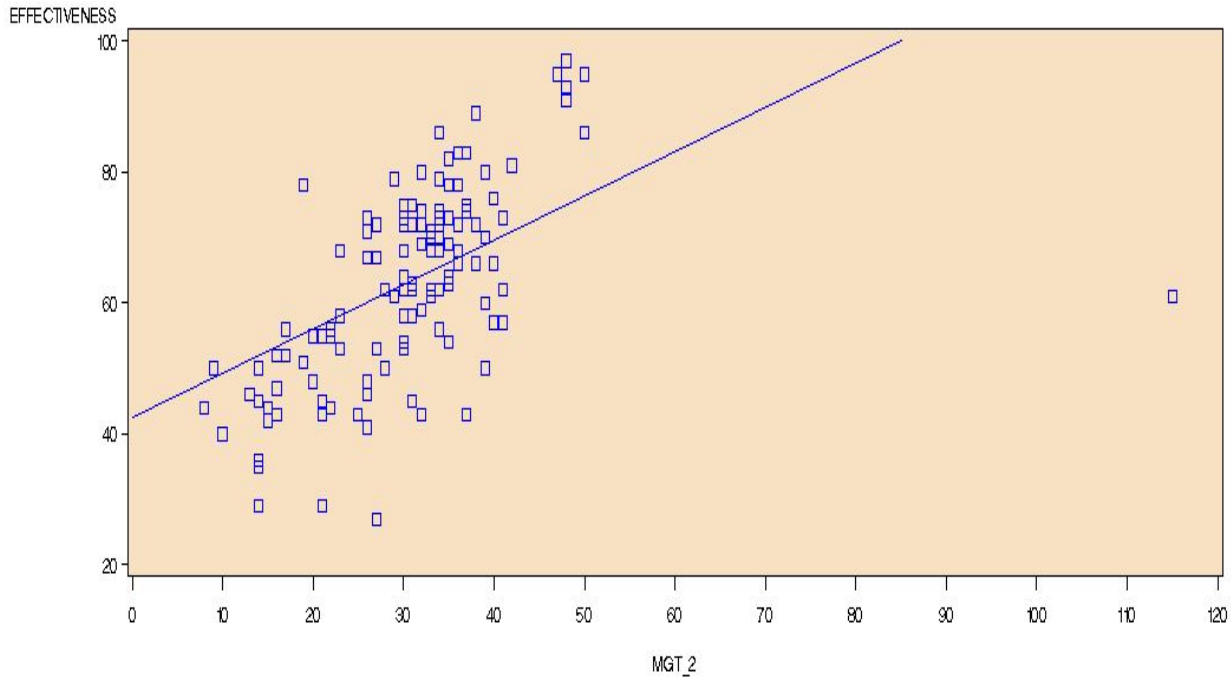
X<sub>2</sub> = Communication and Feedback among Stakeholders

Regression analysis was conducted to empirically determine whether communication and feedback flow was a significant determinant of effective Software Engineering Projects in Nigeria. Regression results in table 3 indicate the goodness of fit for the regression between communication and feedback flow and effective Software Engineering Projects was satisfactory.

Model 1 and figure4 both confirm that there is a positive linear relationship between Communication and Feedback among Stakeholders and Effectiveness of Software Engineering Projects in Nigeria. Table 4 also shows that the computed F-value for Model 1 is 50.79 with a significance probability of <0.0001, which is less than 0.05. Thus, the test is significant (P < 0.05) at 5% level of significance. We therefore reject the null hypothesis and accept the alternative hypothesis. Consequently, we conclude that communication and feedback among stakeholders significantly contributes to effective Software Engineering Projects in Nigeria. However, the R-square value of 0.2841 shows that Model 1 explains only about 28.4% of the variations in Effectiveness of Software Engineering Projects in Nigeria. Thus the model is not suitable for prediction purposes since it does not account for up to 75% of the variations in Effectiveness of Software Engineering Projects in Nigeria.

The findings compare well with those of Abd-Karim et al. (2007), Lim et al. (2005) and Milis and Vanhoof (2007) who argued that good communication and feedback process keeps stakeholders engaged. In addition, Chen and Chen (2007) and Culo and Skendrovic (2010) asserted that effective and efficient communication methods are more likely to make project stay within scope, meet quality standards and deliver intended product. This implies that an

increase in communication and feedback by 1 unit leads to an increase in effective Software Engineering Projects by 0.67722.



**Fig.4: Scatter plot of Communication and Feedback among Stakeholders and Effectiveness of Software Engineering Projects in Nigeria**

A graphical illustration of the relationship between communication and feedback and effective Software Engineering Projects was presented in figure 4. The findings agree with those of Nguyen et al. (2009), Rozanski and Woods (2005), and Savage et al. (1991) who found a positive relationship between communication and feedback and effective project. The figure 4.6 revealed that there is a positive relationship between communication and feedback and effective Software Engineering Projects in Nigeria. An increase in communication and feedback leads to an increase in effective Software Engineering Projects in Nigeria.

## VI. CONCLUSION

The study found out that there is a positive correlation between communication and feedback flow among stakeholders and effective Software Engineering Projects in Nigeria. The obtained results agreed with the findings of Fowler and Walsh (1999) and Smolander and Päivärinta (2002) who asserted that communication and feedback flow among project stakeholders averts cost overrun. It proved that the more the communication among project stakeholders, the higher the participation of the stakeholders and the more efficient software. Regression model also confirmed that there is a positive linear relationship between communication and feedback flow among stakeholders and effective Software Engineering Projects in Nigeria. The computed F-value of 50.79 with a significance probability of  $<0.0001$ , shows that the test is significant ( $P < 0.05$ ) at 5% level of significance. This concludes that communication and feedback among stakeholders significantly contributes to effective SEPs in Nigeria. This agrees with the view of Milis and Vanhoof (2007), Čulo and Skendrović (2010), and El-Gohary et al (2006) that project organizations should incorporate communication and feedback among stakeholders during project development.

The project organizations have to develop the project communication management plan to ensure effective communication between the project and its stakeholders. This research contributes to existing research by explaining how project stakeholders can be managed for effective Software Engineering Project implementation. It will be necessary to conduct additional research on the private organizations projects, since this type of project is growing rapidly as a result of awareness of the capability of software.



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