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Assessment of Stakeholder Involvement and Borehole Water Projects Delivery in Kogi West Senatorial District, Nigeria

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Abstract- The involvement of stakeholders along the project life cycle is crucial to the delivery of community-based projects, particularly Nigeria Kogi West Senatorial District's water projects. This is to provide safe and clean water for consumption and usage. Thus, this study examined at which stage of the cycle was involvement more important to the delivery of water projects in the study area. We rely on 234 completed questionnaires, which included employees of Lower Niger River Basin Development Authority, community leaders, and others. They all provided information through a structured questionnaire. Both descriptive (Mean Ranking) and inferential statistics (Partial Least Square Structural Equation Modelling, PLS-SEM) were deployed in the analyses. The results of the descriptive analysis showed that stakeholder involvement in the delivery of borehole water projects was the highest during the execution stages (bES), with a mean of 3.918, whereas, the lowest average was observed during the planning stages (bPS) with a mean of 2.745. The empirical results showed that stakeholders' involvement recorded the largest significant path with the execution phase on stakeholder satisfaction having a coefficient of 0.495 and a p-value of 6.366, and the least significant path with the monitoring and closing stage on budget (0.164, 2.643). This suggested that many promises from the government have mostly not been fulfilled, but those that were executed always bring satisfaction to the stakeholders, especially the host communities which may be influenced by too many empty promises. Other highlights of the results obtained showed that the paths of involvement at the initial stages were not significant with the constructs of project delivery, which implied that most water projects were pushed rather than pulled.

Keywords: *Stakeholders' involvement, borehole water projects, initiation, planning, execution, monitoring, closure, post-construction.*

1. Introduction

Water is an essential human right and a requirement for achieving sustainable development goal of access to clean and safe water [1]. However, there is a considerable gap in access to dependable water supply systems in many parts of the world, especially in rural areas and developing nations [2]. Water scarcity, health concerns, and slowed socioeconomic development are all consequences of inadequate centralized water infrastructure and unreliable water supplies [3]. Borehole water projects have become more popular as a feasible response to these issues. In order to supply local communities with a decentralized and independent water delivery system, borehole water projects entail

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drilling wells to access subterranean water sources [2]. In addition to enhancing community livelihoods and fostering economic activities including agriculture, industry, and sanitation, boreholes have the ability to provide dependable and sustainable access to water [4].

However, technical factors like drilling and infrastructure installation are not the only factors that determine whether borehole water projects are successful. To guarantee project delivery, sustainability, and community satisfaction, effective stakeholder involvement is essential throughout the project lifetime [5]. Local communities, government organizations, non-governmental organizations (NGOs), businesses, and water management authorities are just a few examples of the wide spectrum of actors that make up stakeholders [6]. Their active participation and engagement are crucial to address the particular difficulties and complications connected with borehole water projects. In borehole water projects, stakeholders play a variety of roles and have unique interests and obligations. The water supply is essential to local communities' daily requirements, means of subsistence, and general well-being. Their participation in decision-making procedures guarantees that the project satisfies their unique needs and takes into account their cultural customs, tastes, and goals [5]. The ability to actively monitor and maintain the water supply systems is made possible through community participation, which develops a sense of ownership, accountability, and sustainability [7]. Governmental organizations and water management bodies are in charge of governance and regulation. Their participation guarantees that borehole water projects adhere to pertinent policies, norms, and laws. These participants contribute technical know-how, oversight, and funding to help with project implementation and sustainability. Collaboration between local communities and government organizations improves project accountability, transparency, and long-term support [5]. In borehole water initiatives, non-governmental organizations (NGOs) and civil society organizations frequently play a crucial role. They help local populations get safe water by offering technical assistance, capacity building, and advocacy. The involvement of stakeholders in decision-making processes can be facilitated by NGOs, who can also fill up gaps in the availability of resources and guarantee the inclusion of marginalized groups [8]. Their participation supports social justice, local empowerment, and sustainable development. A crucial player in borehole water projects is the private sector, which includes drilling companies, equipment suppliers, and maintenance contractors [9]. By including the private sector, borehole water projects can be made more innovative, efficient, and financially viable because to their technical know-how, resources, and market-driven techniques. To make sure that private sector participation is in line with community needs and sustainable development objectives, it is essential to carefully assess the social and environmental implications and equitable benefit sharing [8].

Many African nations struggle to give their citizens access to safe and clean water for drinking and domestic usage. The situation is getting worse as Africa's population continues to grow over time, and many people are migrating into cities with an increased need for piped water [40]. In Sub-Saharan Africa (SSA), only 56% of the entire population is covered by the water delivery system, and 48% of rural inhabitants use unimproved water sources, with 22.5% of these rural water services being inoperable [10]. Half of the population in SSA countries lacks access to safe water, fourteen countries have recorded incidents of severe water stress, and another eleven countries will join the increasing list of African nations by 2025 that will have a severe water stress condition, according to Dos Santos, et al. [11]. Similar issues with water supply services that have an impact on sanitation and public health also exist in Nigeria [37]. Despite significant investment on the part of the federal, state, and donor communities, the situation has not improved. The lack of a functioning water supply infrastructure in rural areas and the densely populated, impoverished urban areas, or slums, make the situation regarding water supply extremely terrible. Like in the majority of Nigeria's developing states, Kogi State's rural communities lack access to good, safe drinking water as well as other difficult issues like adequate access to a quality healthcare system, conducive educational environments, structures, and facilities, year-round motorable roads, electrical sources, contemporary market structures and facilities, and

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environmental/ecological and sanitary control [12]. The Directorate for Rural Development (DRD), the National Poverty Eradication Program for Kogi State, and other organizations working to reduce poverty in the state are obligated to address difficulties with contaminated and frequently inaccessible water supplies, among other things. But it is shocking that these inequalities still exist when poverty reduction is evaluated in light of the agencies' work. Over-centralization, unsustainable design, uncoordinated administration, excessive politicking, irregular payment, a lack of monitoring logistics, and corruption are the causes of the gaps [13]. Water supply rose due to increasing investment and water projects, although some projects collapsed due to poor management and little to no maintenance, which prevented the achievement of higher water delivery rates. Water supply continues to be problematic as a result of project failure and collapse. Thus, the absence of water supply continues to negatively impact people's health, wellbeing, growth, and development as stated in [12] and [14]. It is crucial to look into the best ways to guarantee the supply and functionality of water projects in order to provide enhanced human development and well-being. The delivery of community water supply projects must be successful and efficient, according to the literature that has been published. According to Kisang [15] it is important to train the locals to carry out small repairs, take part in project launch activities, and own the project for its maintenance when it comes to delivering water projects that donors support. According to Ben-Daoud [5], community involvement and engagement will improve the performance of the water projects and raise the likelihood that they will be sustained and continue to benefit the nearby communities for many years to come. According to Koros [13], integrating the project's beneficiaries in its execution fosters a sense of ownership. At every point leading up to the project's completion and commissioning, all stakeholders must be represented on the project planning teams and teams that carry out the plans. However, there are few empirical research on the relationship between stakeholder participation and the delivery of borehole water projects in Nigeria. Furthermore, prior researchers that looked into stakeholders' involvement only connected it to initiatives in Nigeria or other nations. For instance, Magassouba et al. [16] investigated how the performance of development projects in Guinea was impacted by stakeholder involvement. The stakeholder engagement in energy transitions was studied by Marcon-Nora et al. [17]. Furthermore, Jabbour et al. [18] evaluated stakeholders' creative business models for the circular economy and sustainable performance of firms in an emerging economy facing institutional voids. A study also investigated stakeholder engagement in business models for sustainability and their value flow model for sustainability [20]. However, this study examined the level of stakeholder involvement in borehole water with special attention paid to the life cycle of the projects, and the impact of such involvement on the delivery of borehole water projects in Kogi West senatorial district in order to contribute to the existing studies and identify the stage that most impacted on the success of borehole water projects in Nigeria.

The sections in this study is further divided thereafter the introduction into literature review, where related concepts were reviewed. This is followed by the methodology, results and discussion, and lastly the conclusion.

2. Literature Review

2.1 Concept of stakeholders involvement review

Involving interested parties in a planning or decision-making process is known as stakeholder involvement [17].There are both primary and secondary stakeholders. The primary stakeholders must be involved for the activity to proceed because they directly and immediately affect the choice. According to Parboteeah and Cullen [19], secondary stakeholders are those who do not directly benefit from or are influenced by decisions made about the delivery of operations and maintenance (O&M) services. Stakeholder involvement entails locating, categorizing, and ranking them to choose the best communication tactics and utilize the resources at hand. Most stakeholders want to participate because they are interested in the resources. It is usually difficult to implement management decisions established independently by the regulatory body without society support, but stakeholder involvement is crucial. One alternative

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is to actively participate in the decision-making process directly, while another is to participate indirectly through elected officials and other representatives [18].

Owners and non-owners, capital or intangible asset holders, agents or actants, right holders, contractors, or influencers are some of the stakeholder types that might impact a project's outcomes as cited in [17] and [38]. They may be connected to the organization freely or involuntarily, serve as their resource providers, or depend financially on their work [20]. Generally speaking, primary stakeholders are those who have power over the resources, whereas secondary stakeholders are unable to directly influence companies but must instead take part in collective efforts to do so [39].

2.2 Stakeholder Involvement in project initiation

The initial steps define and outline the project's nature and scope. It's possible that the project won't be able to meet community expectations if this phase is badly executed [21]. Benefits of the project should be realized, a project manager should be chosen, goals should be realistically based on needs and requirements, costs and benefits should be analysed from a financial, social, and economic perspective, a funding source should be found, and a stakeholder survey should be carried out [22]. The project's initiation stage plan, which marks the beginning of project implementation, should comprise these tasks. In order to manage their possible impact on the project, genuine and legitimate stakeholders must be identified, and their strength, proximity, and influence must be understood [7].

2.3 Stakeholder Involvement in project planning

Stakeholder involvement in project planning activities includes specifying and allocating the required resources, defining the timetable, assessing various risks, and choosing delivery methods, as well as defining the project's work needs, quality standards, and objective. Project managers can enhance a project's execution plan or final results by incorporating stakeholders early in the planning process. Involving stakeholders in the planning process, according to Mambwe et al. [7], helps to understand their position and roles in creating milestones, and scope statements, assigning the planning team, identifying deliverables, creating the work breakdown structure (WBS), estimating the resources needed for the activities, developing schedules, estimating the time and cost required for the activities, risk planning, and obtaining formal approval to proceed. Magassouba et al. [16] assert that the attitudes of various stakeholders significantly influence the success of development projects. The project's performance will suffer if key stakeholders are not committed to carrying out their duties during implementation to the best of their abilities. According to Spadaro et al. [23], a project's success depends on stakeholder involvement, as a result, it is crucial to consider their claims and interests when the project is put into effect to fulfill its goals.

2.4 Stakeholder Involvement in project implementation

One of the most crucial aspects of project management is involving stakeholders in the execution of the project. In order to carry out the specified project plan, project managers during the implementation stage support the coordination of people, efficient exploitation of resources, and appropriate appraisal of risks [23]. By way of illustration, Magassouba et al. [16] noted that stakeholder involvement in project execution is important to translate a project's planned programs and objectives into realistic, well-structured tasks and activities to meet the project goals.

According to Ebekozien et al. [24], the difficulty of stakeholder engagement in project implementation is related to the features of projects, such as their lengthy duration, significant financial investment, and numerous unanticipated and emerging aspects. The risks and problems connected to stakeholder participation in project execution and project performance can be categorized in a number of different ways. According to Magassouba et al. [16] some examples

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include project sponsorship development, business environment, governmental laws, political influence, financial feasibility, procurement, and social acceptability.

According to Ben-Daoud et al. [5], the performance of development projects is significantly influenced by the attitudes of various stakeholders. As a result, the performance of the project as a whole will suffer if key stakeholders are not committed to carrying out their obligations to the best of their abilities during implementation. According to Attanasio et al. [20] taking into account stakeholder claims and interests during the project implementation stages is mainly necessary to achieve project objectives. Stakeholder participation is crucial to the success of the project.

It should be emphasized that there is a reciprocal relationship between initiatives and stakeholders' involvement. In other words, while stakeholders can somewhat influence project performance, stakeholders can also be somewhat impacted by development programs. For instance, executing better standard projects in the mining or construction sectors might transform and improve people's living standards, but the environmental damage and pollution would disclose the project's negative consequences on some stakeholders [7]. Additionally, as stated by Magassouba et al. [16] using the right stakeholder involvement strategy when implementing a project will make it simpler to manage their needs and foresee potential risks that could impact the project's success.

2.5 Stakeholder Involvement in project monitoring

A project needs to be meticulously managed, assessed and tracked. Tegan and Aigbavboa's [25] noted that performance and progress can be judged by contrasting the intended task with the final outcome. To ascertain a project's present state, an evaluation method is used. This assessment is required to determine whether the project is being managed effectively. The quality of a project is significantly impacted by project monitoring. A suitable control method that offers organized and ongoing information on the project's development is essential [26]. A project must be evaluated before and after implementation, claim Nguyen and Mohamed [26]. For instance, monitoring and control aim to ascertain each item's effects before evaluating how effectively each component contributes to the project's success.

Control is the process of ensuring everything happens according to established law and explicit instructions." The specific target is to establish a comprehensive strategy for planning, sustainability, and decision-making [24]. Stakeholder participation in monitoring, according to Tegan and Aigbavboa [25], affects development project performance since it increases the likelihood of success. Stakeholder reporting and monitoring of development projects helps to spot issues and difficulties with the efforts. Organizational top management has an opportunity to influence and advance project success through stakeholder participation in monitoring. Therefore, having a supportive and capable stakeholder in project monitoring will help the companies because it will make the project run much more smoothly.

2.6 Concept of project delivery

Maintaining the project's final delivery within the allotted budget, schedule, and scope, as well as adhering to the necessary technical standards for quality, operations, functionality, safety, and environmental protection, is how this is accomplished [27]. In terms of delivering the project's goals, project delivery ensures that businesses maximize profitability and reduce the effects of risks and unforeseen events [28]. Cost, time, scope, and quality are the fundamental elements and criteria to gauge project delivery, according to Magasouba et al. [16], and they are also broadly acknowledged by project management past reviewers. For instance, project quality is the key need when determining whether clients will accept a project. The specification of quality requirements should be expressly and properly expressed in planning and contract documents to assure conformance and effectiveness of quality

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performance. In Nigeria, project success is typically determined by characteristics such as project cost, quality, user satisfaction, punctuality, and attaining the project's ultimate aim. These factors are frequently used to evaluate project delivery [16].

Project delivery refers to the entire process of carrying out and finishing projects, including the construction or refurbishment of a facility or building, among other things, for the purposes of this study. It necessitates meticulous planning, designing, and building procedures from numerous actors. To move forward, the project delivery system needs a variety of responsibilities, a set of standards, and a clear set of guidelines.

3. Methodology

The study deployed a survey research design to execute the relationship between stakeholders' involvement and the delivery of borehole water projects in the study area. The study area, Nigeria's West Senatorial District in Kogi State, is situated between latitudes 070 30'N and 80 50'N and longitudes 050 21'E and 70 00E. With Kwara and Niger States to the north, Okehi LGA to the east, Ogori/Magongo LGA to the south, and Ondo and Ekiti States to the west, the study area shares shared borders. Seven Local Government Areas, including Yagba West, Yagba East, Mopamuro, Ijumu, Kotokarfi, Lokoja, and Kabba/Banu LGAs, make up the research area. Farming and mining are the main economic activities in the study area, and these jobs account for the majority of local employment. Eight hundred and three (803) of borehole water projects were completed in the Kogi-West senatorial region during the course of the previous ten years (2012–2022) based on the Lower Niger River Basin Development Agency (LNRBDA, 2022) directory. The LNRBDA staff, community leaders, and community members dispersed across the 127 communities in the seven Local Government Areas that comprise the senatorial districts formed the study's target population. The total population of these senatorial districts is 906,244 (Nigerian Bureau of Statistics, 2021) and from sample size formular we obtained approximately 400 respondents. However, the study could rely on 234 questionnaire which were properly completed and returned representing a percentage of 58.5 per cent. The questionnaire was divided into sections covering the demographic information about the respondents and the involvement in the stages of project and delivery. The study used a 5-point Likert scale and the statistical package for social sciences (SPSS) and partial least square structural equation modelling (PLS-SEM) were used for the analyses. The stakeholder involvement is the independent variable with five sub-constructs, while borehole water project delivery is the dependent variable with three sub-constructs as reflected in Table 1.

4. Results and Discussion

The study was able to receive 267 questionnaire returned with only 234 of those copies returned useful, representing 87.6 per cent of the total returned and 58.5 per cent of total distributed. According to Moser and Kalton [29], a survey response can be considered significant if the rate is between 30 and 40%, which supports the adequacy of the response rate obtained for this study.

Table 1: Variables used for the Study

S/N	Construct	Sub-Construct	No. of items	Code
1	Stakeholder Involvement in the life cycle of borehole water projects	Initiation stage	9	bIS
2		Planning stage	5	bPS
3		Execution stage	5	bES
4		Monitoring and closure stage	5	bMS
5		Post-construction stage	6	bPCS

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6	Borehole water project delivery	Time of delivery	3	cTD
7		Budget	3	cBG
8		Stakeholder satisfaction	5	cSS

4.2 Data on the Respondents' Demographics

Table 2 revealed that respondents within the age group 40–49 made up the majority (39.7%) of the sample population, while respondents under the age of 30 formed the least representation (1.3%). Seventeen percent of respondents (17.1%) were between the ages of 30 and 39; 29.5% were between the ages of 50 and 59; and 12.4% were for ages of 59 and above. Since nearly all of the respondents (98.7%, according to the Table 2) were older than the middle-aged group, the information gathered in this research was credible enough as it composed of knowledgeable age groups rather than dependants. Table 2 also demonstrates that there were more men than women among the respondents, with 68.4% of the men and the rest of respondents being women. However, this won't impact the respondents' answers, eliminating any possibility of gender bias.

Table 2: Demographic information of the respondents

Age	Frequency	Percent
Less than 30	3	1.3
30-39	40	17.1
40-49	93	39.7
50-59	69	29.5
59 and above	29	12.4
Total	234	100.0
Sex	**Frequency**	**Percent**
Male	160	68.4
Female	74	31.6
Total	234	100.0
Level of Education	**Frequency**	**Percent**
SSCE	73	32.9
Diploma	38	17.1
BSC/HND	74	33.3
Post graduate	37	16.7
Total	234	100.0
Profession	**Frequency**	**Percent**
Civil servant	93	43.7
Farmer	25	11.7
Trader	44	20.7

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Self employed	46	21.6
Unemployed	5	2.3
Total	234	100.0
Categories of Stakeholder	Frequency	Percent
Lower Niger River Basin Development Authority (LNRBDA) Staff	79	33.9
Community Leader	102	43.8
Community member	53	22.3
Total	234	100.0

Additionally, the data on the level of education showed that 16.7% of respondents have postgraduate degrees, 33.3% have either a bachelor degree or higher national diploma, 17.1% have diploma certificates, and 32.9% have either SSCE certificate. As a result, it can be inferred that the respondents are well-informed and have the capacity to evaluate and process information in order to come to a decision that is consistent with the involvement of stakeholders and the economic analysis of the delivery of borehole water projects because at least 67.9% of them have educational certificates from tertiary institutions. 43.7% of respondents are civil workers, 11.7% are farmers, 20.7% are traders, 21.6% are self-employed, and 2.3% are unemployed, according to the results of their profession. Furthermore, Table 2 results presented stakeholder categories, revealing that community members comprised 22.3% of respondents, 43.8% were community leaders, and 33.9% worked for the Lower Niger River Basin Development Authority (LNRBDA) and reside in those communities.

4.3 Level of stakeholders' involvement in borehole water projects

There were 30 indicators derived from five constructs (Table 3), with 9 indicators from the Initiation stage (BIS1 to BIS9), 5 indicators from the Planning stage (BPS1 -BPS5), 5 indicators from the Execution stage (BES1-BES5), 5 indicators from the Monitoring and closure stage (BMS1-BMS5), and 6 indicators from the Post construction stage (BPCS1-BPCS6). The indicators of stakeholder involvement in the life cycle of borehole water projects in the study area are all considered important (having between high and moderate ratings) and can be used to track the delivery of borehole water projects, as shown in Table 3, where the mean response rating values range from a maximum of 4.009 (BES2) to a minimum of 2.654 (BPS4). The local ranking means the rating of the items within their sub-constructs, whereas the global ranking involves rating the indicators when the entire construct of stakeholder involvement in project life cycle is considered.

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Table 3: Mean and Standard Deviation for Stakeholders' Involvement Indicators

SN	Latent Variable	Item	Description	Mean	Std.	*Local Rank	**Global Rank
1	**Initiation Stage**	BIS1	Lower Niger River Basin Development Authority involves all project stakeholders during the initiation stage of water borehole projects in my community	3.154	0.769	1	14
2		BIS2	Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the initiation stage	2.962	0.770	2	18
3		BIS3	All the stakeholders get information on the borehole projects regularly during the initiation stage	2.838	0.727	6	24
4		BIS4	All stakeholders are consulted before making decisions on the borehole projects during the initiation stage	2.821	0.786	8	26
5		BIS5	All stakeholders are involved in defining and addressing water issues in my community	2.863	0.756	5	22
6		BIS6	All the stakeholders were involved in the discussion concerning the location of the borehole projects in my community	2.872	0.838	3	20
7		BIS7	Majority of the stakeholders agreed to location of the borehole projects	2.816	0.798	9	27
8		BIS8	The stakeholders have formal and informal discussions during the initiation stage regarding water use in my community	2.829	0.708	7	25

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9		BIS9	Each category of stakeholder conducts formal and informal discussions regarding water issues in my community	2.864	0.704	4	21
10	**Planning Stage**	BPS1	Lower Niger River Basin Development Authority involves all project stakeholders during the planning stage of water borehole projects in my community	2.896	0.767	1	19
11		BPS2	Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the planning stage	2.840	0.809	2	23
12		BPS3	All the stakeholders get information on the borehole projects regularly during the planning stage	2.659	0.758	4	29
13		BPS4	All stakeholders are consulted before making decisions on the borehole projects during the planning stage	2.654	0.761	5	30
14		BPS5	The stakeholders have formal and informal discussions during the planning stage regarding water use in my community	2.674	0.755	3	28
15	**Execution Stage**	BES1	Lower Niger River Basin Development Authority involves all project stakeholders during the execution stage of water borehole projects in my community	3.992	0.547	3	3
16		BES2	Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the execution stage	4.009	0.555	1	1

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17		BES3	All the stakeholders get information on the borehole projects regularly during the execution stage	4.000	0.606	2	2
18		BES4	All stakeholders are consulted before making decisions on the borehole projects during the execution stage	3.800	0.619	4	4
19		BES5	The stakeholders have formal and informal discussions during the execution stage regarding water use in my community	3.790	0.602	5	5
20	**Monitoring and Closure Stage**	BMS1	Lower Niger River Basin Development Authority involves all project stakeholders during the monitoring and closure stage of water borehole projects in my community	3.673	0.677	1	6
21							
22		BMS2	Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the monitoring and closure stage	3.673	0.677	1	6
23		BMS3	All the stakeholders get information on the borehole projects regularly during the monitoring and closure stage	3.462	0.667	3	9
24		BMS4	All stakeholders are consulted before making decisions on the borehole projects during the monitoring and closure stage	3.389	0.697	5	11
25		BMS5	The stakeholders have formal and informal discussions during the monitoring and closure stage regarding water use in my community	3.451	0.639	4	10

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26	**Post Construction Stage**	BPCS1	Lower Niger River Basin Development Authority involves all project stakeholders during the post-construction stage of water borehole projects in my community	3.315	0.747	2	12
27		BPCS2	Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the post-construction stage	3.077	0.724	4	15
28		BPCS3	All the stakeholders get information on the borehole projects regularly during the post-construction stage	3.000	0.745	6	17
29		BPCS4	All stakeholders are consulted before making decisions on the borehole projects during the post-construction stage	3.056	0.699	5	16
30		BPCS5	The stakeholders have formal and informal discussions during the post-construction stage regarding water use in my community	3.239	0.849	3	13
31		BPCS6	There are interactions between stakeholders within a category regarding water borehole projects management	3.474	0.992	1	8

*Global rank is the overall ranking when all the items were considered irrespective of the constructs.
**Local rank is the ranking of indicators/items at each latent variable level.

Note: BIS is Initiation Stage; BPS is Planning Stage; BES is Execution Stage; BMS is Monitoring and Closure Stage; and BPCS is Post Construction Stage.

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According to the findings, BES2 ("Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the execution stage"), with a mean of 4.009 and standard deviation 0.555 represents the highest level of stakeholder involvement in the delivery of borehole water projects, and BPS4 ("All stakeholders are consulted before making decisions on the borehole projects during the planning stage") with a mean of 2.654 and standard deviation 0.761, represents the least level of stakeholder involvement in the delivery of borehole water projects.

In general, Table 4 shows that the Execution stage (bES) has the highest stakeholder involvement in the delivery of borehole water projects with a mean of 3.918 and standard deviation 0.595, while the Planning stage (bPS) has the lowest involvement with a mean of 2.745 and standard deviation 0.777 in the study area. This indicates that most government projects are push rather than pull of projects from the communities which represent the end-users. This evident in the results obtained as both initiation and planning phases constitute the least involvement, it may also be a signal that the communities' involvement at these preliminary stages is without renumeration since they are at the conceptualisation and screening stages.

Table 4: Overall Statistics for Sub-constructs of Stakeholder Involvement

SN	Item	Description	Mean	Std.	Overall Rank
1	bES	Execution Stage	3.918	0.595	1
2	bMS	Monitoring and Closure Stage	3.498	0.672	2
3	bPCS	Post-Construction Stage	3.194	0.816	3
4	bIS	Initiation Stage	2.891	0.770	4
5	bPS	Planning Stage	2.745	0.777	5

4.3.2 Effects of stakeholders' involvement on borehole water projects delivery

The partial least squares approach to structural equation modelling was used to analyse the effects of sub-constructs of independent variable on the dependent latent variables. A measurement model that connects the manifest variables to their corresponding latent variables and a structural model that shows how various latent variables relate to one another make up the model two main assessments, in general [30]. Henseler et al. [31] describe a two-step procedure that starts with estimating the path coefficients of the structural model and ends with independently calculating the PLS model parameters by identifying the components of the measurement model [30]. These two sequences were carried out in this study to show that the indicators from each of the constructs are valid and reliable before the study could draw any conclusions regarding the relationships presented.

(a) Assessment of the measurement Model

The investigation followed the procedures presented by Hair et al. [30] for SmartPLS. Figure 1 shows how each item was modelled as a reflecting indication for the relevant component. Three constructs: budget (cBG), time delivery (cTD), and stakeholder satisfaction (cSS) were utilized in this study to measure project delivery as contained in [41]. They referred to the three constructs as the dominants measures that determine the output and success of a project, where in this case satisfaction represents the proxy for quality. Secondly, five constructs were employed to captured stakeholders' involvement at each stage of the water project: the Initiation stage (bIS), Planning stage (bPS), Execution stage ("bES"), Monitoring and closing stage (bMS), and Post construction stage (bPCS). The total collection of

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variables used to assess stakeholder involvement and delivery of borehole water projects in the research area consists of eight (8) latent variables and forty-one (41) manifest variables.

The measurement model evaluation tries to determine the validity and dependability of the manifest variables. Consistency is evaluated using individual manifest and construct reliability tests. The variables' validity is assessed using convergent and discriminant validity [30]. The individual manifest dependability can be used to explain the variation of an individual manifest in relation to a latent variable by determining the standardized outer loadings of the manifest variables. According to Hair et al. [30], a manifest variable with an outside loading of 0.7 or more is considered to be very good. While Henseler et al. [31] advised examining manifest variables with loading values between 0.4 and 0.7 before deletion, Hair et al. [30] assert that 0.4 should be the acceptable loading value. Manifest variables should be removed if their loading values are less than 0.5, which is the accepted threshold. If eliminating these signals resulted in an increase in the composite dependability value, remove or keep the variables. While Henseler et al. [31] recommendations are taken into consideration, an iterative technique is used to remove the manifest variables even if the cut-off value for outer loading in this study is 0.5.

The second metric for constructing reliability evaluations of internal consistency is composed of Cronbach's alpha (CA) and Composite Reliability (CR), both presented by Hair et al. [30]. According to Herath and Rao [32], both CA and CR have a threshold of 0.700, with higher values signifying a better level of reliability. While a suitable validity coefficient was anticipated for the other factor, some study areas agreed that an acceptable reliability range between 0.600 and 0.700 was required [30]. According to Table 5, the CA values vary from 0.794 to 0.925 and the CR values range from 0.878 to 0.937. These values, which are greater than the required threshold for both tests, demonstrate that the constructs easily link to reliabilities [30]. In Table 5 the findings of the average- variance extracted (AVE), convergent validity indicator, were also shown. The AVE determines how much measurement error-related variance a latent variable collects from related manifest variables. According to Hair et al. [30], latent variables should account for at least 50% of the variance from manifest variables. This implies that the AVE value of the construct should be more than 0.5. The number ranged from 0.590 to 0.772 and was above the recommended range of 0.5 as cited in [30]. The measuring approach further demonstrates the value of the indicators by evaluating the discriminant validity of the constructs. Discriminant validity is utilized to verify if a variable is pertinent to the designated latent variable when its cross-loading value in the defined latent variable is higher than that in any other constructs.

Table 5: Construct Reliability and Validity

	C A	C R	AVE
bES	0.870	0.906	0.659
bIS	0.925	0.934	0.613
bMS	0.916	0.937	0.749
bPCS	0.894	0.919	0.654
bPS	0.923	0.942	0.764
cBG	0.794	0.880	0.710
cSS	0.827	0.878	0.590
cTD	0.853	0.911	0.772

The developed model is repeatedly tested in accordance with the aforementioned criteria to weed out the weak manifest variables. This was established using their cross-loadings, the Fornell-Larcker criterion, and the Heterotrait-Monotrait (HTMT) evaluation of the correlation. The cross-loading results suggest that an indicator's outer loading on

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its latent construct (shown in Table 6) should have a greater significance than its cross-loadings on the other constructs in the model.

According to Table 6, which was reported in [33], the outer loadings of each indicator are larger on their particular construct as compared to their cross-loadings on any other constructs. This difference must be at least 0.10, as stated by Gefen and Straub [34]. The Fornell-Lacker criterion is an additional method for proving the discriminant validity. It was suggested that the squared inter-construct correlation between each construct's AVE and any other reflectively assessed constructs within the structural model should be used to compare each construct's AVEs [30]. Essentially, every model construct's shared variance should not be higher than their AVEs. The findings in Table 7 show that all constructs have been successfully evaluated according to the AVE suggestion. The study next assessed the HTMT in light of the AVE technique's limitations [30]. According to their advice, a value of 0.90 or above indicated a lack of discriminant validity [31]. Additionally, the value 1 should not be included in the HTMT confidence interval. Table 8 demonstrates that the research PLS model has met the HTMT requirement. The HTMT results end the measurement model quality standards for the reflectively organized constructs. The study constructs successfully met the necessary requirements.

Table 6: Cross Loading

	bES	bIS	bMS	bPCS	bPS	cBG	cSS	cTD
BES1	0.783	0.309	0.374	0.359	0.278	0.390	0.394	0.438
BES2	0.828	0.290	0.364	0.390	0.241	0.459	0.400	0.504
BES3	0.781	0.125	0.249	0.394	0.120	0.337	0.384	0.480
BES4	0.828	0.192	0.400	0.317	0.240	0.456	0.416	0.354
BES5	0.836	0.241	0.459	0.322	0.222	0.493	0.470	0.365
BIS1	0.242	0.778	0.298	0.347	0.419	0.217	0.071	0.240
BIS2	0.187	0.857	0.317	0.313	0.430	0.227	0.104	0.180
BIS3	0.163	0.779	0.375	0.233	0.426	0.137	-0.032	0.053
BIS4	0.106	0.783	0.349	0.267	0.507	0.160	0.064	0.066
BIS5	0.263	0.820	0.363	0.336	0.390	0.333	0.220	0.262
BIS6	0.152	0.716	0.414	0.248	0.456	0.132	0.068	-0.011
BIS7	0.213	0.741	0.502	0.378	0.466	0.167	-0.009	0.044
BIS8	0.241	0.791	0.471	0.408	0.470	0.196	0.116	0.161
BIS9	0.291	0.771	0.389	0.360	0.343	0.307	0.190	0.232
BMS1	0.447	0.432	0.849	0.327	0.371	0.327	0.247	0.162
BMS2	0.396	0.411	0.860	0.301	0.411	0.349	0.221	0.080
BMS3	0.393	0.407	0.900	0.303	0.390	0.364	0.215	0.121
BMS4	0.383	0.337	0.857	0.303	0.415	0.308	0.174	0.056
BMS5	0.361	0.448	0.860	0.356	0.424	0.383	0.277	0.181
BPCS1	0.319	0.299	0.374	0.790	0.192	0.212	0.228	0.298
BPCS2	0.344	0.446	0.443	0.800	0.353	0.340	0.200	0.355
BPCS3	0.330	0.324	0.351	0.841	0.284	0.199	0.185	0.275
BPCS4	0.345	0.363	0.343	0.821	0.366	0.215	0.165	0.264
BPCS5	0.373	0.400	0.247	0.802	0.250	0.239	0.146	0.366
BPCS6	0.400	0.217	0.065	0.795	0.087	0.227	0.181	0.446
BPS1	0.226	0.477	0.407	0.279	0.817	0.176	-0.003	0.031

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BPS2	0.174	0.458	0.389	0.323	0.834	0.156	-0.010	0.101
BPS3	0.223	0.443	0.427	0.241	0.925	0.216	0.013	0.044
BPS4	0.245	0.488	0.417	0.290	0.903	0.214	0.029	0.046
BPS5	0.300	0.456	0.400	0.244	0.888	0.219	0.081	0.136
CBG1	0.426	0.284	0.336	0.200	0.152	0.781	0.517	0.456
CBG2	0.481	0.234	0.374	0.299	0.189	0.894	0.542	0.566
CBG3	0.425	0.251	0.306	0.258	0.233	0.849	0.562	0.477
CSS1	0.337	0.113	0.179	0.104	0.041	0.467	0.760	0.349
CSS2	0.367	0.161	0.157	0.154	0.033	0.476	0.775	0.424
CSS3	0.330	0.172	0.371	0.150	0.123	0.560	0.775	0.298
CSS4	0.426	0.002	0.129	0.175	-0.070	0.427	0.782	0.422
CSS5	0.475	0.129	0.168	0.268	-0.013	0.511	0.748	0.566
CTD1	0.449	0.289	0.176	0.436	0.088	0.527	0.437	0.890
CTD2	0.491	0.211	0.138	0.332	0.135	0.553	0.529	0.888
CTD3	0.453	0.068	0.050	0.339	-0.013	0.486	0.475	0.858

Table 7: Fornell-Larcker Criterion

	bES	**bIS**	**bMS**	**bPCS**	**bPS**	**cBG**	**cSS**	**cTD**
bES	0.812							
bIS	0.287	0.783						
bMS	0.457	0.475	0.865					
bPCS	0.439	0.423	0.370	0.809				
bPS	0.272	0.528	0.465	0.310	0.874			
cBG	0.528	0.303	0.403	0.301	0.227	0.842		
cSS	0.509	0.153	0.266	0.229	0.030	0.641	0.768	
cTD	0.528	0.226	0.144	0.423	0.085	0.595	0.545	0.879

Table 8: Hetero-Monotrait Ratio (HTMT)

	Bes	**bIS**	**bMS**	**bPCS**	**bPS**	**cBG**	**cSS**	**cTD**
bES								
bIS	0.295							
bMS	0.510	0.527						
bPCS	0.494	0.448	0.413					
bPS	0.297	0.598	0.507	0.353				
cBG	0.633	0.310	0.469	0.348	0.262			
cSS	0.592	0.184	0.295	0.260	0.089	0.785		
cTD	0.613	0.218	0.150	0.468	0.109	0.719	0.639	

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The study next considered the structural models, which revealed details about the second goal of the study in terms of their hypothesis. The remaining goals for this study are presented in the next two sub-sections.

(b) Effects of Stakeholder involvement on the delivery borehole water projects

The section discussed the relationship between the stakeholder involvement and project delivery frameworks for borehole water. Following the verification of measurement quality, the structural model technique was carried out to include the collinearity, R-square or coefficient of determination, path coefficient, and F-square or effect sizes. With regard to the endogenous composite variables (cBG, cSS, and cTD), the values of the inner VIF are as revealed in Table 9. The outcome demonstrates that multicollinearity across the latent constructs is not a concern because all of them fall below the cutoff value of 5 [33]. Thus, we examined the PLS-algorithm (Figure 1) and bootstrapping (Figure 2) with 5000 resamples using SmartPLS to obtain the standard path coefficient t-statistics values, standard deviations, and P-values [30]. The path coefficients are shown in Table 10 for the following exogenous variables: Initiation (bIS), Planning (bPS), Execution ("bES"), Monitoring and Closure (bMS), Post Construction (bPCS) on each of the following endogenous variables Budget (cBG), Time Delivery (cTD), and Stakeholder Satisfaction (cSS).

Table 9: Variance Inflation Factor (VIF)

	cBG	cSS	Ctd
bES	1.416	1.416	1.416
bIS	1.642	1.642	1.642
bMS	1.619	1.619	1.619
bPCS	1.419	1.419	1.419
bPS	1.517	1.517	1.517

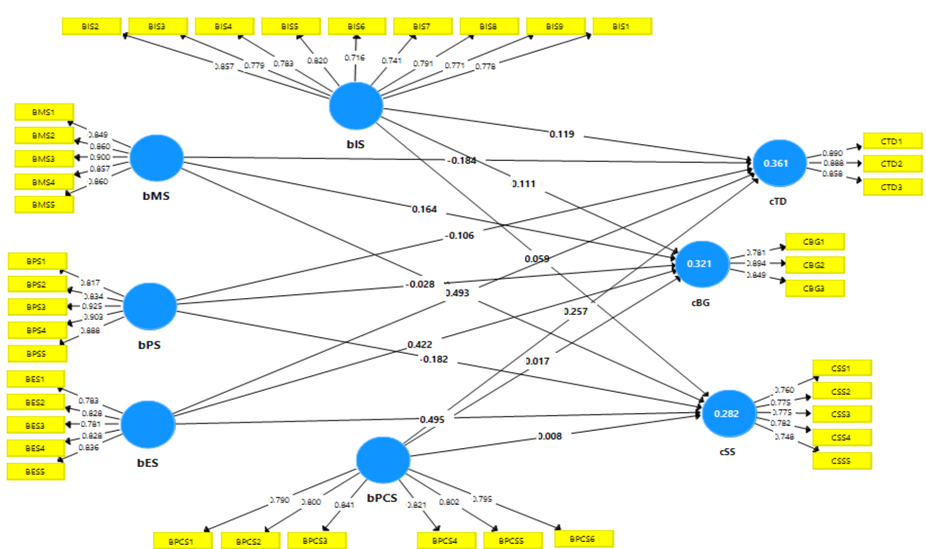

Figure 1: Algorithm of measurement model for all constructs

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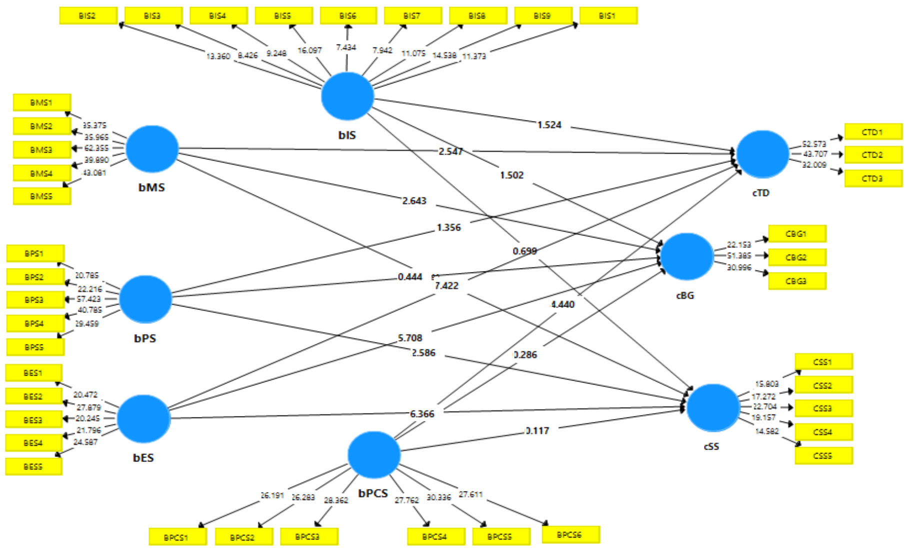

Figure 2: Bootstrapping for structural model

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Table 10: Structural Path Analysis

	Beta	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	2.5%	97.5%	Decision
bES -> cBG	0.422	0.074	5.708	**0.000**	0.253	0.551	Sig.
bES -> cSS	0.495	0.078	6.366	**0.000**	0.324	0.634	Sig.
bES -> cTD	0.493	0.066	7.422	**0.000**	0.347	0.609	Sig.
bIS -> cBG	0.111	0.074	1.502	**0.133**	-0.046	0.241	NS
bIS -> cSS	0.059	0.085	0.699	**0.485**	-0.123	0.214	NS
bIS -> cTD	0.119	0.078	1.524	**0.128**	-0.039	0.261	NS
bMS -> cBG	0.164	0.062	2.643	**0.008**	0.044	0.283	Sig.
bMS -> cSS	0.093	0.073	1.283	**0.200**	-0.048	0.233	NS
bMS -> cTD	-0.184	0.072	2.547	**0.011**	-0.327	-0.048	Sig.
bPCS->cBG	0.017	0.060	0.286	**0.775**	-0.104	0.133	NS
bPCS -> cSS	0.008	0.071	0.117	**0.907**	-0.133	0.143	NS
bPCS-> cTD	0.257	0.058	4.440	**0.000**	0.136	0.363	Sig.
bPS -> cBG	-0.028	0.063	0.444	**0.657**	-0.152	0.093	NS
bPS -> cSS	-0.182	0.070	2.586	**0.010**	-0.320	-0.047	Sig.
bPS -> cTD	-0.106	0.078	1.356	**0.175**	-0.265	0.039	NS

Note: *Sig.=Significant; NS=Not Significant

From Table 10, beta which represents the coefficient of regression for each exogenous construct, 'STDEV' shows the standard deviation. Both T Statistics and p values show the significance of the path, when T value is greater than 1.96, $p < 0.05$, and beta value fall between the values in 2.5% and 97.5% representing the boundary for the confidence interval, then the 'p values' can be accepted. Table 10 and Figure 2 show significant positive relationships between the variables bES and cBG (beta = 0.422, t = 5.708), bES and cSS (beta = 0.495, t = 6.366), bES and cTD (beta = 0.493, t = 7.422), bMS and cTD (beta = 0.257, t = 4.440), and significant negative relationships between the variables bMS and cTD (beta = -0.184, t = 2.547). There were no significant relationships between stakeholder involvement and the delivery of borehole water projects in the followings: bIS ->cBG; bIS ->cSS; bIS ->cTD; bMS -> cSS; bPCS -> cBG; bPCS -> cSS; bPS -> cBG; and bPS -> cTD.

Table 11 shows the values of the coefficient determination (R^2) as 0.321, 0.282, and 0.361; and the adjusted R^2 as 0.307, 0.267, and 0.347 for cBG, cSS, and cTD, respectively. Tehseen et al. [36], citing Cohen [35] study, advised that R^2 values of 0.26, 0.13, and 0.02 be regarded as substantial, moderate, and weak, respectively. Because the R^2 for this study is greater than 0.26, as stated, it can be regarded to be substantial. As a result, the exogenous constructs account for around 31%, 27%, and 35% of the variance in the endogenous constructs cBG, cSS, and cTD, respectively. The effect size (f-square) was also investigated in the study. The values of the f-square effect sizes 0.02, 0.15, and 0.35 are regarded as small, medium, and large significant impacts of the exogenous constructions, respectively, according to [35] suggested threshold. Table 12 illustrates that only bES has a large effect size (0.185, 0.242, and 0.269) on the endogenous constructs cBG, cSS, and cTD in accordance with this rule. Small effect sizes are shared by bIS, bMS, bPCS, and bPS on the endogenous variables.

Table 11: R Square and R Square Adjusted

	R Square	R Square Adjusted
cBG	0.321	0.307

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cSS	0.282	0.267
cTD	0.361	0.347

Table 12: Effect size

Construct	cBG	cSS	Ctd
bES	0.185	0.242	0.269
bIS	0.011	0.003	0.013
bMS	0.025	0.007	0.033
bPCS	0.000	0.000	0.073
bPS	0.001	0.030	0.012

The results of this study showed that bES (execution stage) in Figure 2 and Table 10 has the largest weight (structurally) and bES5 (the stakeholders have formal and informal discussions during the execution stage regarding water use in my community) with the largest significant path showed that the stakeholders at the execution stage have the dominant path coefficient (0.495, 0.493, and 0.422 with cSS, cTD, and cBG, respectively) when compared with others. It is further clear that BES5 (The stakeholders have formal and informal discussions during the execution stage regarding water use in my community), with 0.836 loadings, is the highest of the five items under the execution stage. It is not surprising that at this stage of execution, there are many schedule meetings for the project's success. Especially the aspect of logistics, procurement, and those that will prosecute the project is at this stage prominent. So, engaging in formal and informal meetings becomes imperative. It may also be understood that at this stage, those who want to secure contracts and the modalities become feasible at this phase, so also the local content derivatives are likely to become a matter for discussion which may warrant such formal and informal meetings. Following closely after the discussions were the BES2 (Lower Niger River Basin Development Authority considers opinions presented by each category of stakeholders during the execution stage) and BES4 (All stakeholders are consulted before making decisions on the borehole projects during the execution stage) with 0.828 loadings. This signals that the discussions at this stage are far more important than any other stages as the authority considers them for execution after their due consultations with the relevant stakeholders. We can also figure it out that execution stage had more impact on the stakeholder's satisfaction than other measures of performance as this may be linked to the movement of cash for project execution, the opportunities to strike deals and contracts, and the employment generation that the host communities tend to benefit may be the source of satisfaction.

It would be recall from Figure 1 and Table 11 that the coefficients of determination showed that cTD, time of delivery has 0.361, followed by cBG, budget with 0.321, and lastly, satisfaction which is a proxy for quality of the project with 0.282. It is evident that water is a source of life for many reasons, so the outcome of the results is not surprising as the delivery time becomes more important to the involvement of the stakeholder. They are not bothered much about the quality nor the cost of the project, but much attention is given to the time the project would be completed and ready for use.

Recall from Table 10, apart from the execution stage that has all its paths significant the monitoring and control stage also recorded two of its paths with significance at 95 percent confidence level. With the monitoring and control only the path with satisfaction remained insignificant, which is a testament that the stakeholders were not satisfied with the quality of water projects delivered to the communities or rather it is inconclusive. It is also noticed that the path with the time of delivery is negatively significant as this may results into slowing the pace of project execution if the quality is not good enough and the contractor has to rework, rescope or redesign due to lack of water with the boreholes. This is possible as the projects do not also consider the stakeholders their initial planning stages. The timely delivery may also suffer setbacks when the projects were wrongly located due to lack

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of initial engagement or involvement of the relevant stakeholders. There is also a negative relationship between the planning stage and stakeholder satisfaction in delivering borehole water projects in the study area. This arises when the planning does not conform to the quality of the products or services. Otherwise, two quality management issues may result, including quality of design and quality of conformance as cited in [42]. In this case the design quality, which may be liked to the planning stage outcome, and the conformance of quality a proxy for the reality of what was done in the borehole water projects, were in disagreement. Hence the noticeable opposite movement between the planning stage and the stakeholder satisfaction. Lastly, the importance of the initiation stage should not be undermined in providing infrastructure, such as water projects, to the people. There is none of the paths of initiation stage that was significant with the constructs of performance measures, a lot of improvement needs to go the way in sensitizing the stakeholders about the participation process and the importance of the preliminary stages on the project life cycle.

5.0 Conclusion

The study determined the level of stakeholder involvement in the execution of borehole water projects and empirically demonstrated the link between stakeholder involvement and the execution of borehole water projects in Nigeria's Kogi-West Senatorial District. This study has increased knowledge of the elements that could affect the implementation of borehole water projects and the involvement of stakeholders in an artificial setting. With a mean of 3.918 and a standard deviation of 0.595, the execution stage (bES) of this study had the highest level of stakeholder involvement in the delivery of borehole water projects, whereas the planning stage (bPS) had the lowest level of stakeholder involvement in the study area with a mean of 2.745 and a standard deviation of 0.777.

The findings indicate that the involvement of stakeholders is a significant predictor of borehole water project delivery in the study area and that stakeholders in the area recognized that their ability to formally and informally discuss during the execution stages has the greatest impact on the delivery of borehole water projects. This indicates that all parties involved in borehole water projects must come together to discuss and validate to make the execution stage successful. The results of this study have significant policy ramifications for the implementation of water projects and stakeholder involvement in Nigeria's Kogi-West Senatorial District. The author so advises that the level of participation of all pertinent stakeholders in the project initiation and planning phases of the borehole water project life cycle should be improved in light of the findings.

Involvement of Stakeholders and Borehole Water Projects Delivery in Nigeria's Kogi-West Senatorial District were the main subjects of this study. This means that the research's conclusions might not apply to other senatorial districts, regions, or zones within the nation. Therefore, the researcher proposes expanding the study's scope in follow-up research to include additional Nigerian senatorial districts, states, regions, or zones. This is due to the paucity of studies that have been done on the relationship between the involvement of stakeholders, and the execution of borehole water projects in Nigeria. Also, the modalities to improve participation at the initiation and planning stages require attention. Further studies should adopt the mixed method or rather investigate the outcomes of this work qualitatively.

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